California Fish and Game Commission Meeting Binder

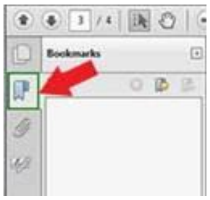
Part 2 (Items 11-29)
(Excluding Item 22)

April 17-18, 2024
San Jose

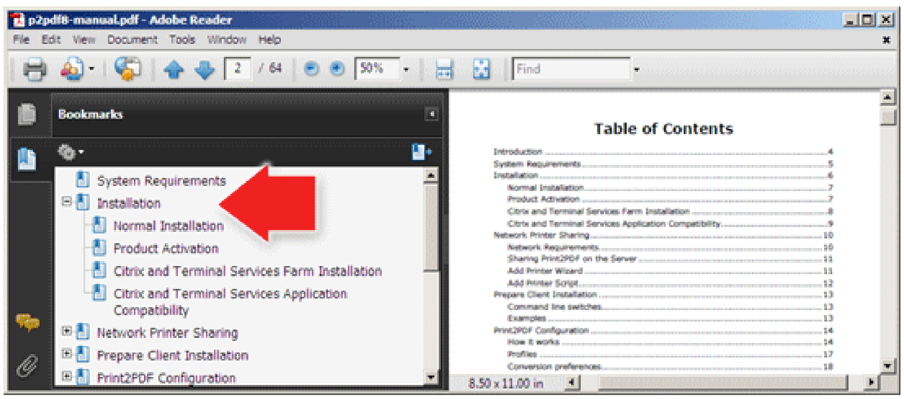
Easy Guide to Using the Binder

1. Download and open the binder document using your Adobe Acrobat program/app.

2. If a bookmark panel does not automatically appear on either the top or left side of the screen, click/tap on the “bookmark symbol” located near the top left-hand corner.



3. To make adjustments to the view, use the Page Display option in the View tab. You should see something like:



4. We suggest leaving open the bookmark panel to help you move efficiently among the staff summaries and numerous supporting documents in the binder. It’s helpful to think of these bookmarks as a table of contents that allows you to go to specific points in the binder without having to scroll through hundreds of pages.

5. You can resize the two panels by placing your cursor in the dark, vertical line  located between the panels and using a long click /tap to move in either direction.

6. You may also adjust the sizing of the documents by adjusting the sizing preferences located on the Page Display icons found in the top toolbar or in the View tab.

7. Upon locating a staff summary for an agenda item, notice that you can obtain more information by clicking/tapping on any item underlined in blue.

8. Return to the staff summary by simply clicking/tapping on the item in the bookmark panel.

9. Do not hesitate to contact staff if you have any questions or would like assistance.

Important Commission Meeting Procedures Information

Welcome to a Meeting of the California Fish and Game Commission

This year marks the 155th year of operation of the Commission in partnership with the California Department of Fish and Wildlife. Our goal is the preservation of our heritage and conservation of our natural resources through informed decision making; Commission meetings are vital in achieving that goal and we provide this information to be as effective and efficient toward that end. Welcome, and please let us know if you have any questions.

Persons with Disabilities

Persons with disabilities needing reasonable accommodation to participate in public meetings or other Commission activities are invited to contact the Department's Civil Rights Office (CRO) at civilrights@wildlife.ca.gov. Accommodation requests for facility and/or meeting accessibility and requests for American Sign Language interpreters should be submitted at least two weeks prior to the event. Requests for real-time captioners should be submitted at least four weeks prior to the event. These timeframes are to help ensure that the requested accommodation is met. If a request for an accommodation has been submitted but is no longer needed, please contact the CRO immediately.

Stay Informed

To receive meeting agendas and regulatory notices about those subjects of interest to you, visit the Commission's website, www.fgc.ca.gov, to sign up on our electronic mailing lists.

Submitting Written Comments

The public is encouraged to comment on any agenda item. Submit written comments by one of the following methods: E-mail to fgc@fgc.ca.gov; mail to California Fish and Game Commission, P.O. Box 944209, Sacramento, CA 94244-2090; deliver to California Fish and Game Commission, 715 P Street, 16th Floor, Sacramento, CA 95814 (you must call at least one business day in advance to arrange delivery); or hand-deliver to a Commission meeting. Materials provided to the Commission will be available to the general public.

Comment Deadlines

The ***Comment Deadline*** for this meeting is **5:00 p.m. on April 4, 2024**. Written comments received at the Commission office by this deadline will be made available to Commissioners prior to the meeting.

The ***Supplemental Comment Deadline*** for this meeting is **noon on April 12, 2024**. Comments received by this deadline will be made available to Commissioners at the meeting.

After these deadlines, written comments may be delivered in person to the meeting. Please bring 12 copies of written comments to the meeting and give them to the designated staff member just prior to speaking.

Petitions for Regulation Change

Any person requesting that the Commission adopt, amend, or repeal a regulation must complete and submit form FGC 1, *Petition to the California Fish and Game Commission for Regulation Change*, available at https://fgc.ca.gov/Regulations/Petition-for-Regulation-Change. To be received by the Commission at this meeting, petition forms must be delivered by the

Supplemental Comment Deadline (or delivered in person at the meeting during the regulation change petitions agenda item). Petitions received at this meeting will be scheduled for consideration at the next regularly scheduled business meeting, unless the petition is rejected under staff review pursuant to subsection 662(b).

Non-Regulatory Requests

All non-regulatory requests follow a two-meeting cycle to ensure proper review and thorough consideration of each item. All requests submitted by the ***Supplemental Comment Deadline*** (or heard during general public comment at the meeting) will be scheduled for receipt at this meeting and scheduled for consideration at the next regularly scheduled business meeting.

Speaking at the Meeting

To speak on an agenda item in-person**,** please complete a "speaker card" and provide it to the designated staff member before the agenda item is announced. Please complete one speaker card per item. Cards will be available near the entrance of the meeting room.

***To speak on an agenda item by webinar/phone**,* please "raise" your hand either through the Zoom function or by pressing *9 once on your phone when prompted at the beginning of the agenda item.

In-person and Webinar

1. In-person speakers will be identified in groups; please line up when your name is called. Speakers by webinar/phone will be identified by your Zoom display name or last three digits of your phone number; please pay attention to when your name or number is called.
2. When addressing the Commission, please give your name and the name of any organization you represent before providing your comments on the item under consideration.
3. If there are several speakers with the same concerns, please appoint a spokesperson and avoid repetitive testimony.
4. The presiding commissioner will allot between one and three minutes per speaker per agenda item, subject to the following exceptions:
    a. The presiding commissioner may allow up to five minutes to an individual speaker if a minimum of three individuals who are present when the agenda item is called have ceded their time to the designated spokesperson, and the individuals ceding time forfeit their right to speak to the agenda item.
    b. In-person participants ceding their time shall complete a speaker card and approach the staff table with the spokesperson so that staff may confirm the presence of those ceding their time. If you are participating via Zoom and ceding your time to another speaker, please notify the Commission at fgc@fgc.ca.gov prior to the start of the agenda item, including to whom you are ceding your time, and be present on Zoom during the agenda item.
    c. Individuals may receive advance approval for additional time to speak if such requests are received by email or delivery to the Commission office by the ***Supplemental Comment Deadline***. The president or designee will approve or deny the request no later than 5:00 p.m. two days prior to the meeting.

d. An individual requiring an interpreter is entitled to at least twice the allotted speaking time pursuant to Government Code Section 11125.7(c).
e. An individual may receive additional time to speak to an agenda item at the request of any commissioner.

Agenda items may be heard in any order and on either day pursuant to the discretion of the presiding commissioner.

Visual Presentations and Associated Materials

All electronic presentations must be submitted by the ***Supplemental Comment Deadline*** and approved by the Commission executive director before the meeting.

1. Electronic presentations must be provided by email to fgc@fgc.ca.gov. If the presentation file is too large to send via email, contact staff to identify an alternative method for submitting the file.
2. All electronic formats must be Windows PC compatible.
3. If presenting at the in-person meeting location, it is recommended that you bring a print copy of your presentation in case of technical difficulties.
4. If you have written materials to accompany your presentation, please bring 12 copies to the meeting and give them to the designated staff member just prior to presenting.

Overview of California Fish and Game Commission Meeting

- Welcome to a meeting of the California Fish and Game Commission. This is the 155th year of operation for the Commission, in partnership with the California Department of Fish and Wildlife. Both organizations originated from the Board of Fish Commissioners in 1870.

- The Commission's goals include preserving our wildlife heritage and conserving our natural resources through informed decision making. These meetings are vital in achieving those goals and, in that spirit, we provide the following information to be as effective and efficient toward that end.

- We are operating under the Bagley-Keene Open Meeting Act and these proceedings are being recorded and broadcast.

- In the unlikely event of an emergency, please note the location of the nearest emergency exits at your location.

- Items may be heard in any order pursuant to the determination of the presiding commissioner, which is President Murray today.

- The amount of time for each agenda item may be adjusted based on time available and the number of speakers.

- If you are here in the in-person location, speaker cards need to be filled out **legibly** and turned in to staff **before** we start the agenda item.

- If you are online or on the phone, you will receive additional instructions in a few minutes.

- We will ask how many speakers we have before taking public comment; please be prepared and listen closely for your name or phone number to be called.

- When you speak, please state your name and any affiliation. Please be respectful and note that disruptions will not be tolerated. Time is precious so please be concise.

- To receive meeting agendas and regulatory notices about those subjects of interest to you, please visit the Commission's website, www.fgc.ca.gov, and sign up for our electronic mailing lists.

- If you want the Commission to consider a regulation change, all petitions for regulation change must be submitted in writing on the authorized form, FGC 1, which is available on the Commission's website or directly from staff.

- For members of the public, if you have access to the Internet and are not planning to make public comment, you may listen to the meeting via our regular webcast by visiting the commission website at www.fgc.ca.gov (link is on right side).

- **Reminder!** Please silence your mobile devices and computers to avoid interruptions.

Introductions for California Fish and Game Commission Meeting

Commission Members

Samantha Murray	President (La Jolla)
Erika Zavaleta	Vice President (Santa Cruz)
Jacque Hostler-Carmesin	Member (McKinleyville)
Eric Sklar	Member (Saint Helena)
Darius W. Anderson	Member (Kenwood)

Commission Staff

Melissa Miller-Henson	Executive Director
David Thesell	Deputy Executive Director
Mike Yaun	Legal Counsel
Susan Ashcraft	Marine Advisor
Ari Cornman	Wildlife Advisor
Kimi Rogers	Environmental Scientist
Sherrie Fonbuena	Associate Governmental Program Analyst
Jenn Bacon	Associate Governmental Program Analyst
David Haug	Associate Governmental Program Analyst
Kelsey Leaird	Executive Analyst
Jessica Shaw	Seasonal Clerk
Devon Rossi	California Sea Grant State Fellow

California Department of Fish and Wildlife Staff

Chuck Bonham	Director
Chad Dibble	Deputy Director, Wildlife and Fisheries Division
Nathaniel Arnold	Acting Deputy Director and Chief, Law Enforcement Division
Josh Grover	Deputy Director, Ecosystem Conservation
Craig Shuman	Regional Manager, Marine Region
Scott Gardner	Branch Chief, Wildlife Branch
Sarah Mussulman	Acting Branch Chief, Fisheries Branch

I would also like to acknowledge special guests who are present:
(i.e., elected officials, including tribal chairpersons, and other special guest

____

Commissioners
Samantha Murray, President
La Jolla
Erika Zavaleta, Vice President
Santa Cruz
Jacque Hostler-Carmesin, Member
McKinleyville
Eric Sklar, Member
Saint Helena
Darius W. Anderson, Member
Kenwood

STATE OF CALIFORNIA
Gavin Newsom, Governor

Fish and Game Commission

Wildlife Heritage and Conservation
Since 1870

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fgc@fgc.ca.gov

www.fgc.ca.gov

Revised* Meeting Agenda
April 17-18, 2024

Participate in Person

San Jose Scottish Rite Center
2455 Masonic Drive
San Jose, CA 95125

or

Participate via Webinar/Phone

The meeting will be live streamed; visit www.fgc.ca.gov the day of the meeting to watch or listen. To provide public comment during the meeting, please join at the in-person location, via Zoom, or by telephone; you may join the webinar directly at https://us02web.zoom.us/j/85095560390. For complete instructions on how to join via Zoom or telephone, click here or visit fgc.ca.gov/meetings/2024.

*** This revised agenda is amended to clarify the scope of item 3, and add a sub-item to item 9(C).**

Notes: **(1)** **See important meeting deadlines and procedures, including written public comment deadlines, starting on page 11.**

(2) **Unless otherwise indicated, the California Department of Fish and Wildlife is identified as Department.**

(3) **All section and subsection references are to Title 14 of the California Code of Regulations, unless otherwise noted.**

Invitation: The Commission invites members of the public to join commissioners and staff for a field trip currently under development for Wednesday, April 17. Details will be available in advance of the Commission meeting. Members of the public are welcome to join but must provide their own transportation.

Day 1 – April 17, 2024; 10:00 AM

Call to Order and Roll Call to Establish a Quorum

1. Consider approving agenda and order of items

Discussion and Action Items

2. Commission executive director and Department reports

(A) ***Commission executive director's report***

I. Justice, equity, diversity and inclusion (JEDI) plan update

(B) ***Department director and Law Enforcement Division***

3. Commercial California halibut and white seabass set gill net

Consider authorizing publication of notice of intent to amend regulations regarding set gill net service interval, gear marking, and mesh depth in the commercial California halibut and white seabass set gill net fisheries.
(Add Section 174.1)

4. Fisheries logbook forms and fishing block charts

Consider authorizing publication of notice of intent to amend regulations regarding fisheries logbook forms and fishing block charts.
(Amend sections 120.7, 122, 165, 180, 190, 197 and 705.1)

5. Experimental Fishing Permit (EFP) Program Major Amendment Request

Consider approving a major amendment to the permit for EFP Application 2023-02 related to pop-up gear testing in the Dungeness and rock crab fisheries.
(Pursuant to Section 91)

6. Commission policies

Discuss potential amendments to five Commission policies currently under review.
(Pursuant to Section 703, California Fish and Game Code)

(A) ***Code of Conduct***

(B) ***Planting Fish in Youth Camps***

(C) ***Youth Fishing Programs***

(D) ***Research***

(E) ***Naming Installations***

7. Regulation change petitions (marine, wildlife, and inland fisheries)

(A) ***New petitions***

Receive new petitions for regulation change.
(Pursuant to Section 662)

Consideration of whether to grant, deny, or refer for additional review is expected to be scheduled for the June 19-20, 2024 meeting.

(B) ***Previously received petitions***

Consider whether to grant, deny, or refer for additional review, petitions for regulation change received at previous meetings.
(Pursuant to Section 662)

I. *Petition 2023-12*: Request to amend recreational groundfish regulations to require use of descending devices to protect groundfish stocks

II. *Petition 2024-01:* Request to amend sport fishing regulations to allow increased take and reduce size limitations of trout in Stony Creek in Colusa County

III. *Petition 2018-016(a):* Request to remove Hope Valley Wildlife Area from the Department Lands Pass Program

8. Non-regulatory requests from previous meetings (marine, wildlife and inland fisheries)

Consider and potentially act on requests for non-regulatory action received from members of the public at previous meetings.

9. Committee and Department reports

Receive updates on items of note since the previous Commission meeting from Commission committees and Department divisions.

(A) ***Tribal Committee***

Receive summary and consider approving recommendations from the April 16, 2024 Committee meeting. Discuss referred topics and consider revisions to topics and timing.

(B) ***Marine Resources Committee***

Receive summary and consider approving recommendations from the March 19, 2024 Committee meeting. Discuss referred topics and consider revisions to topics and timing.

(C) ***Department Marine Region***

I. Update on annual recreational ocean salmon and Pacific halibut regulations, and automatic conformance to federal regulations

II. Public discussion of action taken by the director of the Department in the recreational Dungeness crab fishery to temporarily prohibit the use of crab traps between the Sonoma/ Mendocino county line and Point Conception, Santa Barbara County (fishing zones 3, 4 and 5), and remain under a fleet advisory for all open fishing zones (1, 2 and 6), to protect marine life from entanglement risk. (Pursuant to Section 29.80)

General Public Comment

10. General public comment for items not on the agenda

Receive public comment regarding topics within the Commission’s authority that are not included on the agenda. Agenda item 28 on day 2 is an extension of this general public comment agenda item; as such, speakers may comment on one day or the other.

Note: The Commission may not discuss or take action on any matter raised during this item, except to decide whether to place the matter on the agenda of a future meeting (sections 11125 and 11125.7(a), Government Code).

Day 2 – April 18, 2024; 8:30 AM

Call to Order and Roll Call to Establish a Quorum

Consent Items

Note: Items on the consent calendar are expected to be routine and non-controversial. After public comment, the Commission will consider approving items on the consent calendar in a single vote without discussion. The presiding commissioner may choose to remove any item from the consent calendar and allow a separate discussion and potential action on that item in response to a request by a Commission member, staff, or an interested person.

11. Initial private lands wildlife habitat enhancement and management area (PLM) plan and licence (consent)
Consider approving initial PLM plan and 2024-2028 license for:
(Pursuant to Section 601)

(A) Merced
- I. Stevinson Ranch

12. Five- year PLM plans (consent)
Consider approving five-year PLM plans and 2024-2028 licenses for:
(Pursuant to Section 601)

(A) Del Norte
- I. Smith River PLM

(B) Humboldt
- I. Redwood House Ranch

(C) Mendocino
- I. Capistran Ranch
- II. Four Pines Ranch
- III. Schneider Ranch

(D) Monterey
- I. Gabilan Ranch

(E) San Luis Obispo
- I. Carrizo Ranch
- II. Herst Ranch

(F) Tehama
- I. Bell Ranch

13. Annual PLM plans (consent)
Consider approving annual PLM plans for:
(Pursuant to Section 601)

(A) Del Norte
- I. Alexandre Dairy

(B) Humboldt
- I. Big Lagoon
- II. Diamond C Outfitters
- III. Hunter Ranch
- IV. Klamath PLM
- V. Rainbow Ridge PLM
- VI. Stover Ranch
- VII. Wiggins Ranch

(C) Humboldt and Trinity
- I. Wilkinson Hunting Club

(D) Kern and San Luis Obispo
- I. Temblor Ranch

(E) Mendocino
- I. Ackerman-Southy Daughtery WMA
- II. Amann Ranch
- III. Antler Hill Ranch
- IV. Bridges Ranch
- V. Carley Ranch
- VI. Christensen Ranch
- VII. Eden Velley Ranch
- VIII. Miller-Eriksen Ranch
- IX. R-R Ranch
- X. Seven Springs Ranch
- XI. Shamrock Ranch
- XII. Six Point Ranch
- XIII. Spring Valley Ranch
- XIV. Summer Camp Ranch

(F) Merced
- I. DeFrancesco / Eaton Ranch

(G) Monterey
- I. Alexander Ranch
- II. Bardin Ranch
- III. Hartnell Ranch
- IV. Indian Valley Cattle Company – Lombardo Ranch
- V. Peachtree Ranch
- VI. San Bartolome Ranch
- VII. Sky Rose Ranch

(H) Monterey and San Benito
- I. Morisoli Ranch

(I) Monterey and San Luis Obispo
- I. Camp 5 Outfitters - Roth Ranch

(J) San Benito
- I. Lewis Ranch
- II. Lone Ranch
- III. Pine Mountain Ranch
- IV. Rancho Le Cuesta
- V. Trinchero Ranch

(K) San Joaquin
- I. Corral Hollow Ranch

(L) San Luis Obispo
- I. Avenales Ranch
- II. Carnaza Ranch
- III. Chimney Rock Ranch
- IV. Clark & White Ranch
- V. D-Rafter L Ranch

(M) Santa Clara
- I. Coon Creek Ranch

(N) Shasta
- I. Stackhouse Ranch

(O) Stanislaus
- I. Rooster Comb Ranch

(P) Tehama
- I. 3D Ranch
- II. R Wild Horse Ranch

(Q) Trinity
- I. Stewart Ranch
- II. Travis Ranch

14. Readoption of white sturgeon emergency regulation (consent)
Consider adopting a 90-day extension of emergency regulations concerning recreational take of white sturgeon (*Acipenser transmontanus*) to support recovery populations and to track fishing pressure and success.
(Amend sections 5.79, 5.80, 27.90 and 27.92)

15. Greater sage-grouse (consent)
Consider approving the Department’s request for a six-month extension to deliver the one-year status review report on the petition to list greater sage-grouse (*Centrocercus urophasianus*) as threatened or endangered under CESA.
(Pursuant to Section 2074.6 Fish and Game Code)

Discussion and Action Items

16. Inland sport fishing

Consider authorizing publication of notice of intent to amend regulations for freshwater sport fishing bag limits, gear, and low-flow information.
(Amend sections 2.30, 5.50, 7.50, 8.00, and 703)

17. White sturgeon sport fishing regular rulemaking

Consider authorizing publication of notice of intent to amend regulations through a regular rulemaking to adopt the emergency rules for the recreational take of white sturgeon.
(Amend sections 5.79, 5.80, 27.90 and 27.92)

18. Central Valley sport fishing

Discuss proposed amendments to Central Valley sport fishing regulations.
(Amend subsections 7.40(b)(4), (43), (66) and (80))

19. Klamath River Basin sport fishing

Discuss proposed amendments to Klamath River Basin sport fishing regulations.
(Amend subsection 7.40(b)(50))

20. Waterfowl hunting

Consider adopting proposed amendments to waterfowl hunting regulations and taking final action under the California Environmental Quality Act (CEQA).
(Amend Section 502)

21. Mammal hunting

Consider adopting proposed amendments to mammal hunting regulations and taking final action under CEQA).
(Amend sections 362, 363, 364, 364.1, 554, 555 and 708.14 and add Section 555.1)

22. Southern California steelhead

Consider the petition, Department’s status review report, and comments received to determine whether listing southern California steelhead (*Oncorhynchus mykiss*) as endangered under the California Endangered Species Act (CESA) is warranted.
(Pursuant to sections 2075 and 2075.5, Fish and Game Code)

23. Mohave desert tortoise

Consider the petition, Department’s status review report, and comments received to determine whether changing the status of Mohave desert tortoise (also known as Agassiz’s desert tortoise) (*Gopherus agassizii*) from threatened to endangered under CESA is warranted.
(Pursuant to sections 2075 and 2075.5, Fish and Game Code)

24. Ballona Wetlands Ecological Reserve

Ballona Wetlands Ecological Reserve consistency determination as to whether the visitor uses associated with the parking lots in Area A and the baseball fields in Area C are compatible with the purposes of the reserve.

25. California grizzly bear

Recognize the 100-year anniversary of the extirpation of California's state animal, grizzly bear (*Ursus arctos californicus*).

26. Committee and Department reports

Receive updates on items of note since the previous Commission meeting from Commission committees and Department divisions.

(A) ***Wildlife Resources Committee***

Discuss referred topics and consider revisions to topics and timing. Consider approving draft agenda topics and changing the meeting location for the next committee meeting on May 16, 2024.

(B) ***Department Wildlife and Fisheries Division, and Department Ecosystem Conservation Division***

27. Commission administrative items

(A) ***Legislation***

Receive updates on legislative activity and consider providing direction to staff on potential actions.

(B) ***Rulemaking timetable updates***

Review and potentially approve changes to the perpetual timetable for anticipated regulatory actions.

(C) ***Future meetings and new business – May 15, 2024 and June 19-20, 2024***

Review logistics and approve draft agenda items for the next Commission meetings, consider any changes to approved meeting dates or locations, or introduce new business for a future meeting agenda.

General Public Comment

28. General public comment for items not on the agenda

Receive public comment regarding topics within the Commission's authority that are not included on the agenda. This item is an extension of the "general public comment for items not on the agenda (Agenda Item 9); as such, speakers may comment on one day or the other.

Note: The Commission may not discuss or take action on any matter raised during this item, except to decide whether to place the matter on the agenda of a future meeting (sections 11125 and 11125.7(a), Government Code).

Adjourn

Public Receipt of Documents

This section of the agenda highlights reports or other documents received by the Commission since the previous meeting. Any Commission discussion or action on these documents will be noticed and placed on the agenda of a future meeting. Since February 15, 2024, the Commission received two documents:

1. The Department's evaluation report on the petition to list white sturgeon (*Acipenser transmontanus*) as threatened under California Endangered Species Act. Additional information about the petition is available at https://fgc.ca.gov/CESA#ws.
2. A petition from the Center for Biological Diversity, Defenders of Wildlife, Burrowing Owl Preservation Society, Santa Clara Valley Audubon Society, Urban Bird Foundation, Central Valley Bird Club, and San Bernardino Valley Audubon Society to list western burrowing owl (*Athene cunicularia hypugaea*) as threatened or endangered under the California Endangered Species Act. The petition is available at https://fgc.ca.gov/CESA#wbo.

Executive Session

(Not open to the public)

At a convenient time during the regular agenda of the meeting listed above, the Commission will recess from the public portion of the agenda and conduct a closed session on the agenda items below. The Commission is authorized to discuss these matters in a closed session pursuant to Government Code Section 11126, subdivisions (a)(1), (c)(3), and (e)(1), and Fish and Game Code Section 309. After closed session, the Commission will reconvene in public session, which may include announcements about actions taken during closed session.

(A) Pending litigation to which the Commission is a Party

- I. The Ballona Wetlands Land Trust v. California Fish and Game Commission (Ballona Wetlands Ecological Reserve petition for regulation change)
- II. Fall River Conservancy and California Trout v. California Fish and Game Commission and California Department of Fish and Wildlife (California Environmental Quality Act determination regarding amendments to inland trout regulations)
- III. United Water Conservation District v. California Fish and Game Commission (southern California steelhead "may be warranted" determination under the California Endangered Species Act and regulation authorizing limited take under Fish and Game Code Section 2084)

(B) Possible litigation involving the Commission

(C) Staffing

(D) Deliberation and action on license and permit items

- I. Consider the proposed decision in FGC Case No. 21ALJ02-FGC, regarding revocation of Attila Molnar's application to renew a restricted species exhibiting permit.

California Fish and Game Commission
Meeting Schedule

Note: As meeting dates and locations can change, please visit www.fgc.ca.gov for the most current list of meeting dates and locations. All Commission meetings will include a webinar/teleconference option for attendance and every effort will be made to ensure that committee meetings include the same.

Meeting Date	Commission Meeting	Committee Meeting
May 15, 2024	**Teleconference** Trinidad, Fairfield, Sacramento, Santa Cruz and La Jolla (see website for facility details)	
May 16, 2024		**Wildlife Resources** Yreka
June 19-20, 2024	Mammoth Lakes	
July 18, 2024		**Marine Resources** Santa Rosa area
August 13, 2024		**Tribal** River Lodge Conference Center 1800 Riverwalk Drive Fortuna, CA 95540
August 14-15, 2024	River Lodge Conference Center 1800 Riverwalk Drive Fortuna, CA 95540	
September 12, 2024		**Wildlife Resources** San Jose
October 9-10, 2024	California Natural Resources Headquarters Building Auditorium, 1st Floor 715 P Street Sacramento, CA 95814	
November 7, 2024		**Marine Resources** California Natural Resources Headquarters Building 715 P Street, 2nd Floor Sacramento, CA 95814
December 10, 2024		**Tribal** San Diego area
December 11-12, 2024	San Diego area	

Other Meetings of Interest

Association of Fish and Wildlife Agencies

- September 22-25, 2024 – Madison, WI

Pacific Fishery Management Council

- June 6-13, 2024 – San Diego, CA
- September 18-24, 2024 – Spokane, WA
- November 13-19, 2024 – Costa Mesa, CA
- March 5-11, 2025 – Vancouver, WA
- April 9-15, 2025 – San Jose, CA

Pacific Flyway Council

- August 30, 2024 – Jackson, WY

Western Association of Fish and Wildlife Agencies

- June 3-7, 2024 – Stevenson, WA

Wildlife Conservation Board

- May 23, 2024 – Sacramento, CA
- August 22, 2024 – Sacramento, CA
- November 21, 2024 – Sacramento, CA

11. Initial Private Lands Wildlife Habitat Enhancement and Management Area (PLM) Plan and License (consent)

Today's Item **Information ☐** **Action ☒**

Consider approving initial PLM plan and 2024-2028 license.

Summary of Previous/Future Actions (N/A)

Background

California Fish and Game Code sections 3400-3408 and Title 14 Section 601 prescribe conditions for a PLM program that provides incentives for landholders to manage their property for the benefit of fish and wildlife in exchange for access to increased recreational opportunities, such as hunting tags or extended seasons ("harvest program"). In return for a harvest program, the landholder must prepare a biologically-sound wildlife management plan and complete specific wildlife habitat improvements on the PLM property.

The Department has reviewed the initial management plan for one new property in one county, consisting of approximately 4,988 acres.

The Department recommends that the Commission approve the wildlife management plan, license application, and 2024-2028 harvest program under conditions specified in Exhibit 2. Habitat improvements accomplished under this plan will enhance and maintain wildlife resources on and around the PLM area. The goals and objectives stated in the management plan are compatible with Department management plans for appropriate species in this area and the Department finds it is in compliance with Commission regulations and policies for PLM licenses and plans.

At the June 2024 Commission meeting, the Department will give a presentation on its PLM Program, as requested by the Commission.

Significant Public Comments (N/A)

Recommendation

Commission staff: Approve the initial PLM license for the 2024-2028 seasons and associated PLM management plan with proposed season, harvest, and habitat improvements under a motion to adopt the consent calendar.

Department: Approve the initial PLM license, and management plan and proposed season, harvest, and habitat improvements under the conditions specified in Exhibit 2.

Exhibits

1. Department memo, received March 29, 2024
2. *PLM Area License Initial Management Plans, 2024-2028, Proposed Seasons, Harvests, and Habitat Improvements*, received March 29, 2024

Motion

Moved by __________ and seconded by __________ that the Commission adopts the staff recommendations for items 11-15 on the consent calendar.

Staff Summary for April 17-18, 2024

12. Five-Year Private Lands Wildlife Habitat Enhancement and Management Area (PLM) Plans and Licenses (consent)

Today's Item **Information ☐** **Action ☒**

Consider approving five-year PLM plans and 2024-2028 licenses.

Summary of Previous/Future Actions (N/A)

Background

California Fish and Game Code sections 3400-3408 and Title 14 Section 601 prescribe conditions for a PLM program that provides incentives for landholders to manage their property for the benefit of fish and wildlife in exchange for access to increased recreational opportunities, such as hunting tags or extended seasons ("harvest program"). In return for a harvest program, the landholder must prepare a biologically-sound wildlife management plan and complete specific wildlife habitat improvements on the PLM property.

The Department has reviewed the five-year renewals for nine properties in six counties, consisting of approximately 112,818 acres.

The Department recommends that the Commission approve the five-year wildlife management plan renewals, license renewal applications, and each 2024-2028 harvest program under conditions specified in Exhibit 2. Habitat improvements accomplished under these plans will enhance and maintain wildlife resources on and around the PLM areas. The goals and objectives stated in the management plans are compatible with Department management plans for appropriate species in these areas and the Department finds them compliant with Commission regulations and policies for PLM licenses and plans.

At the June 2024 Commission meeting, the Department will give a presentation on its PLM Program, as requested by the Commission.

Significant Public Comments (N/A)

Recommendation

Commission staff: Approve five-year PLM license renewals for 2024-2028, and proposed seasons, harvests and habitat improvements for 2024-2028 as recommended by the Department for nine properties, under a motion to adopt the consent calendar.

Department: Approve five-year PLM license renewals for nine properties, under the conditions specified in Exhibit 2.

Exhibits

1. Department memo, received March 29, 2024
2. *PLM Area License 5-Year Renewals, 2024-2028, Proposed Seasons, Harvests, and Habitat Improvements*, received March 29, 2024

Motion

Moved by __________ and seconded by __________ that the Commission adopts the staff recommendations for items 11-15 on the consent calendar.

Staff Summary for April 17-18, 2024

13. Annual Private Lands Wildlife Habitat Enhancement and Management Area (PLM) Plans and Licenses (consent)

Today's Item **Information ☐** **Action ☒**

Consider approving annual PLM plans for 2024-25.

Summary of Previous/Future Actions (N/A)

Background

California Fish and Game Code sections 3400-3408 and Title 14 Section 601 prescribe conditions for a PLM program that provides incentives for landholders to manage their property for the benefit of fish and wildlife in exchange for access to increased recreational opportunities, such as hunting tags or extended seasons ("harvest program"). In return for a harvest program, the landholder must prepare a biologically-sound wildlife management plan and complete specific wildlife habitat improvements on the PLM property.

The Department has reviewed the annual reports for 52 properties in 14 counties, consisting of approximately 550,079 acres.

The Department recommends that the Commission approve the wildlife management plans, license renewal applications, and each 2024-25 harvest program under conditions specified in Exhibit 2. Habitat improvements accomplished under these plans will enhance and maintain wildlife resources on and around the PLM areas. The goals and objectives stated in the management plans are compatible with Department management plans for appropriate species in these areas and the Department finds them compliant with Commission regulations and policies for PLM licenses and plans.

At the June 2024 Commission meeting, the Department will give a presentation on its PLM Program, as requested by the Commission.

Significant Public Comments (N/A)

Recommendation

Commission staff: Approve continuing PLM licenses and approve the annual seasons, harvests, and habitat improvements for 2024-2025 as recommended by the Department for 52 properties, under a motion to adopt the consent calendar.

Department: Approve continuing the PLM licenses and approve the annual seasons, harvests, and habitat improvements for 52 properties, under the conditions specified in Exhibit 2.

Exhibits

1. Department memo, received March 29, 2024
2. *PLM Area License Annual Renewals, 2024-2025, Proposed Seasons, Harvests, and Habitat Improvements*, received March 29, 2024

Motion

Moved by __________ and seconded by __________ that the Commission adopts the staff recommendations for items 11-15 on the consent calendar.

14. Readoption of White Sturgeon Emergency Regulation (consent)

Today's Item **Information ☐** **Action ☒**

Consider adopting a 90-day extension of emergency regulations concerning recreational take of white sturgeon (*Acipenser transmontanus*) to support recovery of populations and to track fishing pressure and success.

Summary of Previous/Future Actions

- Adoption hearing for emergency regulations concerning recreational take of white sturgeon — October 11-12, 2023
- **Today consider adopting first 90-day extension of emergency regulations concerning recreational take of white sturgeon** — **April 17-18, 2024**

Background

At its October 2023 meeting, the Commission adopted emergency regulations to amend recreational take of white sturgeon to support recovery of populations and to track fishing pressure and success (see Exhibit 1 for detailed background information). The Commission adopted an emergency regulation that implemented four concepts:

1. Reduced the white sturgeon slot limit from 40 to 60 inches to 42 to 48 inches.
2. Reduced the number of fish harvested to one fish per report card per year but allowed anglers to continue catch and release fishing after they have harvested one fish.
3. Applied a seasonal closure in upper spawning grounds only from January through May.
4. Reduced the vessel limit to two fish per day per boat.

The emergency regulation went into effect on November 16, 2023 for a period of 180 days; if not extended by the Commission, the emergency regulation will expire May 15, 2024.

For today's meeting, the Department has provided a draft finding of emergency and a draft statement of proposed emergency regulatory action for the Commission to consider in re-adopting the emergency regulation (exhibits 2 and 3).

Significant Public Comments (N/A)

Recommendation

Commission staff: Under a motion to adopt the consent calendar, determine, pursuant to Section 399 of the California Fish and Game Code, that adopting these regulation changes is necessary for the immediate conservation, preservation, and protection of birds, mammals, fish, amphibians, or reptiles, including, but not limited to, their nests or eggs. Further determine, pursuant to Section 11346.1 of the California Government Code, that an emergency situation exists and that the proposed regulation changes are necessary to address the emergency. Readopt for an additional 90 days the emergency regulations amending sections 5.79, 5.80, 27.90 and 27.92, related to the recreational take of white sturgeon, as recommended by the Department.

Department: Adopt a 90-day extension of the emergency regulations amending sections 5.79, 5.80, 27.90 and 27.92.

Exhibits

1. Staff summary from October 11-12, 2024 (*for background purposes only*)
2. Department transmittal memo, received March 19, 2024
3. Draft emergency statement
4. Draft proposed regulatory language
5. Economic and fiscal impact statement (STD. 399) and addendum

Motion

Moved by ___________ and seconded by __________ that the Commission adopts the staff recommendations for items 11 through 15 on the consent calendar.

Staff Summary for April 17-18, 2024

15. Greater Sage-Grouse (consent)

Today's Item **Information ☐** **Action ☒**

Consider approving the Department's request for a six-month extension to deliver the one-year status review report on the petition to list greater sage-grouse (*Centrocercus urophasianus*) as threatened or endangered under CESA.

Summary of Previous/Future Actions

• Received petition	November 21, 2022
• Transmitted petition to Department	December 1, 2022
• Published notice of receipt of petition	January 6, 2023
• Received Department's 90-day evaluation report	April 19-20, 2023
• Determined petitioned action may be warranted, initiating Department's one-year status review	June 14-15, 2023
• **Today's consider Department's request for six-month extension**	**April 17-18, 2024**

Background

On November 21, 2022, the Commission received a petition from the Center for Biological Diversity requesting the Commission list greater sage-grouse as threatened or endangered under CESA.

At its June 2023 meeting, the Commission determined that the petition contains sufficient information to indicate that the petitioned action may be warranted. The Commission published a notice of its determination and of greater sage-grouse's protected, candidate species status on June 30, 2023. Pursuant to California Fish and Game Code Section 2074.6, the Department has one year from the date of notice to complete a status review, unless the Commission grants an extension of time.

Today the Commission will consider a request by the Department for a six-month extension to further analyze and evaluate the available science, to undergo the peer review process, and to complete its status review (Exhibit 1). The Commission must receive the Department's status review report before the Commission can make a final listing decision.

Significant Public Comments

1. The Lassen County Board of Supervisors urges the Commission to not list greater sage-grouse under CESA. The board states that conservation efforts are planned for the next few years and lists several conservation accomplishments from previous years, such as slowing juniper encroachment, enhancing spring ecosystems, riparian restoration, invasive grass control, and planting sagebrush. The board states that CESA listings work against collaborative efforts, as many partners will be reluctant to participate in conservation processes with a CESA-listed species, and current conservation work in Lassen County will be significantly reduced or cease. Lastly, the board indicates that

CESA restrictions could result in the loss of jobs, revenue and tax base for Californians. (Exhibit 2)

2. The Inyo County Board of Supervisors provides a bi-state, 10-year accomplishment report for sage-grouse that illustrates the increase in bi-state greater sage-grouse populations. The board states that the results of the study show listing sage-grouse as endangered is not warranted. (Exhibit 3)

Recommendation

Commission staff: Approve the Department's request for a six-month extension to complete the status review report for greater sage-grouse under a motion to adopt the consent calendar.

Department: Approve request for a six-month extension to complete the status review report for greater sage-grouse.

Exhibits

1. Department memo, received March 26, 2024
2. Letter from County of Lassen Board of Supervisors, received April 2, 2024
3. Letter from Inyo County Board of Supervisors, received April 4, 2024

Motion

Moved by _____________ and seconded by ______________, that the Commission adopts the staff recommendations for items 11 through 15 on the consent calendar.

16. Inland sport fishing

Today's Item **Information ☐** **Action ☒**

Consider authorizing publication of notice of intent to amend regulations for freshwater sport fishing bag limits, gear, and low-flow information.

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) vetting — January 16, 2024; WRC
- **Notice hearing — April 17-18, 2024**
- Discussion hearing — June 19-20, 2024
- Adoption hearing — August 14-15, 2024

Background

The Department recommends the Commission amend inland sport fishing regulations to align with current fisheries management goals and objectives, improve angling opportunities, correct errors and inaccuracies in existing regulations, and improve regulatory enforcement (Exhibit 1). The proposed amendments include:

- Section 2.30: Include American shad as a species that may be taken by spearfishing in the Valley District and clarify spearfishing boundaries. These amendments incorporate regulatory changes proposed in regulation change petition 2021-028, granted by the Commission at its December 2023 meeting.
- Section 5.00: Reduce the 15-inch total length minimum size limit for black bass at Castaic Lake (Los Angeles County) to the statewide standard 12-inch total length minimum size limit.
- Section 7.50: Correct the fishing boundary for Deep Creek (San Bernardino County).
- Section 7.50: Amend trout regulations for Parker Lake (Mono County) to year-round angling, a two-fish bag limit, a 14-inch minimum size limit, and restrict gear to artificial lures only. Since Parker Lake is currently subject to the General Statewide Regulations for trout, the proposed amendments will require adding it to Section 7.50, Special Fishing Regulations for Trout.
- Section 7.50: Reduce the daily bag limit from five fish per day to catch-and-release fishing only on Willow Creek (Alpine County) upstream from the confluence with the West Fork Carson River to the main tributary of Willow Creek, and restrict gear to artificial lures with barbless hooks only. Since Willow Creek is currently subject to the General Statewide Regulations for trout, the proposed amendments will require adding it to Section 7.50, Special Fishing Regulations for Trout. These amendments incorporate regulatory changes proposed in regulation change petition 2022-13, granted in part by the Commission at its February 2024 meeting.
- Section 8.00: Remove the three different phone lines that fishers currently rely on for low-flow restriction information and replace them with a single department webpage URL.
- Section 703: Update the mailing address for the Department's Fisheries Branch.

Visual aids and further details and rationale regarding all components of the proposed changes can be found in the draft initial statement of reasons (Exhibit 2).

Significant Public Comments (N/A)

Recommendation

Commission staff: Authorize publication of a notice of intent to amend regulations related to inland sport fishing, as recommended by the Department and supported by the Wildlife Resources Committee.

Committee: Support the proposed changes related to inland sport fishing.

Department: Authorize publication of a notice of intent to amend regulations as detailed in the draft initial statement of reasons.

Exhibits

1. Department memo, received March 26, 2024
2. Draft initial statement of reasons
3. Draft proposed regulatory language
4. Draft economic and fiscal impact statement (STD. 399) and addendum
5. Department presentation

Motion

Moved by ___________ and seconded by ___________ that the Commission authorizes publication of a notice of its intent to amend sections 2.30, 5.00, 7.50, 8.00 and 703 related to inland sport fishing.

Staff Summary for April 17-18, 2024

17. White Sturgeon Sport Fishing Regular Rulemaking

Today's Item **Information ☐** **Action ☒**

Consider authorizing publication of notice of intent to amend regulations through a regular rulemaking to adopt the emergency rules for the recreational take of white sturgeon.

Summary of Previous/Future Actions

• Adoption hearing for *emergency regulations* regarding recreational take of white sturgeon	October 11-12, 2023
• Wildlife Resources Committee (WRC) discussed a regular rulemaking regarding recreational take of *white sturgeon in 2025*	January 16, 2024; WRC
• Today's adoption hearing for first 90-day extension of *emergency regulations*	April 17-18, 2024
• **Today's notice hearing for *regular rulemaking* regarding recreational take of white sturgeon**	**April 17-18, 2024**
• Discussion hearing for *regular rulemaking*	June 19-20, 2024
• Notice hearing for rulemaking concerning recreational take of *white sturgeon in 2025*	June 19-20, 2024
• Adoption hearing for *regular rulemaking*	August 14-15, 2024
• Discussion hearing for rulemaking regarding recreational take of *white sturgeon in 2025*	August 14-15, 2024
• Adoption hearing for rulemaking regarding recreational take of *white sturgeon in 2025*	October 9-10, 2024

Background

Three rulemakings related to white sturgeon are actively being advanced or considered by the Commission: extension of the regulation changes first adopted through an *emergency rulemaking* in October 2023, a request to publicly notice a *regular rulemaking* for the same regulation changes that would be effective for as long as necessary once adopted and approved, and another regular rulemaking for different regulation changes to take effect for *white sturgeon in 2025*. If approved at this meeting, the *white sturgeon in 2025* rulemaking will be introduced for potential notice at the June 2024 Commission meeting.

Emergency Regulations

At its October 2023 meeting, the Commission took emergency action to amend regulations regarding inland and ocean recreational take of white sturgeon to support recovery of populations and to track fishing pressure and success. The emergency regulation went into effect on November 16, 2023 and, if not extended by the Commission, will expire May 15, 2024. The Commission will be asked to consider re-adopting the emergency regulations for an additional 90-day period during Agenda Item 14 of today's meeting. If approved, the emergency regulations will then expire August 13, 2024. Staff may recommend a second and final extension at the June 2024 Commission meeting.

Prior to the effective date of the emergency regulations, recreational anglers were permitted to keep one white sturgeon per day, and a combined total of three per year, between 40- and 60-inches fork length. The season was open year-round, with some limited regional and/or seasonal closures.

At the October 2023 Commission meeting, the Department recommended the Commission adopt regulations for recreational catch-and-release only for white sturgeon (see Exhibit 1). However, after receiving public testimony regarding the impact of a catch-and-release only fishery on the recreational fishing industry, the Commission adopted regulations that allow limited recreational harvest of white sturgeon. The emergency regulations:

- Reduced the annual bag limit for white sturgeon from three fish to one fish;
- reduced the legal slot limit from 40 to 60 inches fork length to 42 to 48 inches fork length;
- established a limit of two white sturgeon per day per vessel;
- closed white sturgeon fishing in the migrating and spawning reaches of the Sacramento and San Joaquin rivers from January 1 through May 31, and specified other portions of the Sacramento and San Joaquin rivers and ocean waters remained open year-round except for a seasonal closure in the San Fransisco Bay;
- specified that once an angler has retained and tagged a white sturgeon, they may not continue to catch-and-release white sturgeon on the same day, but may catch-and-release white sturgeon starting the day after;
- specified that once the white sturgeon vessel limit is reached, only anglers who have not retained and tagged a white sturgeon that day may continue to catch-and-release white sturgeon;
- amended white sturgeon report card and tagging requirements for consistency with the changes to the white sturgeon annual bag limit and catch-and-release restrictions;
- added a requirement to report length of sturgeon caught and released on the report card; and
- required anglers to report additional sturgeon caught and released on the back of the report card once all the lines on the front of the card are filled.

Proposed Regulations through Regular Rulemaking

The proposed regulatory action under this agenda item seeks to continue through a regular rulemaking the emergency amendments to sections 5.79, 5.80, 27.90 and 27.92 that specify report card and tagging requirements, and seasons and bag limits for white sturgeon sport fishing in inland waters and ocean waters. The intent is to continue the limited harvest regimen until the effective date of the 2025 regulations concerning recreational take of white sturgeon. Further details on the proposed changes are available in the draft initial statement of reasons (ISOR) and proposed regulatory language (exhibits 3 and 4).

Future Rulemaking for 2025

At the January 16, 2024 WRC meeting, the Department proposed for 2025 a limited-entry harvest tag system with a set number of tags for a regular rulemaking. Guides and sturgeon anglers proposed an alternative tag system with an unlimited number of tags and close monitoring of harvest levels. Discussions considered the status of white sturgeon populations and potential economic losses from businesses that support the recreational sturgeon fishery. The Department underscored the importance of protecting spawning areas to conserve white sturgeon populations in the long-term. Some stakeholders voiced reservations about the reliability of data presented by the Department and whether population declines are real.

WRC Chair Zavaleta explained the range of options, from closure through catch-and-release, to the tag system proposals, to the current emergency regulations. She expressed concerns about the status of white sturgeon as a species and requested that the Department include an option for catch-and-release fishing only in the proposal it presents to the Commission.

At its February 14-15, 2024 meeting, the Commission approved WRC's recommendation that the Commission support a future regular rulemaking regarding white sturgeon, with options for both the Department's recommendation and catch-and-release. Under Agenda Item 27 today, the Department proposes that the Commission, at its June 2024 meeting, issue a notice of intent to amend white sturgeon regulations for the 2025 rulemaking.

Significant Public Comments (N/A)

Recommendation

Commission staff: Authorize publication of notice of proposed changes to regulations regarding recreational take of white sturgeon as recommended by the Department.

Department: Authorize publication of notice of proposed changes to regulations regarding recreational take of white sturgeon as described in the draft ISOR.

Exhibits

1. Staff summary for October 11-12, 2023 Commission meeting, Agenda Item 9 (*for background purposes only*)
2. Department memo, received April 8, 2024
3. Draft ISOR
4. Draft proposed regulatory language
5. Draft economic and fiscal impact statement (STD. 399) and addendum

Motion

Moved by ___________ and seconded by __________ that the Commission authorizes publication of a notice of its intent to amend sections 5.79, 5.80, 27.90 and 27.92 related to recreational take of white sturgeon.

Staff Summary for April 17-18, 2024

18. Central Valley Sport Fishing

Today's Item **Information ☒** **Action ☐**

Discuss proposed changes to Central Valley sport fishing regulations.

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) vetting September 12, 2024; WRC
- Notice hearing February 14-15, 2024
- **Today's discussion hearing** **April 17-18, 2024**
- Adoption hearing May 15, 2024

Background

The Commission generally adopts Central Valley sport fishing on an annual basis, informed by Department recommendations intended to align state regulations with federal fishery management objectives set by the Pacific Fishery Management Council (PFMC). In February 2024, the Commission authorized publication of a notice of proposed changes to bag and possession limits for the Sacramento River fall-run Chinook salmon (SRFC) in the American, Feather, Mokelumne, and Sacramento rivers to reflect PFMC management objectives for SRFC stocks. The scope of the options in the initial statement of reasons (ISOR; Exhibit 1) is intentionally broad to allow flexibility during Commission adoption based on the harvest projections identified by PFMC.

In mid-April 2024, PFMC will adopt its recommendation for the upcoming ocean salmon season. At today's meeting, the Department will recommend specific regulation changes based on PFMC's final ocean salmon recommendations. Changes to state regulations are expected to be adopted at the Commission's May 15, 2024 teleconference meeting.

Options included in the ISOR may be adopted independently or in combination and would apply in the anadromous areas of and tributaries to the American, Feather, Mokelumne, and/or Sacramento rivers:

- Option 1 – Allows take of any size Chinook salmon up to the daily bag limits [0-4] and possession limits [0-12].
- Option 2 – Allows take of a limited number of adult Chinook salmon, with grilse Chinook salmon making up the remainder of the daily bag limits [0-4] and possession limits [0-12].
- Option 3 – Allows a ***grilse-only*** Chinook salmon fishery up to the daily bag limits [0-4] and possession limits [0-12].
- Option 4 – Closed to take and possession of Chinook salmon.

The four options provide the Commission flexibility; it can choose to adopt various options for each river section independently or combine them to meet PFMC SRFC management objectives and maximize recreational salmon fishing opportunities.

At today's meeting, the Department will present its recommendation.

California Environmental Quality Act (CEQA)

In compliance with CEQA, the Department prepared a draft addendum (Exhibit 3) to *2022 Negative Declaration (SCH No. 2022040250) for the Central Valley Sport Fishing - 2022*; the negative declaration was certified by the Commission in May 2022. The addendum is intended to inform Commission consideration of proposed amendments to daily bag and possession limits for Chinook salmon, as described in the proposed rulemaking.

The 2022 negative declaration concluded that there would be no significant impacts for the range of daily bag and possession limits considered under regulatory options 1, 2, and 3. Since the proposed daily bag and possession limits for 2024 fall within the previously analyzed range, and the proposed amendments use similar regulatory options, there are no anticipated new, significant, or substantially more severe environmental impacts.

Significant Public Comments (N/A)

Recommendation (N/A)

Exhibits

1. Central Valley sport fishing ISOR, dated January 9, 2024
2. Department memo, transmitting draft CEQA addendum
3. 2024 CEQA Central Valley sport fishing addendum

Motion (N/A)

Staff Summary for April 17-18, 2024

19. Klamath River Basin Sport Fishing

Today's Item **Information ☒** **Action ☐**

Discuss proposed amendments to Klamath River Basin sport fishing regulations.

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) vetting — September 12, 2024; WRC
- Notice hearing — February 14-15, 2024
- **Today's discussion hearing — April 17-18, 2024**
- Adoption hearing — May 15, 2024

Background

The Commission annually adopts Klamath River Basin sport fishing regulations for consistency with federal fishery management objectives. As part of the annual process, specific bag, possession and size limits for Klamath River fall-run Chinook salmon (KRFC) are scheduled for adoption by the Commission after the Pacific Fishery Management Council (PFMC) reviews the status of West Coast salmon stocks and recommends fishery allocations.

At its February meeting, the Commission authorized publication of notice of its intent to amend Klamath and Trinity rivers (referred to as Klamath River Basin) sport fishing regulations; the initial statement of reasons (ISOR; Exhibit 1) includes ranges for proposed bag possession and size limits.

At its April 2024 meeting, PFMC adopted its recommendation for the upcoming ocean salmon season. At today's meeting, the Department will recommend specific regulation changes based on PFMC's final ocean salmon recommendations. Changes to state regulations are expected to be adopted by the Commission at its May 15, 2024 meeting.

Options included in the ISOR for Commission consideration are:

- Option 1: KRFC Adult Stocks (Sport Fishery Quota Management)
    - Quota range of 0-67,600 adult KRFC
    - Bag limit of [0-4] Chinook salmon – of which no more than [0-4] fish over [20-24] inches total length may be retained until the subquota is met, then 0 fish over [20-24] inches total length.
    - Possession limit of [0-12] Chinook salmon – of which no more than [0-4] fish over [20-24] inches total length may be retained when the take of salmon over [20-24] inches total length is allowed.
- Option 2: KRFC Fishery Closure
    - Closed to the take and possession of Chinook salmon

At today's meeting, the Department's will present its recommendation

California Environmental Quality Act (CEQA)

In compliance with CEQA, the Department prepared a draft addendum (Exhibit 3) to the *2022 Negative Declaration (SCH No. 2022040251) for the Klamath River Basin Sport Fishing – 2022* Rulemaking, certified by the Commission in May 2022. The addendum is intended to inform the Commission's consideration of the proposed amendments to the daily bag and possession limits for the proposed rulemaking.

The 2022 negative declaration concluded that varying the KRFC daily bag and possession limits, along with the Klamath River Basin quota, would have not significant environmental impacts. The proposed 2024 Klamath River Basin quota, and daily bag and possession for KRFC, fall within the previously analyzed scope. Therefore, amending the Klamath River Basin regulations to adjust KRFC daily bag and possession limits on the Klamath and Trinity rivers is unlikely to cause new significant or substantially more severe environmental impacts.

Significant Public Comments (N/A)

Recommendation (N/A)

Exhibits

1. Klamath River Basin sport fishing ISOR, dated January 15, 2024
2. Department memo, transmitting Draft CEQA addendum
3. Draft 2024 CEQA Klamath River Basin sport fishing addendum

Motion (N/A)

20. Waterfowl Hunting

Today's Item **Information** ☐ **Action** ☒

Consider adopting proposed amendments to waterfowl hunting regulations and taking final action under the California Environmental Quality Act (CEQA).

Summary of Previous/Future Actions

• Wildlife Resources Committee (WRC) vetting	September 19, 2023, WRC
• Notice hearing	December 13-14, 2023
• Discussion hearing	February 14-15, 2024
• **Today's adoption hearing**	**April 17-18, 2024**

Background

Waterfowl hunting regulations are reviewed annually by the U.S. Fish and Wildlife Service (USFWS) to adjust federal regulations based on waterfowl surveys, population trends, and other information. The result is a federal regulatory framework within which states may adjust their regulations. In developing the federal framework for the 2024-25 hunting seasons, USFWS published in the Federal Register (Volume 89, No. 27) on February 8, 2024 a proposal to amend federal migratory bird hunting regulations.

In December 2023, the Commission authorized a notice of rulemaking to set the bag and possession limits for migratory waterfowl for the 2024-25 hunting seasons to comply with the proposed federal framework. Federal processes require states to provide season selections to USFWS by the end of April each year for inclusion in the final framework, which is anticipated to be published in May 2024. Commission adoption of state regulation changes is scheduled for today's meeting given the federal timing requirements and expectation that the final federal framework will not differ substantially from the proposed regulations due to lack of new biological data or harvest strategies.

The initial statement of reasons (ISOR; Exhibit 1) includes ranges for bag and possession limits and seasons. The proposed regulations also include an option that would allow geese to be taken during the Veterans and Active Military Personnel waterfowl hunting days for the Balance of State Zone. Today the Department will present its final, specific recommendations (Exhibit 5).

Significant changes in the rulemaking include:

- decreasing the duck season length from 103 to 98 days for the Southern San Joaquin Valley Zone, the Southern California Zone, and the Balance of State Zone;
- decreasing the goose season length from 103 to 98 days for the Southern San Joaquin Valley Zone and the Southern California Zone, and from 100 to 98 for the Balance of State Zone; and
- allowing up to five days of falconry-only season for the San Joaquin Valley, Southern California and Balance of State zones.

California Environmental Quality Act

The Department prepared a draft environmental document consistent with the Commission's CEQA certified regulatory program. Commission staff evaluated the draft document and determined that the document reflects the independent judgment of the Commission. Staff submitted the environmental document for public comment (State Clearinghouse Number #2023120465, available at CEQAnet.opr.ca.gov). A final environmental document, updated to reflect public comment, will be included in the Commission's supplemental handouts for this meeting (Exhibit 3).

Significant Public Comments

1. The California Farm Bureau is concerned about potential changes to goose hunting regulations and opposes allowing public land hunting during the late season as it could push geese to private farms and increase crop damage. California Farm Bureau also disagrees with shortening the goose hunting season and advocates for keeping the current duration. (Exhibit 6)
2. A waterfowl hunter states that the Aleutian goose hunting season in the North Coast Management Area is unfair as the season was moved away from the peak period and public lands are closed during the proposed time. The hunter believes the proposed change only benefits private landowners and urges the Commission to return the season dates to the regular waterfowl season for equal opportunity. (Exhibit 7)

Recommendation

Commission staff: Certify the final environmental document, adopt the proposed project, and adopt the proposed waterfowl hunting regulation changes as presented by the Department today.

Department: Adopt the waterfowl hunting regulation changes as presented in the ISOR.

Exhibits

1. ISOR and original proposed regulatory language
2. Email in lieu of a pre-adoption statement of reasons, received March 20, 2024
3. Waterfowl final environmental document (*to be provided separately*)
4. Economic and fiscal impact statement (STD. 399)
5. Department presentation
6. Letter from Chris Reardon, Director of Government Affairs, California Farm Bureau, received February 13, 2024
7. Email from Dustin Kuehn, received March 12, 2024

Motion

Moved by __________ and seconded by __________ that the Commission finds that the environmental document reflects the independent judgment of the Commission, certifies the final environmental document, adopts the proposed project, and adopts the staff recommendations to amend Section 502, regarding migratory waterfowl hunting regulations for the 2024-2025 seasons.

Staff Summary for April 17-18, 2024

21. Mammal Hunting

Today's Item **Information ☐** **Action ☒**

Consider adopting proposed amendments to mammal hunting regulations and taking final action under the California Environmental Quality Act (CEQA)

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) vetting — May 17, 2023; WRC
- WRC discussion and recommendation — September 21, 2023; WRC
- Notice hearing — December 13-14, 2023
- Discussion hearing — February 14-15, 2024
- **Today's adoption hearing** — **April 17-18, 2024**

Background

At its December 2023 meeting, the Commission authorized publication of a notice of its intent to amend mammal hunting regulations. The notice was published in the California Regulatory Notice Register on February 2, 2024. The proposed changes affect several species and hunt programs, as well as regulations pertaining to preference points reinstatement:

- Section 362, Nelson bighorn sheep
  - Modify hunt tag quotas
- Section 363, Pronghorn antelope
  - Modify hunt tag quotas
- Sections 364 and 364.1, Elk and Shared Habitat Alliance for Recreational Enhancement (SHARE) elk hunting
  - Modify hunt tag quotas
  - Increase SHARE tag allocations in tandem with the modifications to Section 555
- Section 554, Cooperative deer hunting areas
  - Clarify application process
  - Limit the number of tags per landowner for zones X3a, X5a, and X5b.
- Sections 555 and 555.1, Cooperative elk hunting areas
  - Modify qualifying criteria and tag allocation within "conflict zones" in existing Section 555
  - Define conflict zones, increase hunting opportunity, and address chronically elevated levels of human-elk conflict on private property in a new Section 555.1
- Section 708.14, Big game license tag drawing system
  - Require junior hunters to return all first-choice tags to be eligible for preference points reinstatement

- Require the carcass portion of tags to be included with harvest reports for point reinstatement
- Clarify how tag-holder-return requirements apply within the context of a hunting party.

The proposal also makes several non-substantive edits to regulatory language across the affected sections, such as corrections to spelling and grammar, corrections to addresses, updates to outdated language, and improvements in clarity.

When the Commission authorized notice, several sections where hunt tag quota changes were proposed contained ranges of tag amounts rather than finite quotas. Ranges were necessary because the collection and analysis of species data was not available at the time the Commission issued its notice. The Department completed its data collection and analysis in March of 2024. (Exhibit 24).

Department Recommendations

Based on its analysis of mammal populations, the Department has provided final recommendations on tag quotas for Nelson bighorn sheep (Exhibit 3), pronghorn antelope (Exhibit 8), and elk (Exhibit 12). All tag quotas for each species and associated hunt zones fall within the ranges publicly noticed by the Commission in February of 2024, except for those discussed below.

Necessity of Continuation Notices

At its February 2024 meeting, the Commission directed staff to explore ways to ensure that the Commission has the flexibility at its April 2024 meeting to either omit or include Siskiyou County and/or the Siskiyou Hunt Zone in the new section of regulation. The direction came as a result of concerns raised by the Siskiyou County Board of Supervisors regarding the proposal's original inclusion of the Siskiyou Hunt Zone as a "conflict zone" in Section 555.1 – Conflict Zone Cooperative Elk Hunting Areas. On April 5, 2024, the Commission sent a notice to interested and affected parties that included revised proposed regulatory language, providing an option that omits the Siskiyou Hunt Zone from the list of elk "conflict zones."

The Commission also included revisions to the tag quota ranges for pronghorn antelope in its April notice. The revisions expanded the proposed tag ranges for pronghorn antelope *Zone 3 – Likely Tables* from 15-25 tags to 0-25 tags for General Season Period 1 Buck and from 10-25 tags to 0-25 tags for General Season Period 2 Buck. Expansion of the ranges provided flexibility for the Commission to consider a lower tag quota for that species and zone, since it is below the range in the original notice. While most of the Department's tag quota recommendations throughout this proposal fall within the originally-noticed ranges, survey data for pronghorn antelope revealed drastically lower population numbers in the affected zone than the Department anticipated when recommending the original tag quota ranges.

On April 10, 2024, the Commission sent a subsequent notice that included another revision to Section 363; this revision changed the originally-noticed 15 tag allotment for *Zone 3 – Likely Tables Archery Only Season (Buck)* to a tag quota range of 0-15. The change to a range provides flexibility for the Commission to consider the Department's recommended tag quota since it is less than the quota originally noticed.

California Environmental Quality Act (By Species)

Section 362: Bighorn Sheep. An initial CEQA review of the proposed project was conducted in accordance with CEQA in 2019, and the Commission certified a *Final Environmental Document Regarding Bighorn Sheep Hunting* (SCH No. 2018112036). In the 2019 environmental document, the Commission assessed the then-proposed project's increase of 10 tags, creation of new hunt zones, and reallocation of a fundraising tag. In total, a range of between 0 and 42 bighorn sheep tags was assessed.

As lead agency, the Commission certified the 2019 environmental document and determined that adopting the regulations as proposed would not result in any new significant or substantially more severe environmental effects. The Commission adopted the proposed regulations.

The bighorn sheep tag quota ranges in the 2019 environmental document are the basis for the current proposal. All of the Department's recommended tag quotas fall within the previously analyzed ranges. Therefore, the Department drafted an addendum to the 2019 environmental document which Commission staff has evaluated and determined to be reflective of the independent judgment of the Commission. No new significant or substantially more severe impacts under CEQA than those analyzed and disclosed in the 2019 environmental document will occur due to this proposal. Details of the CEQA analysis and conclusions can be found in the addendum (Exhibit 4).

Section 363: Pronghorn Antelope. An initial CEQA review of the proposed project was conducted in accordance with CEQA in 2004, and the Commission certified a *Final Environmental Document Regarding Pronghorn Antelope Hunting* (SCH No. 2003112078). In the 2004 environmental document, the Commission assessed a pronghorn antelope tag allocation not to exceed 60 in the Mount Dome Hunt Zone; 80 in the Clear Lake Hunt Zone; 150 and 130 for Periods 1 and 2, respectively, in the Likely Tables Hunt Zone; 150 tags each in Periods 1 and 2 in the Lassen Hunt Zone; 150 tags in the Big Valley Hunt Zone; and 25 in the Surprise Valley Hunt Zone.

As lead agency, the Commission certified the 2004 environmental document and determined that adopting the regulations and tag quotas as proposed – within the assessed ranges in each hunt zone – would not result in any new significant or substantially more severe environmental effects. The Commission adopted the proposed regulations.

The pronghorn antelope tag quota ranges described in the 2004 environmental document are the basis for the current proposal. All of the Department's recommended tag quotas fall within the previously analyzed ranges. Therefore, the Department drafted an addendum to the 2004 environmental document which Commission staff has evaluated and determined to be reflective of the independent judgment of the Commission. No new significant or substantially more severe impacts under CEQA than those analyzed and disclosed in the 2004 environmental document will occur due to this proposal. Details of the CEQA analysis and conclusions can be found in the addendum (Exhibit 9).

Sections 364, 364.1, 555 and 555.1: Elk. An initial CEQA review of the proposed project was conducted in accordance with CEQA in 2010, and the Commission certified a *Final Environmental Document Regarding Elk Hunting* (SCH number 2009112083) as part of its review and adoption of elk hunting regulations. In 2019, the Commission again amended elk hunting regulations and certified a final supplemental environmental document (SCH number 2018112037) which assessed an increase in the tag quota range in the Northwestern Elk Zone, concluding that it would not result in any new significant or substantially more severe environmental effects than previously identified by the Commission in 2010.

Most recently, in 2023 the Commission as lead agency adopted regulations: (1) amending elk hunting tag quotas in the Siskiyou and Northwestern hunt zones, adding 10 and 22 tags, respectively; (2) modifying the boundaries of the Bear Valley, Cache Creek, and La Panza hunt zones; and (3) creating the Gabilan, Central Coast, and Tehachapi hunt zones, adding 70 elk tags across these new zones. In adopting the regulations, the Commission determined that they would not result in any new significant or substantially more severe environmental impacts than previously analyzed in the 2010 and 2019 elk hunting environmental documents.

The Department has prepared an addendum to the 2019 elk supplemental environmental document which Commission staff has evaluated and determined to be reflective of the independent judgment of the Commission. Amending the current elk hunting regulations as proposed will not result in any new significant or substantially more severe environmental impacts than those previously analyzed and disclosed in the 2010 and 2019 elk hunting environmental documents. Details of the CEQA analysis and conclusions can be found in the addendum (Exhibit 13).

Significant Public Comments

1. A commenter opposes increases to Roosevelt elk tags in the Northwestern Hunt Zone. (Exhibit 25)
2. The Siskiyou County Fish and Game Commission opposes classifying the Siskiyou Hunt Zone as a “conflict zone” in the new Section 555.1, supports the existing SHARE program, and expresses concerns about the size of SHARE properties. The county advocates for a minimum acreage of 640 acres and allowing adjacent properties to combine acreage for a total size increase. (Exhibit 26)
3. A commenter opposes the entirety of the new proposed Section 555.1 and opposes increased tag allocations for Roosevelt elk on the grounds that elk are facing a number of threats, particularly an outbreak of treponeme-associated hoof disease, and therefore need conservative management to provide a population buffer against loss. (Exhibit 27)
4. The Agua Caliente Band of Cahuilla Indians supports sustainable hunting of bighorn sheep and pronghorn antelope as culturally important animals integral to the tribe’s economic, social, and religious fabric. (Exhibit 28)

Recommendation

Commission staff: Approve the revised projects pursuant to CEQA and adopt the regulations as recommended by the Department.

Department: Adopt the proposed regulations, including option 2 of Section 555.1, and the tag allocations as outlined in the pre-adoption memoranda.

Exhibits

1. Initial statement of reasons (ISOR) for Section 362 – Bighorn sheep hunting
2. Noticed regulatory language (Section 362)
3. Department pre-adoption memo with recommended tag allocations, received April 11, 2024 (Section 362)
4. Addendum to 2019 *Final Environmental Document Regarding Bighorn Sheep Hunting*
5. ISOR for Section 363 – Pronghorn antelope hunting
6. Noticed regulatory language (Section 363)
7. Revised proposed regulatory language (Section 363)
8. Department pre-adoption memo with recommended tag allocations, received April 11, 2024 (Section 363)
9. Addendum to *2004 Final Environmental Document Regarding Pronghorn Antelope Hunting*
10. ISOR for Sections 364 and 364.1 – Elk hunting
11. Noticed regulatory language (Sections 364 and 364.1)
12. Department pre-adoption memo with recommended tag allocations, received April 11, 2024 (Sections 364 and 364.1)
13. Addendum to *2019 Supplemental Environmental Document to the 2010 Final Environmental Document Regarding Elk Hunting*
14. ISOR for Section 554 – Deer cooperative hunting
15. Noticed regulatory language (Section 554)
16. Department pre-adoption memo, received April 11, 2024
17. ISOR for Sections 555 and 555.1 - Elk cooperative hunting
18. Noticed regulatory language (Sections 555 and 555.1)
19. Revised proposed regulatory language (Section 555.1)
20. Pre-adoption statement of reasons (PSOR), received April 11, 2024 (Section 555.1)
21. ISOR for Section 708.14 – Preference points reinstatement
22. Noticed regulatory language (Section 708.14)
23. Department pre-adoption memo, received April 11, 2024 (Section 708.14)
24. Department presentation
25. Email from Phoebe Lenhart, received February 9, 2024
26. Letter from the Siskiyou County Fish and Game Commission, received February 12, 2024
27. Email from Marie Kyle, received April 1, 2024
28. Email from Timothy Wilcox, Tribal Archaeologist, Agua Caliente Band of Cahuilla Indians, received April 3, 2024

Motion

Moved by __________ and seconded by __________ that the Commission, having considered the addenda and associated environmental documents, approves the revised projects pursuant to the California Environmental Quality Act, and adopts the proposed regulations and regulation changes related to mammal hunting as discussed today, including adoption of Option 2 for Section 555.1 to exclude the Siskiyou Hunt Zone.

Staff Summary for April 17-18, 2024

22. Southern California Steelhead

Today's Item **Information** ☐ **Action** ☒

Consider the petition, Department's status review report, and comments received to determine whether listing southern California steelhead as endangered under the California Endangered Species Act (CESA) is warranted.

Summary of Previous/Future Actions

• Received petition	June 14, 2021
• Transmitted petition to Department	June 23, 2021
• Published notice of receipt of petition	July 16, 2021
• Receipt of petition at public meeting; approved Department's 30-day extension request	August 18, 2021
• Receipt of Department's 90-day evaluation report at public meeting	December 15, 2021
• Closed public hearing and administrative record, and continued deliberations to April 2022 meeting	February 16-17, 2022
• Determined petitioned action may be warranted, initiating Department's one-year status review	April 20-21, 2022
• Approved Department's six-month extension request	October 12-13, 2022
• Public notice of having received the Department's one-year status review	February 14-15, 2024
• **Today, potentially determine if listing is warranted**	**April 17-18, 2024**

Background

On June 14, 2021 the Commission received a petition to list southern California steelhead (SCS; *Oncorhynchus mykiss*) as endangered under CESA (Exhibit 1). At its April 2022 meeting, the Commission determined that listing may be warranted, and subsequently provided notice regarding SCS's protected, candidate species status. The notice prompted the Department's status review of the species, as required by California Fish and Game Code Section 2074.6.

The Commission received the Department's status review report on January 18, 2024 (exhibits 2 and 3), and highlighted receipt of the report on its February 14-15, 2024 meeting agenda for public awareness. The status review report represents the Department's final written review of the status of SCS. Based on the information provided, possessed, and received, the Department has concluded that the petitioned action to list SCS as endangered under CESA is warranted, and further recommends implementing the management recommendations and recovery measures described in the status review report.

At today's meeting, the Commission may consider the petition, the Department's written evaluation and status review report, written and oral comments received, and the remainder of the administrative record, to determine if listing SCS as endangered under CESA is warranted. Findings will be adopted at a future meeting.

Significant Public Comments

1. The Endangered Habitats League urges the Commission to classify SCS as endangered under CESA, stating that research shows the fish is critically endangered due to urbanization, agriculture, and water development damaging its habitat. Additionally, the league states that the petition and the Department's report provide strong scientific backing for the listing. (Exhibit 5)
2. A member of the public supports listing SCS under CESA, stating that research shows that the species populations are in danger of extinction. (Exhibit 6)
3. The Cachuma Conservation Release Board requests that the Commission hold the hearing for the listing in southern California (rather than San Jose), as southern California is closer to the natural range of the fish and the agencies that would be most impacted by the listing. (Exhibit 7)
4. The Cachuma Operation and Maintenance Board (COMB) notes concerns about how its data was used in the Department's status review report, stating that data from different surveys was mixed and may lead to inaccurate comparisons of steelhead abundance, and that there are limits to using migrant trapping data. COMB recommends using snorkel survey data to provide a more representative picture of steelhead abundance in the Santa Ynez River basin. COMB questions the report's recommendation and believes COMB's data presents a different conclusion. (Exhibit 8)
5. The Pasadena Casting Club supports listing SCS as endangered, stating that club members have observed its decline due to habitat loss, and that the fish is a barometer of watershed and environmental health. The club states that protecting the fish will benefit water quality, watersheds, recreation, and Californians. (Exhibit 9)
6. A law firm representing the United Water Conservation District (UWCD) argues that the potential CESA listing of SCS as endangered is not supported by sufficient evidence. The firm states that the Department's status review report fails to address key evidence necessary for the Commission's final listing decision, including evidence on resident populations, the interplay between anadromous and resident populations and its effect on species persistence, and the effect of barriers on the long-term persistence of the fish. Additionally, the firm claims that the status review did not follow judicial guidance that examination of this evidence would likely be necessary for any final listing decision. The firm holds that the Commission should either find the listing not warranted or remand the status review to the Department for reconsideration. Attachments sent with the letter include a transcript from previous SCS litigation, a technical memorandum on an SCS lifecycle model, an SCS recovery plan, a South-Central/Southern California Coast Steelhead recovery planning domain five-year review, and a report on the occurrences of steelhead trout in southern California between 1994 and 2018. (Exhibit 10)

7. UWCD submits comments regarding the Department’s status review, as well as previously submitted comments, for the Commission’s review. UWCD states that the status review does not provide an analysis of the status of the species based on the best available science and that the recommendation from the Department to list SCS under CESA is premature. UWCD states that the Commission should find that listing is not warranted at this time and should delay the listing decision until after additional data collection. UWCD also states that the information it has provided demonstrates the need for a more transparent analysis of the data. (Exhibit 11)

8. Rancho Mission Viejo maintains that it follows the Southern Subregion Habitat Conservation Plan (SSHCP) to protect endangered species and their habitats on the southern Orange County ranch, and that it has already addressed a steelhead passage barrier in San Juan Creek by building a bridge and removing an old crossing, as outlined in the steelhead recovery plan. If steelhead return to the area, the ranch hopes ongoing conservation efforts under the SSHCP will be recognized and the need for incidental take permits under CESA can be avoided. (Exhibit 12)

9. A coalition of 26 non-governmental organizations supports listing SCS, stating that the populations are nearing extinction due to habitat loss from urbanization, agriculture, and water development. The coalition further states that a healthy steelhead population benefits California’s future by signaling a resilient ecosystem. Also included are signatures from over 2000 individuals who support listing the fish. (Exhibit 13)

10. The Santa Clarita Valley Water Agency (SCV) disputes the steelhead distribution map in the Department’s status review report. SCV points out that the map shows steelhead presence in the upper Santa Clara River east of Piru Dry Gap, although SCV believes there is no evidence to support this distribution, and requests that the Department correct the map to show no steelhead in that section of the river. If the Department disagrees, SCV asks that supporting data be provided, and an explanation of how steelhead distribution was determined for the area. Additionally, SVC provides a white paper titled *Review of Current and Historical SCS in the Upper Santa Clara River Watershed*. (Exhibit 14)

11. The Association of California Water Agencies (ACWA) expresses concern that the Department’s status review does not consider all available science, particularly the role of resident rainbow trout populations in the overall steelhead population health. ACWA claims that listing SCS under CESA would not provide additional protections beyond those from the federal Endangered Species Act listing, but would create redundancies and potentially hinder water management projects. ACWA requests that the Commission consider resident rainbow trout contributions to steelhead populations in its final decision and exclude coastal watersheds with concrete-lined flood channels from the listing, as they block steelhead passage. Additionally, ACWA provides two technical memoranda, one from Four Peaks Environmental Science & Data Solutions and one from Cramer Fish Sciences. (Exhibit 15)

12. CalTrout forwarded a public support letter with over 4700 signatures collected by EnviroVoters. (Exhibit 16)

13. The Los Angeles County Sanitation District expresses concern for the potential impacts from an SCS listing on wastewater treatment operations, which it states could

result in the need for expensive upgrades to treatment facilities. The district also states that the Department's distribution map is inaccurate and requests that the Commission correct the map to remove SCS designation from the upper Santa Clara River. The district also requests to work with the Department to develop regulations that will protect the fish but allow essential services to continue. (Exhibit 17)

14. The California Building Industry Association opposes listing SCS, stating that there is not enough solid science to justify the listing and that the Department's report relies on uncertain data sources, leading to inaccurate range maps showing steelhead in places where they likely are not present. The association suggests using data from the U.S. Fish and Wildlife Service for better accuracy. Additionally, the association is concerned for the listing's impact on water agencies and homebuilding. (Exhibit 18)

Recommendation

Commission staff: Determine that listing southern California steelhead as endangered is warranted, as recommended by the Department.

Department: List southern California steelhead as endangered under CESA.

Exhibits

1. Petition, received June 14, 2021
2. Department transmittal memo, received January 18, 2024
3. Department status review report, dated February 2024
4. Department presentation
5. Letter from Dan Silver, Executive Director, Endangered Habitats League, received March 18, 2024
6. Letter from Stephen Kanne, received March 20, 2024
7. Letter from Lauren Hanson, Board President, Cachuma Conservation Release Board, received March 21, 2024
8. Letter from Polly Holcombe, Board President, COMB, received March 26, 2024
9. Letter from Edward Wallace, Conservation Chair, Pasadena Casting Club, received March 29, 2024
10. Letter from David Boyer and Christopher Francis, attorneys for United Water Conservation District, Atkinson, Andelson, Loya, Ruud & Romo, received April 3, 2024 (Note: This link goes to an external document due to file size)
11. Letter from Mauricio Guardado, General Manager, UWCD, received April 3, 2024
12. Letter from Laura Coley Eisenberg, Senior Vice President, Regulatory Compliance & Open Space Management, Rancho Mission Viejo, received April 3, 2024
13. Co-written letter from 26 non-governmental organizations, received April 3, 2024
14. Letter from Stephen Cole, Assistant General Manager, SCV, received April 4, 2024
15. Letter from Stephen Pang, State Relations Advocate, ACWA, received April 4, 2024
16. Email from Russell Marlow, Senior Project Manager, CalTrout, received April 4, 2024
17. Letter from Raymond Tremblay, Department Head, Facilities Planning, Los Angeles Sanitation Districts, received April 4, 2024

18. Letter from Nick Cammarota, Senior Vice President & General Counsel, California Building Industry Association, received April 4, 2024
19. Department memo, *Evaluation of Additional References Received for the Status Review of southern California steelhead* (Oncorhynchus mykiss), received April 11, 2024

Motion

Moved by ___________ and seconded by __________ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list southern California steelhead (*Oncorhynchus mykiss*), and the other information in the record before the Commission, **warrants** listing southern California steelhead as an endangered species under the California Endangered Species Act, consistent with the Commission staff and Department recommendations. Findings will be adopted at a future meeting.

OR

Moved by ___________ and seconded by __________ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list southern California steelhead (*Oncorhynchus mykiss*), and the other information in the record before the Commission, **does not warrant** listing southern California steelhead as an endangered species under the California Endangered Species Act.

23. Mohave Desert Tortoise

Today's Item **Information ☐** **Action ☒**

Consider the petition, Department's status review report, and comments received to determine whether listing Mohave (also known as Agassiz's) Desert tortoise as endangered under the California Endangered Species Act (CESA) is warranted.

Summary of Previous/Future Actions

• Received petition to change status from threatened to endangered	March 20, 2020
• Transmitted petition to Department	April 13, 2020
• Public receipt of petition	April 15-16, 2020
• Published notice of receipt of petition	May 1, 2020
• Public receipt of Department's 90-day evaluation report	June 24-25, 2020
• Determined petitioned action may be warranted, initiating Department's one-year status review	October 14, 2020
• Approved Department's six-month extension request	October 14, 2021
• Public notice of having received the Department's one-year status review	February 14-15, 2024
• **Today, potentially determine if changing the listing from threatened to endangered is warranted**	**April 17-18, 2024**

Background

On March 20, 2020, the Commission received a petition to change the status of Mohave Desert tortoise (*Gopherus agassizii*) from threatened to endangered under CESA (Exhibit 1). At its October 2020 meeting, the Commission determined that listing may be warranted, and subsequently provided notice of that determination. The notice prompted the Department's status review of the species, as required by California Fish and Game Code Section 2074.6.

The Commission received the Department's status review report on January 9, 2024 (exhibits 2 and 3), and highlighted receipt of the report on the February 14-15, 2024 meeting agenda for public awareness. The status review report represents the Department's final written review of the status of Mohave Desert tortoise. Based on the information provided, possessed, and received, the Department has concluded that the petitioned action to list Mohave Desert tortoise as endangered under CESA is warranted, and further recommends implementing the management recommendations and recovery measures described in the status review report.

At today's meeting, the Commission may consider the petition, the Department's written evaluation and status review report, written and oral comments received, and the remainder of the administrative record, to determine if listing Mohave Desert tortoise as endangered under CESA is warranted. Findings will be adopted at a future meeting.

Significant Public Comments

A co-written letter submitted by Defenders of Wildlife, the Desert Tortoise Council, and the Desert Tortoise Preserve Committee states that the organizations have reviewed the Department's status review and agree with the Department's recommended actions. They urge the Commission to list the tortoise as endangered under CESA and further state that the desert tortoise population is in decline despite past efforts at protection. Lastly, the authors believe that the change in listing status would likely increase funding for conservation efforts and lead to stricter regulations on activities that harm the species. (Exhibit 6)

Recommendation

Commission staff: Determine that listing Mohave Desert tortoise as endangered is warranted, as recommended by the Department.

Department: List Mohave Desert tortoise as endangered under CESA.

Exhibits

1. Petition, received March 20, 2020
2. Department transmittal memo, received January 9, 2024
3. Department status review report, dated February 2024
4. Department presentation
5. Letter from Defenders of Wildlife, the Desert Tortoise Council, and the Desert Tortoise Preserve Committee, received March 29, 2024

Motion

Moved by ___________ and seconded by __________ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list Mohave Desert tortoise (*Gopherus agassizii*), and the other information in the record before the Commission, **warrants** listing Mohave Desert tortoise as an endangered species under the California Endangered Species Act, consistent with the Commission staff and Department recommendations. Findings will be adopted at a future meeting.

OR

Moved by ___________ and seconded by __________ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list Mohave Desert tortoise (*Gopherus agassizii*), and the other information in the record before the Commission, **does not warrant** listing Mohave Desert tortoise as an endangered species under the California Endangered Species Act.

24. Ballona Wetlands Ecological Reserve

Today's Item **Information ☐** **Action ☒**

Ballona Wetlands Ecological Reserve consistency determination as to whether the visitor uses associated with the parking lots in Area A and the baseball fields in Area C are compatible with the purposes of the reserve.

Summary of Previous/Future Actions

- Adoption hearing for regulations designating ecological reserve and authorizing special uses — August 19, 2005
- **Today make a consistency determination** — April 17-18, 2024

Background

In August 2005, the Commission adopted regulation amendments designating approximately 577 acres along coastal Los Angeles County, which the Department had recently acquired, as Ballona Wetlands Ecological Reserve (Ballona Reserve). The amendments also included special regulations that allowed for specific public uses on Ballona Reserve beyond those allowed by the general regulations for ecological reserves.

Ballona Reserve included some parking lots and Little League baseball fields at the time of acquisition. The special regulations adopted in 2005 included two provisions related to the parking lots and Little League fields:

1. Existing recreational uses may be allowed under license agreement with Playa Vista Little League in that portion of Area C identified in the license agreement unless it is determined by the department that restoration or other uses in this area are more appropriate.
2. Existing parking areas under leases to the County of Los Angeles may be allowed unless it is determined by the Department that restoration or other uses in those areas are more appropriate.

The substance of the two provisions has remained in the Commission's regulations through today and is currently codified in Section 630(h)(3).

In September 2020, Ballona Wetlands Land Trust filed a petition for a writ of mandate and complaint for declaratory relief in Los Angeles County Superior Court. The court issued a writ directing the Commission to make a compatibility determination pursuant to Section 630 as to whether the parking lots in Area A and baseball fields in Area C of Ballona Reserve are compatible with the purpose of the reserve (Exhibit 1).

Since adopting the special regulations for Ballona Reserve, the Commission has never interpreted the two provisions as affirmatively requiring the Department to evaluate the existing uses. Based on the plain language, the provisions allow for the continued use until the Department determines "that restoration or other uses in those areas are more appropriate." However, recently the Department evaluated the special uses related to the parking lots and

Little League fields. The Department "determined that restoration or other uses of the Little League baseball fields or parking lots is not more appropriate at this time" and transmitted a memorandum to the Commission to that effect (Exhibit 2).

Significant Public Comments (N/A)

Recommendation

Commission staff: Based on the analysis in the Department's memorandum, determine that the visitor uses associated with the parking lots in Area A and the baseball fields in Area C are compatible with the purposes of Ballona Wetlands Ecological Reserve.

Exhibits

1. Writ of mandate from the Los Angeles County Superior Court, dated November 7, 2023
2. Department memorandum with attachments, dated April 2, 2024

Motion

Moved by _____________ and seconded by _____________ that Commission determines the visitor uses associated with the parking lots in Area A and the baseball fields in Area C are compatible with the purposes of the Ballona Wetlands Ecological Reserve.

Staff Summary for April 17-18, 2024

26A. Wildlife Resources Committee (WRC)

Today's Item **Information ☐** **Action ☒**

Discuss referred topics and consider revisions to topics and timing. Consider approving draft agenda topics and changing the meeting location for the next committee meeting.

Summary of Previous/Future Actions

- Previous committee meeting — January 16, 2024; WRC
- **Today consider approving agenda topics — April 17-18, 2024**
- Next committee meeting — May 16, 2024; WRC

Background

WRC works under Commission direction to set and accomplish its work plan.

Committee Work Plan

Topics that have been referred by the Commission to WRC are displayed within a work plan for scheduling and tracking. The updated work plan is provided as Exhibit 1 and includes proposed topics for September 2024.

New Topics

Staff has no recommendations for new topics for Commission referral to WRC.

Next Committee Meeting

The next committee meeting is scheduled for May 16, 2024, with webinar and phone options. In addition to standing agenda items (Department updates and future agenda items), four topics are proposed:

1. *Periodic and Annual Rulemakings*: Initial vetting for upland (resident) game birds, mammal hunting, waterfowl hunting, Central Valley sport fishing, and Klamath River Basin sport fishing.
2. *Take of Nongame Mammals*: Discuss concerns regarding take of nongame mammals.
3. *Shotgun Wads:* Continue discussion of plastic pollution caused by shotgun debris from waterfowl hunting.
4. *Waterfowl Hunting in Southampton Bay:* Continue exploration and vetting of potential regulation changes to address waterfowl hunting noise concerns specific to Southampton Bay, consistent with Commission direction at its October 2023 meeting.

The May WRC meeting is currently scheduled to be held in Yreka to accompany a site visit to the Klamath River dam removal sites; that site visit will now be held separately. Staff requests to move the next WRC meeting to the Redding area to simplify travel and to facilitate locating a suitable meeting venue.

Significant Public Comments (N/A)

Staff Summary for April 17-18, 2024

Recommendation

Commission staff: Approve the topics and work plan as proposed and approve the Redding area as the location for the next WRC meeting.

Exhibits

1. WRC work plan, updated April 8, 2024

Motion

Moved by ____________ and seconded by ___________ that the Commission approves the Wildlife Resources Committee topics and work plan as proposed and approves the change of location for the May 16, 2024 meeting to Redding.

26B. Department Wildlife and Fisheries Division, and Department Ecosystem Conservation Division Report

Today's Item **Information ☒** **Action ☐**

The Department will highlight items of note since the last Commission meeting.

Summary of Previous/Future Actions (N/A)

Background

The Department will provide a verbal update on items of interest since the last Commission meeting.

Three news releases of potential interest are provided as exhibits 1-2.

Significant Public Comments (N/A)

Recommendation (N/A)

Exhibits

1. CDFW news: *CDFW Introduces License Application for Mobile Devices*, dated March 20, 2024
2. CDFW news: *CDFW Seeks Artists to Enter Annual California Duck Stamp Art Contest*, dated March 20, 2024

Motion (N/A)

Staff Summary for April 17-18, 2024

27B. Rulemaking Timetable Updates

Today's Item **Information ☐** **Action ☒**

Review and potentially approve changes to the perpetual timetable for anticipated regulatory actions.

Summary of Previous/Future Actions

- Commission approved rulemaking timetable — February 14-15, 2024
- **Today consider approving changes to the rulemaking timetable — April 17-18, 2024**

Background

This is a standing agenda item for staff and the Department to request changes to the Commission's rulemaking timetable (Exhibit 2), confirm changes made by the Commission during this meeting, and highlight minor changes made by staff.

The Department recommends two changes to the rulemaking timetable:

- Schedule a "Possession of Wildlife and Wildlife Rehabilitation" rulemaking, which is currently under "Future Rulemakings: Schedule to be Determined," to repeal Section 679 and add Sections 679.1, 679.2, 679.3, 679.4, 679.5, 679.6, 679.7, 679.8, and 679.9, as well as a manual and associated forms. This rulemaking is necessary to overhaul how the Department administers the wildlife rehabilitation program. The proposed rulemaking schedule is notice in June 2024, discussion in August 2024, and adoption in October 2024.

- Add a "White Sturgeon Harvest and Reporting" rulemaking to amend Sections 1.74, 5.79, 5.80, 27.90, 27.92 and 701, and add Section 701.1. This rulemaking is necessary to revise management of the white sturgeon sport fishery and would provide the Commission with three different management options to consider: (1) catch-and-release only; (2) limited entry harvest tag; and (3) real-time quota. The proposed rulemaking schedule is notice in June 2024, discussion in August 2024, and adoption in October 2024.

Proposed regulation changes for both wildlife rehabilitation and white sturgeon have been discussed at multiple Commission Wildlife Resources Committee meetings.

Staff requests additional adjustments as shown under Agenda Item 27C, *Future Meetings and New Business.* Commission staff suggests adjusting the days upon which items are heard by moving wildlife and inland fisheries items to day one and marine items to day two for the June 2024 meeting. Additionally, staff requests that two recently withdrawn rulemakings be added back to the timetable for adoption: (1) Special Hunts Permits and Drawings and (2) Mitigating Risks for Cervid Importation and Movement. If approved under Agenda Item 27C, the schedule will be adjusted on the draft timetable accordingly.

Significant Public Comments (N/A)

Recommendation

Commission staff: Approve the proposed changes to the rulemaking timetable as identified in this staff summary and Exhibit 2, and any other additional changes identified during this meeting.

Exhibits

1. Department memo, received April 8, 2024
2. *Perpetual Timetable for Regulatory Actions*, dated April 11, 2024

Motion

Moved by _____________ and seconded by _____________ that the Commission approves the proposed changes to the rulemaking timetable as discussed today.

27C. Administrative Items - Future Meetings and New Business

Today's Item **Information ☐** **Action ☒**

This is a standing agenda item to review logistics and approve draft agenda items for the next Commission meetings, consider any changes to approved meeting dates or locations, or introduce new business for a future meeting agenda.

Summary of Previous/Future Actions (N/A)

Background

Upcoming Commission Meetings

The next Commission meetings are scheduled for May 15, 2024 as a teleconference – with an in-person option in Trinidad, Fairfield, Sacramento, Santa Cruz, and San Diego where commissioners will be located – and June 19-20, 2024 in Mammoth Lakes. For all Commission and committee meetings, we continue to provide the ability to participate via webinar and phone, in addition to physical meeting locations. Potential agenda items for both meetings are provided in Exhibit 1 for consideration and potential Commission approval.

For the June meeting only, a commissioner proposes to move marine items to Thursday and wildlife and inland fisheries items to Wednesday. Staff has confirmed the change is feasible for rulemaking purposes and for colleagues at the Department. Most meeting attendees can expect additional travel time to Mammoth Lakes; otherwise, there are no special logistics to consider.

Approved Meeting Dates and Locations

For the May 16, 2024 Wildlife Resources Committee meeting, staff proposes to move the location to the Redding area. The meeting was originally approved for Yreka to accommodate a possible commissioner visit to the Klamath River dams removal site and restoration areas; due to scheduling challenges, that trip will be accommodated separately.

Significant Public Comments (N/A)

Recommendation

Commission staff: Approve agenda items for the May 15, 2024 and June 19-20, 2024 meetings as presented in Exhibit 1 and amended during this meeting; approve moving the May 16, 2024 Wildlife Resources Committee meeting location to the Redding area.

Exhibits

1. Potential agenda items for May 15 and June 19-20, 2024 Commission meetings

Motion

Moved by _____________ and seconded by _____________ that the Commission approves the draft agenda items for the May 15, 2024 and June 19-20, 2024 Commission meetings, as amended during this meeting, and approves moving the May 16, 2024 Wildlife Resources Committee meeting to the Redding area.

Staff Summary for April 17-18, 2024

28. General Public Comment for Items Not on the Agenda

Today's Item **Information ☐** **Action ☒**

Receive public comment regarding topics within the Commission's authority that are not included on the agenda.

Summary of Previous/Future Actions

- **Today's receipt of requests and comment** April 17-18, 2024
- Consider granting, denying, or referring June 19-20, 2024

Background

This item is to provide the public an opportunity to address the Commission on topics not on the agenda. Staff may include written materials and comments received prior to the meeting as exhibits in the meeting binder (if received by the written comment deadline), or as supplemental comments at the meeting (if received by the supplemental comment deadline).

General public comments are categorized into two types: (1) requests for non-regulatory action and (2) informational-only comments. Under the Bagley-Keene Open Meeting Act, the Commission cannot discuss or take action on any matter not included on the agenda, other than to schedule issues raised by the public for consideration at future meetings. Thus, non-regulatory requests generally follow a two-meeting cycle (receipt and direction); the Commission will determine the outcome of the non-regulatory requests received in today's meeting at the next regularly scheduled Commission meeting, following staff evaluation (currently June 19-20, 2024)

Significant Public Comments (N/A)

Recommendation (N/A)

Commission staff: Consider whether to add any future agenda items to address issues that are raised during public comment.

Exhibits

See exhibits for Agenda item 10.

Motion (N/A)

Staff Summary for April 17-18, 2024

Executive Session

Today's Item **Information ☐** **Action ☒**

Executive session will include four standing topics:

(A) Pending litigation to which the Commission is a party

(B) Possible litigation involving the Commission

(C) Staffing

(D) Deliberation and action on license and permit items

Summary of Previous/Future Actions (N/A)

Background

During the public portion of its meeting, the Commission will call a recess and reconvene in a closed session pursuant to the authority of California Government Code Section 11126, subdivisions (a), (c)(3) and (e)(1). The Commission will address four items in closed session:

(A) ***Pending Litigation to Which the Commission is a Party***

See agenda for a complete list of pending civil litigation to which the Commission is a party, at the time the agenda was made public.

(B) ***Possible Litigation Involving the Commission***

(C) ***Staffing***

For details about staffing, see the executive director's report under Agenda Item 2(A) for today's meeting.

(D) ***Deliberation and Action on License and Permit Items***

I. *Consider the proposed decision in Agency Case No. 21ALJ02-FGC, regarding the denial of Attila Molnar's restricted species exhibiting permit renewal application.*

On December 18, 2020, the Department sent Attila Molnar a notice of denial of a renewal application for a restricted species permit. The denial letter stated the Department's decision was based on multiple violations of regulations regarding restricted species.

Molnar timely appealed the denial to the Commission and filed a written statement in support of the appeal. The Department filed a response with the Commission arguing that the denial should be affirmed.

Commission staff referred the appeal to the California Office of Administrative Hearings (OAH). After Molnar submitted a supplemental brief to OAH, OAH submitted a proposed decision (Exhibit 1) to the Commission. The proposed decision finds the Department proved violations occurred that were cause for denial and the denial of the renewal application was the correct result.

Significant Public Comments (N/A)

Recommendation

Commission staff: (D)I. Adopt the proposed decision for Agency Case No. 21ALJ02-FGC.

Exhibits

1. Proposed decision regarding Molnar appeal, dated February 7, 2024

Motion

Moved by _____________ and seconded by _____________ that the Commission adopts the proposed decision for Agency Case No. 21ALJ02-FGC.

State of California
Department of Fish and Wildlife

Original on file
Received March 29, 2024

Memorandum

Date: March 25, 2024

To: Melissa Miller- Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Agenda Item for the April 17-18, 2024 Fish and Game Commission Meeting Private Lands Wildlife Habitat Enhancement and Management (PLM) Area Licenses**

California Fish and Game Code Section 3406(c) requires that the activities conducted pursuant to each Private Lands Wildlife Habitat Enhancement and Management Plan (PLM) shall be reviewed annually by the Department of Fish and Wildlife (Department) and by the Fish and Game Commission (Commission) at a public hearing. Licenses for such areas may be granted by the Commission for a period of five (5) years following department review and approval of the management plan (Title 14, California Code of Regulations Section 601(a)).

The Department has reviewed the initial management plan for one new property in one county consisting of approximately 4,988 acres and the 5-year renewals for nine properties in six counties consisting of approximately 112,818 acres. Additionally, the Department has reviewed the annual reports for 52 properties in 14 counties consisting of approximately 550,079 acres.

The Department recommends that the Commission approve the wildlife management plans, applications, and each 2024/25 harvest program under conditions specified in the attached tables. Habitat improvements accomplished under these plans will enhance and maintain wildlife resources on and around the PLM areas. The goals and objectives stated in the management plans are compatible with Department management plans for appropriate species in these areas.

The remaining PLM areas will be submitted to the Commission for approval at the June 19-20, 2024 meeting.

If you have any questions, please contact Ms. Victoria Barr at (916) 203-0567 or by email at Victoria.barr@wildlife.ca.gov.

Attachment

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Scott Gardner, Branch Chief
Wildlife Branch

Mario Klip, Environmental Program Manager
Wildlife Branch

Brett Furnas, Senior Environmental Scientist Supervisor
Wildlife Branch

Victoria Barr, Environmental Scientist
Wildlife Branch

California Department of Fish and Wildlife
PLM Area License
Initial Management Plan, 2024-2028
Proposed Seasons, Harvests, and Habitat Improvements

CENTRAL REGION

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Stevinson Ranch A Deer Zone Merced 4,988 Acres	Authorized Harvest: 9 forked-horn or better buck deer Issue 9 buck deer tags for the period July 13, 2024 through September 22, 2024	Maintain 20 existing mature valley oak trees. Mow 5 acres of non-native grass in oak woodland to promote oak generation. Install and maintain cattle exclusion fencing around 5 valley oak saplings. Disk or mow 5 acres in areas adjacent to riparian habitats. Install and maintain 5 wood duck nesting boxes per year. Install and maintain 3 nesting boxes for American Kestrel. Install and maintain 3 raptor perch poles in appropriate areas. Disk 10 acres and plant legumes and cereal grains in areas not grazed by cattle. Install 3 wildlife friendly fence crossings. Cut and maintain 5 wildlife travel corridors to open up dense vegetation.

State of California
Department of Fish and Wildlife

Original on file
Received March 29, 2024

M e m o r a n d u m

Date: March 25, 2024

To: Melissa Miller- Henson
Executive Director
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The Department has reviewed the initial management plan for one new property in one county consisting of approximately 4,988 acres and the 5-year renewals for nine properties in six counties consisting of approximately 112,818 acres. Additionally, the Department has reviewed the annual reports for 52 properties in 14 counties consisting of approximately 550,079 acres.

The Department recommends that the Commission approve the wildlife management plans, applications, and each 2024/25 harvest program under conditions specified in the attached tables. Habitat improvements accomplished under these plans will enhance and maintain wildlife resources on and around the PLM areas. The goals and objectives stated in the management plans are compatible with Department management plans for appropriate species in these areas.

The remaining PLM areas will be submitted to the Commission for approval at the June 19-20, 2024 meeting.

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California Department of Fish and Wildlife
PLM Area License
5-Year Management Plan Renewals, 2024-2028
Proposed Seasons, Harvests, and Habitat Improvements

NORTHERN REGION		
PLM Area	**2024 Proposed Season and Harvest**	**Habitat Improvement Program**
Bell Ranch Deer Zone C4 Tehama 15,000 Acres	Authorized Harvest: 15 forked-horn or better buck deer Issue 15 buck deer tags for the period October 26, 2024 through November 30, 2024	Maintain 16 previously developed springs by checking for broken pipes and repairing as necessary. Maintain 30 water sources by inspecting and making any necessary repairs to the ponds, springs, guzzlers, and water troughs. Install 1 new guzzler near Campbell Creek. Mechanically treat (by crushing with a bulldozer or masticating) at least 15 acres of decadent brush annually to encourage the growth of nutritious deer forage. Restrict off-road vehicle use within the recent brush treatment areas and minimize disturbance to wildlife. Spray invasive plants including star thistle and Italian thistle.
Capistran Ranch Deer Zone B1 Mendocino 14,510 Acres	Authorized Harvest: 20 deer of which no more than 15 may be forked-horn or better buck deer and 5 may be antlerless deer, 2 bull elk, and 2 antlerless elk Issue 10 either-sex deer tags for the period of August 1, 2024 through November 30, 2024 No antlerless deer shall be harvested before September 15, 2024. No more than 10 buck deer may be harvested after October 27, 2024.	Managed livestock grazing (no more than 500 cow/calf pairs on 13,200 acres) for the period of November 15 through June 20 annually will be used to manage invasive plant species and thatch build up. Masticate at least 10 acres of decadent brush annually to create browsing opportunities. Manage invasive plants by focused high-intensity, short-term grazing. Maintain 24 springs by checking the flow and wildlife escape ramps and repairing any damaged parts.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Capistran Ranch Cont.	On or before October 15, 2024, the licensee may request (in writing) up to 10 additional either-sex tags to accomplish the authorized harvest. Issue 2 bull elk tags for the period of August 1, 2024 through December 1, 2024 Issue 2 antlerless elk tags for the period of September 15, 2024 through December 1, 2024	Exclude trespass livestock from USFS and BLM grazing allotments by inspecting and repairing the boundary fence. Replace the nesting material in 4 bluebird nest boxes. Boxes will be relocated if not used the previous season. Maintain 10 wood duck nest boxes annually. Maintain 8 elk crossings annually. Construct 15 brush piles for wildlife cover and oak seedling protection. The 20 foot x 5-foot pile will be created using slash from down trees and brush and will be located near a routinely used water source. Maintain and monitor 2 approximately 1,000-sq. foot food plots spread out over the property and in areas where green summer browse is limited. Each food plot is fenced from cattle and wild pigs. Each will have a motion-sensing camera to record day and night deer activity. The annual report will include a table of total number and composition of deer photographed. Using a tractor, create a 6 foot wide by 300 foot long trail through decadent chaparral to provide access and new palatable forage for wildlife. Maintain 20 mallard hen nest tubes annually. Treat 10 acres of yellow star thistle with appropriate herbicide annually. At least 5 acres of elk and deer forage will be planted and irrigated through the summer months.

California Department of Fish and Wildlife
PLM Area License
5-Year Management Plan Renewals, 2024-2028
Proposed Seasons, Harvests, and Habitat Improvements

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Four Pines Ranch Deer Zone B1 Mendocino 2,001 Acres	Authorized Harvest: 12 forked-horn or better buck deer and 4 antlerless deer Issue 12 buck deer tags and 4 antlerless deer tags for the period of July 16, 2024 through November 30, 2024 No more than 6 buck deer may be harvested after October 27, 2024. No antlerless deer shall be harvested before September 15, 2024.	Maintain at least 7 previously improved springs and 3 existing ponds. Develop 1 additional spring site for wildlife use. Maintain all previously established forage plots with legume mix for wildlife use. Develop 0.25-acre forage plot for enhanced wildlife browse opportunity. Treat at least 3 acres annually of invasive weeds through hand manipulation, herbicides or vegetation management plan burns with CalFire to encourage native vegetation growth. Remove at least 100 feet of unnecessary interior fence to enhance wildlife passage. Create at least a 1 acre opening through dense brush to enhance browse feeding opportunities for wildlife. Remove encroaching conifer seedlings and saplings in at least 3 acres of oak woodlands. Restrict livestock grazing to no more than 50 head of cattle during the winter and spring. In addition manage grazing to only assigned pastures during the specific grazing season. Plant at least 25 willow shoots annually at existing water sources; there will be an expected 75% survival of these shoots after the second year or replanting will be required the next season. Create at least 2 brush piles measuring at least 6 feet high and 15 feet in diameter annually. Older piles (at least 5 years old) will be burned.

California Department of Fish and Wildlife
PLM Area License
5-Year Management Plan Renewals, 2024-2028
Proposed Seasons, Harvests, and Habitat Improvements

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Redwood House Ranch Deer Zone B1 Humboldt 8,419 Acres	Authorized Harvest: 20 either-sex deer of which no more than 10 may be antlerless deer and 1 bull elk Issue 20 either-sex deer tags for the period of August 10, 2024 through November 30, 2024 Issue antlerless deer may be harvested for the period of October 1, 2024 through November 30, 2024 No more than 7 buck deer may be harvested after October 27, 2024. Issue 1 bull elk tag for the period of August 1, 2024 through October 31, 2024	Treat at least 200 acres of oak woodlands by removing encroaching conifers less than or equal to 12 inches DBH from oak woodlands and prairies.
Schneider Ranch Deer Zone B1 Mendocino 5,222 Acres	Authorized Harvest: 6 forked-horn or better buck deer Issue 6 buck deer tags for the period of August 1, 2024 through November 30, 2024 No more than 3 buck deer may be harvested after October 27, 2024.	Burn or mechanically treat at least 7 acres of decadent brush annually. Cultivate with equipment and irrigate the 1-acre Cabin food plot, which provides a year-round deer feeding area annually. Create at least 6 brush piles for wildlife cover. The piles will each be approximately 10 feet in diameter and 6 feet tall and will provide good habitat for both deer and quail. Burn at least 6 brush piles. The remnant charcoal and ashes are nutrient rich and deer roll in them, perhaps for control of external parasites. Inspect 6 previously improved springs and repair any damaged parts, clear any brush that is intruding on the collection

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Schneider Ranch Cont.		galleries, cleaning out accumulated debris and mud, and ensure the box is structurally sound. Exclude all livestock from the ranch.
Smith River PLM Del Norte 25,229 Acres	Authorized Harvest: 4 bull elk and 6 antlerless elk Issue 4 bull elk tags for the period of August 1, 2024 through October 31, 2024 On or before October 15, 2024, the licensee may request (in writing) up to 1 additional bull tag to accomplish the harvest goal. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of elk available to harvest. Issue 6 antlerless elk tags for the period of September 4, 2024 through October 31, 2024	Within the 5-year term, provide and deliver 30 merchantable trees 12 inches-24 inches DBH to project site. Enhance Coho salmon habitat in Rowdy Creek and/or Savoy Creek through the placement of 30-40-foot-long tree segments with root wads attached to be placed instream for large woody debris habitat for salmonids. At least 125 acres of invasive plant species will be treated with herbicide, hand tools, and/or heavy equipment. Treated areas will be revegetated with reseeding and/or planting with native species. Effectiveness monitoring will occur post treatment. 3 wood duck boxes will be installed and annually monitored and maintained.

California Department of Fish and Wildlife
PLM Area License
5-Year Management Plan Renewals, 2024-2028
Proposed Seasons, Harvests, and Habitat Improvements

CENTRAL REGION		
PLM Area	**2024 Proposed Season and Harvest**	**Habitat Improvement Program**
Carrizo Ranch San Luis Obispo County 27,056 Acres	Authorized Harvest: 3 bull elk, 2 antlerless elk, 5 forked-horn or better buck deer and 4 antlerless deer Issue 3 bull elk tags for the period of July 15, 2024 through December 1, 2024 Issue 3 antlerless elk tags for the period of September 15, 2024 through December 1, 2024 Issue 5 buck deer tags for the period of July 15, 2024 through December 31, 2024 Issue 3 antlerless deer tags for the period of September 1, 2024 through December 31, 2024	Burn tule grass at Big Spring. Managed and appropriately timed grazing to improve habitat. Leave gates open to ease movement between pastures and neighboring properties (CDFW and Nature Conservancy lands). Manage invasive plants. Install basking structures for turtles at Big Spring.
Gabilan Ranch Deer Zone A Monterey 10,000 Acres	Authorized Harvest: 3 bull elk and 1 antlerless elk Issue 3 bull elk tags for the period of July 1, 2024 through December 31, 2024 Gabilan Ranch is not requesting their antlerless elk tag for the 2024 season.	Maintain perennial water for wildlife and water retention devices and pipes as needed. Burn 200 acres of decadent brush to improve forage for wildlife. Remove cattle in May to provide feed and reduce competition for wildlife. Treat 0.50 acre of purple star thistle to enhance and maintain habitats for wildlife. VMP burns, follow Smoke Management Plan with CDF and Monterey Air Quality Control Board in order to improve burn scheduling flexibility.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Gabilan Ranch Cont.		Continue an erosion control program to reduce sedimentation in the area creeks. Construct 10 brush piles. Maintain wood duck boxes. Grow out gathering field between March and May. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Hearst Ranch San Luis Obispo 5,381 Acres	Authorized Harvest: 6 bull elk and 6 antlerless elk Issue 2 bull elk tags for the period of July 15, 2024 through December 1, 2024 Issue 3 antlerless elk tags for the period of September 15, 2024 through December 1, 2024	Improve stock pond for red-legged frogs. Irrigate approximately 152 acres in the Arroyo de la Cruz drainage and, if necessary, seed with native grassed to produce year-round forage for wildlife. Continue rotational grazing practices to meet the standard for ‘light’ grazing. Exclude livestock with approximately. 2.50 miles of fencing from the 105-acre Arroyo de la Cruz riparian corridor during stream flow. Treat 1 acre for Spanish broom using hand pulling and digging. Application of 3% glyphosate or mechanical cutting as needed. Treat 1 acre of jubata grass with hand pulling and application of 2% glyphosate as needed. Control flower plumes by bagging and removing or burning. Install 4 raptor perches. Monitor/repair/replace escape ramps in wildlife troughs.

State of California
Department of Fish and Wildlife

Signed original on file,
received March 29, 2024

M e m o r a n d u m

Date: March 25, 2024

To: Melissa Miller- Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Agenda Item for the April 17-18, 2024 Fish and Game Commission Meeting Private Lands Wildlife Habitat Enhancement and Management (PLM) Area Licenses**

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The Department has reviewed the initial management plan for one new property in one county consisting of approximately 4,988 acres and the 5-year renewals for nine properties in six counties consisting of approximately 112,818 acres. Additionally, the Department has reviewed the annual reports for 52 properties in 14 counties consisting of approximately 550,079 acres.

The Department recommends that the Commission approve the wildlife management plans, applications, and each 2024/25 harvest program under conditions specified in the attached tables. Habitat improvements accomplished under these plans will enhance and maintain wildlife resources on and around the PLM areas. The goals and objectives stated in the management plans are compatible with Department management plans for appropriate species in these areas.

The remaining PLM areas will be submitted to the Commission for approval at the June 19-20, 2024 meeting.

If you have any questions, please contact Ms. Victoria Barr at (916) 203-0567 or by email at Victoria.barr@wildlife.ca.gov.

Attachment

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California Department of Fish and Wildlife
PLM Area License
Annual Management Plan Renewals, 2024-2025
Proposed Seasons, Harvests, and Habitat Improvements

NORTHERN REGION

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
3D Ranch Deer Zone B5 Tehama 2,052 Acres	Authorized Harvest: 8 forked-horn or better buck deer, 7 bear and 75 quail Issue 8 buck deer tags for the period of August 15, 2024 through November 30, 2024 No more than 5 buck deer may be harvested after October 27, 2024. Issue 7 bear tags for the period of August 1, 2024, through December 31, 2024, or when the season closes because the Department has determined that 1,700 bears have been harvested. No cubs or females with cubs will be harvested. Cubs are defined as bears less than one year of age or bears weighing less than 50 pounds. Issue 75 quail seals for the period of September 1, 2024 through February 28, 2025	Mechanically crush 18 acres of decadent brush to improve forage for wildlife. These areas may also be burned dependent upon CalFire, all environmental evaluations have been completed. Cattle grazing has been planned on a rest and utilization rotation that considers forage availability for wildlife. Maintain a minimum of 7 acres of forage plots planted with legumes by replanting as necessary and irrigating. Plots 6 and 7 will be managed to promote turkey mullein through chiseling to remove competition from pasture grasses. Maintain 5 water sources to provide water for wildlife by checking for broken pipes and repairing as necessary. Remove at least 0.50 mile of unnecessary interior fencing to prevent wildlife entanglement. Deepening and sealing all water sources to a depth of at least 5 feet to maintain available water for wildlife during the year.
Ackerman-Southy Daugherty WMA Deer Zone A Mendocino 10,831 Acres	Authorized Harvest: 18 forked-horn or better buck deer Issue 18 buck deer tags for the period of July 15, 2024 through November 30, 2024 No more than 9 buck deer tags may be harvested after September 15, 2024	All habitat projects have been completed for this 5-year management plan.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Ackerman-Southy Daugherty WMA Cont.	On or before October 15, 2024, the licensee may request (in writing) up to 10 additional buck tags to accomplish the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of deer available to harvest.	
Alexandre Dairy PLM Del Norte 1,728 Acres	Authorized Harvest: 2 bull elk and 4 antlerless elk Issue 2 bull elk tags for the period of August 1, 2024 through December 31, 2024 Issue 4 antlerless elk tags for the period of October 1, 2024 through December 31, 2024	Finalized removal of a fish passage barrier on Tryon Creek. Finalize installation of the 20 water troughs for this 5-year management plan. All water troughs will be maintained and have wildlife escape ramps. 30 Sitka spruce will be planted and protected with elk exclusion fencing to allow proper propagation of the trees. Seasonal grazing of 30 acres of wetlands will be excluded from January 1 through July 15.
Amann Ranch Mendocino 375 Acres	Authorized Harvest: 1 bull elk and 1 antlerless elk Issue 1 bull elk tag for the period of August 1, 2024 through November 30, 2024. Issue 1 antlerless elk tag for the period of September 15, 2024 through November 30, 2024	Irrigate and sub-irrigate at least 225 acres of pasture for use by wildlife. Install 2 new elk friendly fence crossing and repair 2 damaged elk friendly fence crossings. Maintain 100 cattle to reduce competition with elk for forage. Cattle and horses will be removed from the pastures in October and allow for wildlife use. Maintain 16 water troughs and water tanker by ensuring they are holding

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Amann Ranch Cont.		adequate water for wildlife and install escape ramps. Mow, disc and reseed 25 acres in the yellow star-thistle treatment area. Leave unharvested the second cutting of hay on 342 acres. This will retain approximately 500 tons of forage accessible to elk. Preserve the tri-colored blackbird habitat.
Antler Hill Ranch Deer Zone A Mendocino 900 Acres	Authorized Harvest: 5 forked-horn or better buck deer Issue 5 buck deer tags for the period July 7, 2024 through November 30, 2024 No more than 3 buck deer may be taken after September 15, 2024.	Remove at least 2 acres of coyote brush that is encroaching into grasslands. Remove final 200 feet of woven wire fencing in deer travel corridors. Clear at least 1.50 acres of chamise by hand, mechanically or burning. Remove at least 75% of the overstory on 1.50 acres of timberland, to allow the growth of new browse. Remove at least 200 conifer trees up to 16 inches DBH encroaching into grasslands.
Big Lagoon Humboldt 113,933 acres	Authorized Harvest: 5 bull elk and 2 antlerless elk Issue 5 bull elk tags for the period of August 1, 2024 through October 31, 2024 On or before October 1, 2024, the licensee may request (in writing) up to 1 additional bull elk tag to accomplish the authorized harvest.	All habitat projects have been completed for this 5-year management plan.

California Department of Fish and Wildlife
PLM Area License
Annual Management Plan Renewals, 2024-2025
Proposed Seasons, Harvests, and Habitat Improvements

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Big Lagoon Cont.	In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of elk available to harvest. Issue 2 antlerless elk tags for the period of September 4, 2024 through November 15, 2024	
Bridges Ranch Deer Zone A Mendocino 1,144 Acres	Authorized Harvest: 10 forked-horn or better buck deer Issue 10 buck deer tags for the period of August 13, 2022 through November 30, 2022 No more than 5 buck deer may be harvested after September 25, 2022.	All burning has been completed for the 5-year management plan. Remove 3 acres of conifer trees 12 inches DBH or less in oak woodland areas. Create at least 5 brush piles measuring at least 15 feet in diameter and 6 feet high. Install 1 wood duck nesting box near the lake. Remove 1 abandoned structure of at least 150 square feet. Remove 30 yards of woven wire fencing.
Carley Ranch Deer Zone B1 Mendocino 1,660 acres	Authorized Harvest: 15 forked-horn or better buck deer Issue 6 buck deer tags for the period of August 1, 2024 through November 30, 2024 No more than 8 buck deer may be harvested after October 27, 2024. On or before October 15, 2024, the licensee may request (in writing) up to 9 additional buck	20 acres of controlled burn in the annual grasslands and chaparral. If this burning cannot be accomplished, brush rake removal of at least 5 acres of montane chaparral will occur. Maintain all previously developed water sources (3 springs, 6 guzzlers, and six associated water tanks) to provide water for wildlife. Maintenance includes repairing broken and deteriorating pipes and other components.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Carley Ranch Cont.	deer tags to accomplish the authorized harvest.	Maintain wildlife-friendly livestock exclusion fencing around developed springs and repairing any damage. Irrigate the 1-acre alfalfa food plot during the dry season. The plot is fenced with wildlife-friendly fencing to exclude livestock. Maintenance of 30 fruit trees have been planted and protected with wire fencing to provide a wildlife food source. Plant at least 3 acres of dryland forage mix for wildlife. Road maintenance and erosion control practices will be completed on roads. No livestock grazing on the ranch as it is used for wildlife habitat only.
Christensen Ranch Deer Zone B1 Mendocino 1,061 Acres	Authorized Harvest: 22 deer of which no more than 15 may be forked-horn or better buck deer and 7 may be antlerless deer Issue 22 either-sex deer tags for the period of August 1, 2024 through November 30, 2024 No antlerless deer shall be harvested before September 15, 2024. No more than 7 buck deer may be harvested after October 27, 2024. On or before October 15, 2024, the licensee may request (in writing) up to 12 additional either-sex tags to accomplish the authorized harvest.	Erosion control on ranch roads to reduce chances of sediment run off into nearby watercourses. Continue to promote bald eagle nesting through the retention of snags and large trees. Annual maintenance on 8 previously developed springs and repair any broken water pipes. Plant *Brassica* seed in the fall by manually seeding and raking in fresh pig rooting areas. The extent of this activity will depend on pig activity but is expected to represent at least 3 sites this year, scattered throughout the ranch. Exclude cattle from the ranch; no cattle leases are proposed under the PLM 5-year management plan.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Christensen Ranch Cont.	The number of tag holders actively hunting shall not exceed the number of deer available to harvest. In no case shall the number of tags issued be used to exceed the authorized harvest.	Remove conifers up to 12 inches DBH from oak woodlands on 2 acres. Install 2 escape ramps into water troughs. Maintain Star thistle control project using appropriate herbicide treatments on 2 acres. Create 3 slash piles that are at least 6 feet high and 10 feet wide at the base.
Diamond C Outfitters Deer Zone B1 Humboldt 3,200 Acres	Authorized Harvest: 17 forked-horn or better buck deer Issue 17 buck deer tags for the period of July 15, 2024 through November 30, 2024 No more than 7 buck deer may be harvested after October 27, 2024.	Remove or replace (with wildlife friendly fencing) at least 522 yards of wildlife unfriendly fencing. Maintain at least 125 acres of previously treated oak woodlands by removing all conifers. Remove all conifers from at least 10 acres of oak woodlands in new areas. Treat at least 8 acres and 2.25 linear miles of star thistle through hand pulling or herbicide. Create at least 1 brush pile measuring at least 15 feet by 6 feet.
Eden Valley Ranch Deer Zone B1 Mendocino 20,789 Acres	Authorized Harvest: 8 bull elk, 7 antlerless elk, 20 forked-horn or better buck deer, and 5 antlerless deer Issue 8 bull elk tags for the period of July 13, 2024 through December 15, 2024 Issue 7 antlerless elk tags for the period of September 15, 2024 through December 15, 2024	Maintain 23 water sources by repairing any damaged parts. To improve wildlife forage plant, fertilize and irrigate a 100-acre area with oats, legumes, and grasses in pivot #1, pivot #2, and the canon field. Reseed at least 100 acres of pastures used by wildlife. Exclude livestock from 10,000 acres on the east side of Eden Valley to improve wildlife forage. Monitor and maintain the 4 existing rail-

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Eden Valley Ranch Cont.	Issue 20 buck deer tags for the period of July 13, 2024 through November 30, 2024 No more than 7 buck deer may be taken after October 27, 2024. Issue 5 antlerless deer tags for the period of September 15, 2024 through November 30, 2024	type elk crossings and add 5 per year to fences outside the valley. To improve wildlife forage, manage livestock grazing in the 4 pastures on a rest-rotation basis, with cattle primarily spending spring/summer in the upland pastures and fall/winter in the lowland pastures. Remove 0.25 miles of woven wire fencing. Maintain road surfaces and culverts to reduce sedimentation of waterways. Maintain exterior and interior wildlife friendly fences. Treat with herbicide at least 25 acres of yellow starthistle per year. Burn at least 30 acres of yellow star thistle per year. Plant all burned brush piles in M&M mix #2. Create 10 brush piles per year for wildlife at least 20 feet in diameter and 10 feet high. Plant 25 willow shoots near impoundments excluded from livestock to shade and help maintain cooler temperatures. Develop or redevelop and add one water tank if required in at least one pasture per year. Install 6 wood duck boxes. Develop and create at least a 0.25-acre plot planted in M&M seed mix in the Jarbo Pasture.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
		Add escape ramps in water troughs in Paradise Mountain pasture.
Hunter Ranch Deer Zone B1 Humboldt 16,103 Acres	Authorized Harvest: 20 forked-horn or better buck deer and 2 bull elk Issue 20 buck deer tags for the period of July 15, 2024 through November 30, 2024 No more than 7 buck deer may be harvested after October 27, 2024. Issue 2 bull elk tag for the period September 1, 2024 through October 31, 2024	Remove encroaching conifers from at least 60 acres of oak woodland. A total of 414 acres have been identified to provide flexibility to meet this 300-acre requirement: Treatment Group 1 consists of approximately 74 acres. These woodlands are encroached by pre-emergent Douglas-fir. Restoration activities shall include removal of all conifers ≤ 12 inches DBH. Treatment Group 2 consists of approximately 200 acres. These woodlands have emergent Douglas-fir and will be treated under a Timber Harvest Plan (THP) currently in development. These areas are to be treated using a combination of special prescriptions; White and Black Oak Woodland Management and Meadow Restoration silviculture. Restoration activities shall include removal of conifers ≥ 12 inches DBH. Larger Douglas-fir may be retained as wildlife trees as per the THP where they exist. Further treatments for conifers ≤12 inches DBH will be considered in the next PLM 5-year management plan. Treatment Group 3 consists of approximately 140 acres. These woodlands are encroached by pre-emergent and emergent Douglas-fir. Restoration activities shall include removal of all conifers ≤ 10 inches DBH where noncommercial treatments are implemented, and removal of all conifers between 10 feet and 24 feet in diameter

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
		under an Oak Woodland Management Exemption.
Klamath PLM Humboldt 32,594 acres	Authorized Harvest: 2 bull elk and 2 antlerless elk Issue 2 bull elk tags for the period of August 1, 2024 through October 31, 2024 On or before October 1, 2024, the licensee may request (in writing) up to 1 additional bull elk tag to accomplish the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of elk available to harvest. Issue 2 antlerless elk tags for the period of September 7, 2024 through November 15, 2024	All habitat projects have been completed for this 5-year management plan.
Miller-Eriksen Ranch Deer Zone B1 Mendocino 983 Acres	Authorized Harvest: 16 deer of which no more than 14 may be forked-horn or better buck and 2 may be antlerless deer and 1 bull elk Issue 10 either-sex tag for the period of July 13, 2024 through November 30, 2024	Plant 100 pounds of commercial pasture seed mix in the areas of feral hog rooting to provide food and cover for wildlife. Maintain 0.50 mile of low elk crossing fences. Timber thinning on at least 0.50 acre to create new browse. Build 100 brush piles throughout the property to provide wildlife cover.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Miller-Eriksen Ranch Cont.	No antlerless deer shall be harvested before September 15, 2024. Issue 14 buck deer tags for the period of July 8, 2024 through November 30, 2024 Issue 2 antlerless deer tags tag for the period of September 15, 2024 through November 30, 2024 No more than 7 buck deer may be harvested after October 27, 2024. On or before October 15, 2024, the licensee may request (in writing) up to 7 additional either-sex tags to accomplish the authorized harvest. Issue 1 bull elk tags for the period of July 10, 2024 through November 9, 2024	Maintain the reduced number of livestock, not to exceed 25 cow/calf pairs. Herbicide treatment of at least 1 acre of yellow star thistle. Burn 125 brush piles created in previous years. Maintain livestock exclusion pasture totaling at least 33 acres. Maintain 15 water developments. Burn at least 8 acres of oak woodlands. Burn or thin at least 2 acres of decadent chaparral.
R-R Ranch Mendocino 1,470 Acres	Authorized Harvest: 2 bull and 6 antlerless elk Issue 2 bull elk tags for the period of July 18, 2024 through November 30, 2024 Issue 4 antlerless elk tags for the period of September 5, 2024 through November 30, 2024 On or before October 15, 2024, the licensee may request (in writing) up to 2 additional antlerless elk tags to	Irrigate a 7-acre alfalfa pasture. If the alfalfa production falls below a total cover of 50% in the fall, rip, replant and roll the pasture at a rate of 20 lbs./acre the following March or April with a clover and alfalfa seed mix to provide high quality forage for wildlife. The first cutting of hay will be removed and all subsequent growth will be left for wildlife use. Maintain the existing 100-acre dryland plot with a rye grass/clover mix by harvesting and thatching every summer. Maintain 2 ponds, 3 springs, and 2 water troughs for wildlife use.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
	accomplish the authorized harvest.	Exclude livestock from the ranch to improve forage and cover for wildlife. Create at least 4 wood piles at least 15 feet in diameter and 6 feet high for wildlife. Recycle 50% of existing decadent wood piles by burning. Finalize a control burning plan for the ranch with the goal of burning at least 15 acres per year. Evaluate invasive species on at least 100 acres each year. Initiate treatment on at least 10 acres if invasive species reach 25% cover.
Rainbow Ridge PLM Humboldt Deer Zone B4 21,300 Acres	Authorized Harvest: 15 forked-horn or better buck deer Issue 15 buck deer tags for the period of August 1, 2024 through November 30, 2024 No more than 8 buck deer may be harvested after September 29, 2024.	Finalize treatment of at least 6 acres of conifer removal less than or equal to 12 inches DBH from oak woodlands and prairies in unit E. All other habitat projects have been completed for this 5-year management plan.
R Wild Horse Ranch Deer Zone B5 Tehama 4,000 Acres	Authorized Harvest: 4 forked-horn or better buck deer Issue 4 buck deer tags for the period of November 19, 2024 through November 22, 2024	Mechanically treat at least 10 acres of decadent brush to promote new growth and create wildlife travel corridors. Create a 0.50-acre dugout water catchment basin to provide a water source for wildlife. Build at least 10 brush piles (each 20 feet in diameter) to provide escape cover for wildlife. Burn brush piles created in 2019.

Seven Springs Ranch Deer Zone A Mendocino 2,250 Acres	Authorized Harvest: 9 forked-horn or better buck deer Issue 9 buck deer tags for the period of July 13, 2024, through November 30, 2024. No more than 4 buck deer may be harvested after September 15, 2024.	Exclude livestock grazing from the PLM area to increase habitat quality for wildlife. Remove 0.20 miles of dilapidated woven wire fencing. Plant 0.125 acres of clover and vetch seed on washouts along roads and slides. Cut and mechanically treat, by uprooting, approximately 1 acre of young Douglas fir which are growing on ridges within the oak woodland area. Mechanically treat at least 1.25 acres, with heavy equipment, by removing and crushing decadent brush above the root crown (chaparral areas). Will cut the decadent branch growth off willows that were planted in springs and washouts in prior years.
Shamrock Ranch Deer Zone B1 Mendocino 16,400 Acres	Authorized Harvest: 8 bull elk, 10 antlerless elk, 50 deer of which no more than 30 may be forked-horn or better buck deer, and 20 may be antlerless deer Issue 8 bull elk tags for the period of July 12, 2024 through December 12, 2024 Issue 10 antlerless elk tags for the period of September 15, 2024 through December 12, 2024 Issue 35 either-sex deer tags for the period of July 12, 2024 through November 30, 2024 No antlerless deer shall be harvested before September 15, 2024.	Continued removal and/or treatment of invasive scotch broom in the Anderson pasture near the springs. Fertilize and irrigate 15 acres of hay meadow from mid-July through mid-September to provide forage for wildlife. Rebuild the fencing at the 6-acre Meyer pasture livestock exclosure. Initiate a high intensity/ short duration cattle grazing treatment in the Meyers exclosure to remove accumulated mature, decadent forage. Remove and/or treat 4 acres of invasive scotch broom and restore and protect 2 springs. Create 3 new brush piles in the Meyer Pasture sub-area. 3 mature brush piles will be burned and reseeded.

Shamrock Ranch Cont.	No more than 15 buck deer may be taken after October 27, 2024. On or before October 15, 2024, the licensee may request (in writing) up to 15 additional either-sex deer tags to accomplish the authorized harvest.	Leave approximately 10.5 acres of hay meadow in the North Meadow and 30 feet wide by approximately 1,900 feet long buffer strip along Long Valley Creek in the South Meadow during haying to provide mature forage for elk and cover for the calves. Limit cattle grazing in the hay meadows and surrounding area which encompasses approximately 200 acres to mid-October through mid-December. Remove 660 feet of old woven wire fencing in the Meyers Pasture sub-area to reduce wildlife entanglement. Check and maintain 21 ponds and 8 springs. Repair an existing spring box which feeds an off-channel pond (Sawmill Pond and spring). The pond will be fenced to provide water and habitat for wildlife.
Six Point Ranch Deer Zone A Mendocino 3,960 Acres	Authorized Harvest: 12 forked-horned or better deer, 3 bull elk and 5 antlerless elk Issue 12 buck deer tags for the period of July 15, 2024 through November 30, 2024 No more than 4 buck deer may be harvested after September 27, 2024. Issue 3 bull elk tags for the period of July 20, 2024 through December 1, 2024 Issue 5 antlerless elk tags for the period of September 15, 2024 through November 1, 2024 On or before October 15, 2024, the licensee may request (in writing) up to 1 bull elk tag and 3 additional antlerless elk tags	Maintain 7 miles of roads and water bars where slopes are greater than 15% to reduce sediment entering waterways. Seed along 7 miles roads for wildlife forages and erosion control. Create 15 wildlife brush piles at least 8 feet high and 30 feet in diameter. Place tree stems and brush in the head cuts in at least 5 locations to decrease soil erosion on the upland areas. There will be no cattle grazing on the ranch this year in accordance with the rest period outlined in the management plan. Maintain exclusion fencing around Matthews Ranch Lake and riparian.

Six Point Ranch Cont.	to accomplish the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of elk available to harvest.	Remove at least 50 feet of fence barriers and replace with elk crossings of wildlife friendly fencing. Maintain all the water developments, name and map them all for better management in the future. Plant 10 acres of forage plots for deer utilization. Establish a 2-acre exclusion plot for deer fawning area. Treat at least 10 acres of yellow star thistle.
Spring Valley Ranch Deer Zone A Mendocino 4,860 Acres	Authorized Harvest: 24 forked-horn or better buck deer, 4 bull elk and 1 antlerless elk tag Issue 24 buck deer tags for the period of August 1, 2024 through November 30, 2024 No more than 8 buck deer may be harvested after September 15, 2024. Issue 4 bull elk tags for the period of August 1, 2024 through November 30, 2024 On or before October 15, 2024, the licensee may request (in writing) up to 1 additional bull elk tag to complete the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of elk available to harvest.	Remove at least 10 acres of conifer removal in oak woodlands. Maintain 10 previous water development projects. Create at least 10 brush piles at least 6 feet tall and 10 feet in diameter at the base. Remove and manipulate at least 5 acres of brush manipulation by tractor, hand, and/or herbicide to control scotch broom and coyote brush to improve wildlife forage. Mechanical removal of at least 1 acre of blackberries to create clearings for wildlife. Mechanical removal of at least 2 acres of manzanita to create clearings for wildlife. Repair existing elk crossings as necessary and construct 1 new elk crossing. Remove at least 1,000 feet of woven wire cross fencing to reduce wildlife entanglement.

	Issue 1 antlerless elk tag for the period of September 15, 2024 through November 30, 2024	Maintain 2 ponds (1-large 5-acre pond with 1-smaller pond) for use by migratory birds and other wildlife, including large mammals. The pond provides year-round water, as well as roosting, feeding, and nesting habitat. At least 1 mile of road maintenance and erosion control measures to lessen the sedimentation in waterways. Burn at least 5 decadent brush piles.
Stackhouse Ranch Shasta Deer Zone C3 400 Acres	Authorized Harvest: 2 deer of which no more than 1 may be antlerless deer Issue 2 either-sex deer tags for the period of September 1, 2024 through November 30, 2024 No antlerless deer shall be harvested before September 15, 2024.	Conduct at least a 5-acre prescribed burn under the mature oak stands. Allow regrowth of important brush species to 3 feet in the 100 acres of thinned plantations. Plant black oak seedlings. Complete 20 acre thinning and fuels management project. Control invasive blackberries on 15 acres at the pond and restored meadows through spraying with appropriate herbicide. Maintain 6 wood duck nesting boxes. Complete 20 acre thinning and fuels management project.
Stewart Ranch Deer Zone B1 Trinity 11,006 Acres	Authorized Harvest: 36 forked-horn or better buck deer and 5 antlerless deer Issue 36 buck deer tags for the period of July 20, 2024, through November 30, 2024. 10 of those tags shall be provided to apprentice or first-time hunters, and 1 shall be donated to a Hunter Education Instructor.	Rebuild wildlife friendly fencing and rebuild irrigation for all wildlife food plots that burned. Replant 4 irrigated food plots (10 acres total) with clover, chicory, and brassica to provide forage for wildlife at least every 4 years. Replant at least 11 acres of dryland food plots with barley, wheat, oats, plantain, and grains. Maintain 8 water sources (ponds and springs) with cattle exclusion fencing by

Stewart Ranch Cont.	Issue 3 antlerless deer tags for the period of September 15, 2024 through November 30, 2024 No more than 18 buck deer may be harvested after October 23, 2024. On or before October 15, 2024, the licensee may request (in writing) up to 5 additional either-sex deer tags to accomplish the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of tag holders actively hunting shall not exceed the number of deer available to harvest.	inspecting and repairing any damaged parts. Maintain the 200-yard buffer Golden Eagle nesting site protection area below "TinaMarie's Rock" Maintain all 15 wood duck nesting boxes by repairing and replacing damaged boxes and checking annually for nesting activity. Retreat conifer removal projects that have regrown.
Stover Ranch Humboldt 7,000 Acres	Authorized Harvest: 4 bull elk and 2 antlerless elk Issue 4 bull elk tags for the period September 1, 2024, through November 15, 2024. Issue 2 antlerless elk tags for the period September 4, 2024 through November 15, 2024 One of the antlerless elk tags will be made available for DFW to distribute to an Apprentice Hunter through the SHARE Program. The SHARE program will reimburse the PLM for the tag fee, but the PLM will otherwise provide the hunt free of charge.	Treat at least 33 acres of oak woodland/ prairie margin. Removing all conifer trees less than or equal to 12 inches DBH. Treat at least 50 acres of Grassland core treatment. Removing all conifer trees less than or equal to 18 inches DBH.

Summer Camp Ranch Deer Zone B1 Mendocino 38,502 Acres Summer Camp Ranch Cont.	Authorized Harvest: 80 forked-horn or better buck deer and 1 bull elk Issue 80 buck deer tags for the period of July 13, 2024 through November 30, 2024 No more than 40 buck deer may be taken after October 27, 2024. Issue 1 bull elk tag for the period of July 13, 2024 through November 30, 2024 On or before October 15, 2024, the licensee may request (in writing) up to 20 additional buck deer tags and 1 additional bull elk tag to accomplish the authorized harvest. In no case shall the number of tags issued be used to exceed the authorized harvest. The number of deer or elk tag holders actively hunting shall not exceed the number of deer or elk available to harvest.	Maintain 3 irrigated wildlife forage areas, totaling 12.50 acres. Maintain RE2 riparian exclusion areas totaling 0.50 acre by repairing any damaged fencing and willows will be monitored for survival. Maintain 14 developed springs by checking and repairing any damage. Exclude livestock grazing from July through October. Improved grazing management on the 9-acre Garcey Unit to leave a minimum of 1000 pound per acre RDM. Create a 25-acre shaded fuel break throughout this 5-year period (5 acres each year). The fuel break will be up to 100 feet in width along both sides of approximately 1 mile of existing permanent roadway. Create at least 20 slash piles that are a minimum of 10 feet in diameter. Remove planted conifers in 5 acres of grassland areas to improve forage for wildlife. Cattle will be removed from the PLM from July through October. Maintain approximately 7 miles of riparian fencing on the Eel River and repair any damage. Maintain a minimum of 10 miles of road to prevent sedimentation into the Eel River system. Road maintenance will generally include grading roads, pulling inside ditches where they exist, shaping the road surface to promote proper drainage,

Summer Camp Ranch Cont.		and inspection/repair of drainage facilities such as cross drains and culverts. Burn 100 acres of brush and grasslands in coordination with CalFire Vegetation Management Program to rejuvenate vegetation and control conifers invading oak woodlands. Burns throughout the 5-year period with the CAL FIRE Vegetation Management Program are dependent upon conditions, if burning cannot be conducted during the five-year project, 25 acres of planted ponderosa pine in grassland areas will be treated for conifer removal as an alternative.
Travis Ranch Deer Zone B1 Trinity 11,907 Acres Travis Ranch Cont.	Authorized Harvest: 15 deer of which no more than 5 may be antlerless deer Issue 15 either-sex deer tags for the period of July 15, 2024 through November 30, 2024 Buck deer must be forked-horn or better. No antlerless deer shall be harvested before September 15, 2024. No more than 8 buck deer may be harvested after October 27, 2024.	Remove all dead plant material less than or equal to 10 inches DBH from at least 20 acres of oak woodlands. Create 5 brush piles at least 6 feet tall and 10 feet in diameter at the base.
Wiggins Ranch Humboldt 16,657 Acres	Authorized Harvest: 2 bull elk and 2 antlerless elk Issue 2 bull elk tags for the period of August 1, 2024 through October 31, 2024 Issue 2 antlerless elk tags for the period of September 4,	Remove encroaching conifers less than or equal to 12 inches DBH from at least 50 acres of oak woodland and adjacent grasslands. Within the treatment area at least 20 conifers greater than 12 inches DBH will be girdled.

	2024 through November 15, 2024 On or before October 1, 2024, the licensee may request (in writing) up to 1 additional bull elk tag to complete the authorized harvest. One of the antlerless elk tags will be made available for DFW to distribute to an Apprentice Hunter through the SHARE Program. The SHARE program will reimburse the PLM for the tag fee, but the PLM will otherwise provide the hunt free of charge.	
Wilkinson Hunting Club Deer Zone B1 Humboldt/ Trinity 5,376 acres	Authorized Harvest: 14 forked-horn or better buck deer Issue 14 buck tags for the period of August 19, 2024, through November 30, 2024. No more than 7 buck deer may be harvested after October 27, 2024.	Remove 10 acres of conifer trees 12 inches DBH or less in oak woodland areas. Remove at least 2,200 feet of abandoned fencing. Create at least 2 brush piles measuring at least 15 feet in diameter and 6 feet high. Create a 1 acre planted food plot enclosed by 3-foot electric fencing to keep wild pigs and cattle out but allow deer passage. Develop or rehabilitate 2 springs.

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BAY DELTA REGION

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Corral Hollow Ranch Deer Zone A San Joaquin County 2,772 Acres	Authorized Harvest: 1 bull elk Issue 1 bull elk tag for the periods of July 15, 2024 through September 15, 2024 and November 15, 2024 through December 15, 2024.	Provide 480 acres of grasslands for exclusive use by elk. Continue to implement a rotational cattle grazing regime to provide adequate forage for elk. Leave downed and standing dead trees, including those that are a result of the SCU Lightning Complex and Corral Fires. Fence off a 30-acre section to establish elk forage plots. Five-acre plots are to be disked and planted each year for the next 5 years, resulting in 25 acres of planted forage. Seed mixes should contain a mixture of native grasses and forbs. Build and install 5 peeler-core elk crossings over the next 5 years. Two of these crossings will be located on the forage plot boundary fence and should be completed during the first year of this plan.
Coon Creek Ranch Deer Zone A Santa Clara County 1,650 Acres	Authorized Harvest: 8 forked-horn or better buck deer Issue 8 buck deer tags to take for the periods of July 11, 2024 through November 30, 2024.	Brush approximately 10 new acres of chaparral. Pile brush and burn. Maintain springs and pond. Limit cattle grazing to 80 acres of ranch.

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CENTRAL REGION		
PLM Area	**2024 Proposed Season and Harvest**	**Habitat Improvement Program**
Alexander Ranch Deer Zone A Monterey 786 Acres	Authorized Harvest: 1 bull elk, 2 antlerless elk and 1 forked-horn or better buck deer Issue 1 bull elk tag for the period of July 2, 2024, through December 31, 2024 Issue 2 antlerless elk tags for the period of September 15, 2024, through December 31, 2024 Issue 1 buck deer tag for the period of July 2, 2024, through November 30, 2024.	Maintain existing springs, troughs and reservoirs to provide water for wildlife. Conduct 2 elk counts per year (count deer when possible, too). Create 5 brush piles for use by wildlife. Mechanically crush or manipulate 5 acres of decadent brush to improve forage for wildlife. Limit cattle stocking rate to 75 animals to enhance and provide habitat and feed for wildlife.
Avenales Ranch San Luis Obispo County 11,300 Acres	Authorized Harvest: 4 bull elk and 3 antlerless elk Issue 3 bull elk tags for the period of July 15, 2024, through December 1, 2024. Issue 3 antlerless elk tags for the period of September 15, 2024, through December 1, 2024.	Repair, maintain, and upgrade wildlife projects which were built in 2019. Install a 5,000-gallon water tank, rain catch cover, fencing, and Wildlife friendly water trough for wildlife usage on the lower Power line road. Install an extra 5000-gallon water tank for extra water storage. Install 1 wildlife friendly water trough. Work with local college students on research on the mountain king snake. This would consist of allowing them to access the ranch, helping with access to remote back county and recording any sighting we come across. |

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Bardin Ranch Deer Zone A Monterey 8,000 Acres	Authorized Harvest: 2 bull elk tags (*every other year*), and 1 antlerless elk tag (*annually*) Issue 2 bull elk tag for the period of October 1, 2024, through December 31, 2024. Issue 4 antlerless elk tags for the period of October 1, 2024, through December 31, 2024.	Plant forage in the Gabilan elk and two hay fields. Mechanically clear and pile brush to improve grazing and enhance bird nesting habitat. Maintain all water supplies, springs, water troughs, and dams and remove brush in springs. Continue livestock grazing rotation and construct elk crossings. Implement improvements to storage reservoirs. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Camp 5 Outfitters – Roth Ranch Deer Zone A Monterey/San Luis Obispo 5,800 Acres	Authorized Harvest: 2 bull elk, 1 antlerless elk, 6 forked-horn or better buck deer, and 3 either-sex deer Issue 2 bull elk tags for the period of July 2, 2024, through December 31, 2024. Issue 1 antlerless elk tag for the period of September 15, 2024, through December 31, 2024. Issue 6 buck deer tags for the period of July 2, 2024, through November 30, 2024. Issue 3 either- sex deer tags for the period of September 1, 2024 through November 30, 2024 for antlerless deer.	Maintain perennial water for wildlife and water retention devices and pipes as needed. Plant 100 acres of grain for wildlife. Plant 20 acres safflower for wildlife Build a 20 foot x 20 foot brush pile. Continue to keep cattle grazing at 20% of carrying capacity. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Carnaza Ranch San Luis Obispo County 8,475 acres	Authorized Harvest: 3 bull elk and 3 antlerless elk Issue 3 bull elk tags for the period of July 15, 2024, through December 31, 2024. Issue 3 antlerless elk tags for the period of September 15, 2024, through December 31, 2024.	Plant 100 acres of barley for wildlife. Plant 10 trees. Keep water troughs full year-round.
Chimney Rock Ranch San Luis Obispo County 6,500 Acres	Authorized Harvest: 3 bull elk and 10 forked-horn or better buck deer Issue 3 bull elk tags for the period of July 15, 2024, through November 30, 2024. Issue 16 buck deer tags for the period beginning July 15, 2024, through November 30, 2024. At the request of the licensee on or before October 25th, the licensee may request an addition of 4 deer tags to accomplish the authorized harvest.	Construct 10+ brush piles for wildlife cover. Will burn old, collapsed piles, weather/burn days permitting. Defer cattle from Lake Pasture from early spring thru mid-fall. Continue to monitor/repair and/or improve all water sources. Spray yellow star thistle, medusa head, thistles, etc. in Lake Pasture and on San Marcos Dam.
Clark & White Ranch San Luis Obispo County 5,660 Acres	Authorized Harvest: 3 bull elk and 2 antlerless elk Issue 3 bull elk tags for the period of July 15, 2024, through December 15, 2024. Issue 2 antlerless elk tags for the period of September 15, 2024, through December 15, 2024.	Plant 1,000 acres of barley for use by elk and other wildlife. Repair 1 dam to increase standing water and enhance riparian/marsh habitats.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
D- Rafter L Ranch San Luis Obispo County 3,156 Acres	Authorized Harvest: 2 bull elk, 1 antlerless elk Issue 2 bull elk tags for the period of July 15, 2024, through December 31, 2024. Issue 1 antlerless elk tag for the period of September 15, 2024, through December 31, 2024.	Maintain existing brush piles by adding new brush to the tops/edges of the brush piles. Create brush pile #11 near Pond 2 for bird and small animal cover. Maintain duck boxes at Ponds 1-8. Maintain goose/turtle platforms at Ponds 2 and 3. Maintain pond turtle basking structures at Ponds 4 and 10. Maintain oak trees for mast production by preserving existing oak trees and woodlands, and preventing brush encroachment through livestock grazing. Leave downed woody material for wildlife use. Maintain operational status of two existing water projects. Plant 5 valley oak trees from acorns collected on site.
DeFrancesco/ Eaton Ranch Deer Zone: A Merced 4,149 Acres	Authorized Harvest: 10 forked-horn or better buck deer, 3 bull elk, and 3 cow elk Issue 10 buck deer tags for the period of July 13, 2024, through November 30, 2024. Issue 3 bull elk tags for the period of July 13, 2024, through November 30, 2024. Issue 3 antlerless elk tags for the period of September 14, 2024, through November 30, 2024.	Plant and maintain 5 acres of winter forage in area where juniper removal took place. Eliminate cattle grazing on APNs 087-070-011 and 087-070-013 between June 1, 2024 and December 31, 2024. Maintain water supply troughs at Main spring, Deer Camp, Laurel spring, Squirrel Spring, & Hay Barn.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Hartnell Ranch Deer Zone A Monterey 4,600 Acres	Authorized Harvest: 1 bull elk, 2 antlerless elk and 2 forked-horn or better buck deer Issue 1 bull elk tag for the period of July 2, 2024, through December 31, 2024. Issue 2 antlerless elk tags for the period of September 15, 2024, to December 31, 2024. Issue 2 forked horn or better buck deer tags for the period of July 2, 2024, to November 30, 2024.	Maintain existing springs, troughs and reservoirs to provide water for wildlife. Conduct 3 elk counts per year (count deer, when possible, too). Create 8 brush piles for use by wildlife. Mechanically crush or manipulate 10 acres of decadent brush to improve forage for wildlife. Limit Cattle stocking rate to 250 animals to maintain reserve habitats for wildlife.
Indian Valley Cattle Company (IVCC) – Lombardo Ranch Deer Zone A Monterey 12,500 Acres	Authorized Harvest: 3 bull elk, 2 antlerless elk and 4 forked-horn or better bucks Issue 3 bull elk tags for the period of July 15, 2024, through December 31, 2024. Issue 2 antlerless elk tag for the period of September 15, 2024, through December 31, 2024. Issue 4 buck deer tags for the period of July 2, 2024, through November 30, 2024.	Burn or brush crush 3-5 acres of chaparral. Create 4-6 brush piles for use by wildlife. Maintain cattle stocking rate of approximately 300 animals to provide feed and reduce competition with wildlife. Plant 350 acres of barley. Rotationally graze all pastures and rest others to increase wildlife access. No grazing in the Big Sandy Creek. Rotate cattle grazing of volunteer barley to facilitate wildlife use. Rehabilitate 25-50 acres of abandoned farmland to improve habitat value.
Lewis Ranch Deer Zone A San Benito 512 Acres	Authorized Harvest: Issue 1 bull elk tag (*every other year*), and 1 antlerless elk tag (*annually*) Issue 1 bull elk tag for the period of July 15, 2024, through December 31, 2024.	Maintain perennial water for wildlife and repair collection devices and troughs as needed. Clean and repair 4 existing owl boxes. Check 4 bat boxes. Create 12 brush piles for use by wildlife.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Lewis Ranch Cont.	Issue 1 antlerless elk tag for the period of September 15, 2024, to December 31, 2024.	Disc/plant/fertilize 8 fields with barley. No grazing of livestock on 512 acres.
Lone Ranch Deer Zone A San Benito 12,500 Acres	Authorized Harvest: 3 bull elk, 2 antlerless elk and 4 forked-horn or better buck deer Issue 3 bull elk tags for the period of August 1, 2024, through December 31, 2024. Issue 2 antlerless elk tag for the period of September 15, 2024, to December 31, 2024. Issue 4 forked horned or better buck deer tags for the period of July 2, 2024, through November 30, 2024.	Maintain perennial water for wildlife and repair collection devices and troughs as needed. Repair and improve Red Mountain Pond Spring to provide clean drinking water for wildlife. Rest Lower McCoy Pasture (1,500 acres), Cabin Pasture (300 acres), Loco Flat Pasture (200 acres) and Johnson Pasture (1,200 acres). Install 3 elk crossings in McCoy. Treat noxious weeds, such as yellow-star thistle, with herbicide in Driveway and Devil’s Canyon.
Morisoli Ranch Deer Zone A Monterey and San Benito Counties 14,700 Acres	Authorized Harvest: 4 bull elk and 4 antlerless elk Issue 4 bull elk tags for the period of July 1, 2024, through December 31, 2024. Issue 4 antlerless elk tags for the period of September 15, 2024, through December 31, 2024.	Maintain perennial water for wildlife and water retention devices and pipes as needed – develop one new water source for wildlife. Mechanically clear 5 acres of old growth brush to stimulate new forage growth for use by wildlife. Upgrade/improve old elk crossings and install one additional crossing. Construct and install 1 owl next box. Construct additional water storage tank, lines and troughs. Plant a minimum of 10 acres of dryland forage mix to provide wildlife forage.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
		Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Peachtree Ranch Deer Zone A Monterey 32,104 Acres	Authorized Harvest: 7 bull elk and 4 antlerless elk Issue 7 bull elk tags for the period of July 2, 2024, through December 31, 2024. Issue 4 antlerless elk tag for the period of September 15, 2024, through December 31, 2024. **This represents an increase in tag allocation (2 additional bull elk tag and 1 additional antlerless tag)*	Maintain perennial water for wildlife and water retention devices and pipes as needed. Build 1 elk crossing. Conduct 10-12 elk counts. Report the vegetation height by pasture after the steers have shipped. Install 15 escape ramps in water troughs. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Pine Mountain Ranch Deer Zone A San Benito County 1,621 Acres	Authorized Harvest: 4 forked-horn or better buck deer Issue 4 buck deer tags for the period of July 2, 2024, through November 20, 2024.	Maintain perennial water for wildlife and water retention devices and pipes as needed – develop 1 new water source for wildlife. Continue to mechanically clear or brush crush decadent to stimulate new forage growth for use by wildlife. Plant a minimum of additional dryland forage mix to provide wildlife forage. Repair and maintain fencing as needed – continue to remove interior fencing to encourage wildlife to traverse the property.

PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
		Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Rancho La Cuesta Deer Zone A San Benito 4,000 Acres	Authorized Harvest: 2 bull elk, 1 antlerless elk, and 4 forked-horn or better buck deer Issue 2 bull elk tags for the period of July 15, 2024, through December 31, 2024. Issue 1 antlerless elk tag for the period of September 15, 2024, through December 31, 2024. Issue 2 buck deer tags for the period of July 15, 2024, through November 30, 2024 *Rancho La Cuesta is not requesting their full allocation of deer tags.*	Clean and maintain water points on the ranch to provide water for wildlife. Provide water for the upper ranch. Continue to repair pond damage that occurred in 2023. Plant 5 acres of grass and legumes to provide high quality food for elk and deer. Maintain 2,350-acre cattle free refuge on the upper portion of the ranch for exclusive use by wildlife. Burn or mechanically manipulate 5 acres of decadent chaparral to stimulate growth of quality browse for wildlife. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Rooster Comb Ranch Deer Zone: A Stanislaus 4,862 Acres	Authorized Harvest: 6 forked-horn or better buck deer and 2 bull elk Issue 6 buck deer tags for the period of August 10, 2024, through November 24, 2024. Issue 2 bull elk tags for the period of September 6, 2024, through December 31, 2024.	Plant 20 acres with rye/vetch/sudan mix in Area A. Clear 5 acres of decadent chapparal and use cuttings to make quail habitat. Maintain and/or repair all water sources. Maintain and/or repair all elk crossings.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
San Bartolome Ranch Deer Zone A Monterey 3,500 Acres	Authorized Harvest: 1 bull elk, 1 antlerless elk, 3 forked-horn or better buck deer, and 3 either- sex deer Issue 1 bull elk tag for the period of July 2, 2024, through December 31, 2024. Issue 1 antlerless elk tag for the period of September 15, 2024, through December 31, 2024. Issue 2 buck deer tags for the period of July 2, 2024, through November 30, 2024 *San Bartolome Ranch is not requesting their full allocation of tags.*	Maintain perennial water for wildlife and water retention devices and pipes as needed. Build 1 elk crossing in the back pasture. Mow or disk a 3-mile fire break. Provide water in the back pasture for wildlife access. Build a 20 foot x 20 foot brush pile. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.
Sky Rose Ranch Deer Zone A Monterey 14,039 Acres	Authorized Harvest: 7 forked-horn or better buck deer, 2 antlerless deer, and 2 bull elk Issue 7 buck deer tags for the period of July 1, 2024, through November 30, 2023. Issue 2 antlerless deer tags for the period of July 1, 2024, through November 30, 2023. Issue 2 bull elk tags for the period of July 1, 2023, through December 31, 2023.	Plant 10 acres of barley and grass mix to provide forage and cover for wildlife. Remove and dispose of mature tree of heaven; seed with site-appropriate native seed mix. Open dense juniper stands by trimming lower branches to create refuge and shaded sites. Install any combination of blue bird nesting boxes or bat roosting boxes totaling 10 units at locations to be determined on the ranch. Construct 10 brush piles in appropriate areas to enhance wildlife habitat. Maintain existing wildlife watering sources.

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PLM Area	2024 Proposed Season and Harvest	Habitat Improvement Program
Temblor Ranch 30,000 Acres Kern/San Luis Obispo Counties	Authorized Harvest: 9 bull elk and 10 antlerless elk Issue 9 bull elk tags for the period of July 15, 2024, through December 31, 2024. Issue 10 antlerless elk tags for the period of September 15, 2024, through December 31, 2024.	Plant 100 acres of barley. Plant 5 shade trees and 5 fruit trees. Install 1 water trough.
Trinchero Ranch Deer Zone A San Benito 4,452 Acres	Authorized Harvest: 2 bull elk and 1 antlerless elk Issue 2 bull elk tags for the period of July 15, 2024, through December 31, 2024. *Trinchero Ranch is not requesting their full allocation of tags.*	Maintain perennial water for wildlife and water retention devices and pipes as needed. Control invasive tamarisk along San Benito River adjacent to house pasture. Plant dryland range mix in brush cleared areas. Construct 4-6 brush piles for wildlife use. Limit cattle grazing on approximately 4000 acres in Black Mountain and Red Mountain pastures from December through May. Contribute to CDFW chronic wasting disease surveillance by providing samples from harvested elk.

STAFF SUMMARY FOR OCTOBER 11-12, 2023
(For Background Purposes Only)

9. WHITE STURGEON EMERGENCY REGULATION

Today's Item **Information ☐** **Action ☒**

Discuss and consider adopting emergency regulations concerning recreational take of white sturgeon to support recovery of sturgeon populations and to track fishing pressure and success.

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) discussion and recommendation — September 19, 2023; WRC
- **Today's adoption hearing — October 11-12, 2023**

Background

White sturgeon is an anadromous fish species that resides primarily in the San Francisco Bay-Delta and migrates as adults into the major rivers of the Central Valley to spawn. White sturgeon are long lived, potentially in excess of 100 years, with most individuals reaching maturity by approximately 14 to 15 years. Mature white sturgeon spawn every 2 to 5 years. Successful recruitment to the adult population is uncommon, occurring approximately every s6to 7 years, and is highly correlated with above normal water years as measured by high mean daily Sacramento–San Joaquin River Delta outflow. The abundance of legal-sized white sturgeon in California has declined considerably since the 1980s, when abundance was estimated to be approximately 175,000 fish. In 2015, the Department estimated abundance in California at about 48,000 fish, and the Department's 2023 estimate was about 33,000 fish.

At present, recreational anglers can keep one white sturgeon per day, with a combined total of three per year, between 40 and 60 inches (fork length). The season is open year-round, with some limited regional and/or seasonal closures. Fishing pressure for white sturgeon, as measured by the number of fish harvested by anglers, has remained relatively stable; however, the number of fish caught and released has declined precipitously, indicating that fewer fish overall are being caught. The exploitation rate (i.e., the age-specific proportion of the population or biomass that is removed each year) of white sturgeon is estimated to be very high, ranging from 8 to 29.6% between 2007 and 2015. It has been suggested that the highest exploitation rate that a white sturgeon population can sustain is approximately 5 to 10%.

During July and August 2022, the San Francisco Bay region experienced a major harmful algal bloom (HAB) of *Heterosigma akashiwo* that resulted in significant mortality of fishes, including sturgeon. The resulting mortality has exacerbated what the Department believes to be an already unsustainable level of fishery exploitation of white sturgeon into a crisis situation.

Synopsis of Events

The Commission was first informed about the existence of an emergency through WRC. At the January 2023 WRC meeting at the request of the chair, the Department responded to an op-ed written by various sturgeon researchers in the academic field, calling on the Department to close the recreational white sturgeon fishery. The Department's response included a brief discussion of white sturgeon population declines, and the status of white sturgeon data being processed from various sources, including ongoing evaluation of impacts caused to the species by the summer of 2022 HAB, the possibility of future regulatory actions, data collection and modelling, and future stakeholder input. At the January meeting, the Department indicated that, based on the information available at the time, emergency action was not warranted, but that data was still being analyzed.

During the May 2023 WRC meeting, the Department outlined its previous and future plans for stakeholder engagement on the subject of potential white sturgeon regulation changes, stating its intent to develop a proposed regular rulemaking for Commission consideration that would change white sturgeon regulations for the 2025 calendar year, and that the Department was continuing to analyze data to determine the status of white sturgeon and appropriate management measures, including options for changes to sport fishing.

At the September 2023 WRC meeting, the Department presented new evidence on the white sturgeon population, the effects of the HAB, current and historical rates of sturgeon exploitation, and other information, all of which led the Department to conclude that an emergency situation exists. To protect the surviving population of white sturgeon and maintain a recreational fishery into the future, the Department stated that immediate steps are necessary to (1) stop angler-associated harvest of adult white sturgeon and (2) minimize harassment and handling on the spawning grounds so that adults can successfully spawn, and new individuals can recruit to the population.

Given this new information, WRC decided to recommend to the full Commission that it consider an emergency regulation at its next scheduled meeting, in October 2023. As a result of that WRC decision, Commission staff requested the Commission president add an agenda item to the October meeting to allow the Commission to consider emergency action.

Proposed Emergency Regulations

This proposed regulatory action amends sections 5.79, 5.80, 27.90 and 29.72, which describe report card and tagging requirements, seasons, and associated bag limits for white sturgeon recreational fishing in inland waters.

- Section 5.79: Removes language regarding white sturgeon harvest tags, as no harvest would be allowed under the proposed emergency regulations. Adds a requirement for anglers to report the length of any fish caught, to provide the Department with additional data for future management options. Adds language to instruct anglers to report additional sturgeon caught and released to provide data on fishing pressure and success.
- Section 5.80: Specifies white sturgeon fishing seasons from the west Carquinez Bridge east to the Highway 50 bridge on the Sacramento River, and above the Highway 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River; changes the fishing to catch-and-release only; and changes the daily bag limit to 0.
- Section 27.90: Specifies white sturgeon fishing seasons for the Carquinez Bridge area, which falls under the jurisdiction of marine fisheries; changes the fishing to catch-and-release only; and changes the daily bag limit to 0.

- Section 27.92: Updates language to a bag limit of 0 and specifies that white sturgeon is catch-and-release only in ocean waters.

Further details on the proposed changes are available in the emergency statement and proposed regulatory language (exhibits 4 and 5).

Significant Public Comments

1. An owner of a bait shop writes in opposition to the proposed emergency regulations, stating that the closure is not necessary and will have a dire effect on small businesses and the fishing industry (Exhibit 6).
2. A member of the public expresses concern that the urgency for the rulemaking is exaggerated. They state that the information provided is only from the last 4 years and that historical information from the past 80 years should also be considered. Lastly, they indicate that they are unaware of any successful catch-and-release fisheries on the West Coast, and are skeptical of the survey results that inquired if people would continue to fish without the option of harvest (Exhibit 7).

Recommendation

Commission staff: Adopt the emergency regulations amending sections 5.79, 5.80, 27.90, and 27.92 related to white sturgeon catch and release as recommended by the Department.

Committee: The Wildlife Resources Committee recommends the Commission adopt an emergency regulation regarding recreational take of white sturgeon.

Department: Adopt the emergency regulations as presented in the emergency statement in Exhibit 4 to pause all harvest of white sturgeon within the recreational fishery until new regulations can be developed that will limit exploitation to sustainable rates based on monitoring data.

Exhibits

1. Department presentation
2. Supplementary material from the Department, received October 4, 2023
3. Department memo, received September 22, 2023
4. Draft emergency statement and informative digest
5. Draft proposed regulatory language
6. Email from Leonard Butcher, received September 18, 2023
7. Email from Jacob Linard, received September 25, 2023

Motion

The Commission determines, pursuant to Section 399 of the California Fish and Game Code, that adopting these regulations is necessary for the immediate conservation, preservation, and protection of birds, mammals, fish, amphibians, or reptiles, including, but not limited to, their nests or eggs.

The Commission further determines, pursuant to Section 11346.1 of the California Government Code, that an emergency situation exists and finds the proposed regulations are necessary to address the emergency.

Moved by ___________ and seconded by ___________ that the Commission adopts the emergency regulations amending sections 5.79, 5.80, 27.90 and 27.92 related to white sturgeon catch and release fishing regulations.

State of California
Department of Fish and Wildlife

Signed original on file,
received March 19, 2024

M e m o r a n d u m

Date: March 15, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Submittal of Emergency Statement for Readoption of Sections 5.79, 5.80, 27.90 and 27.92, Title 14, California Code of Regulations, Re: White Sturgeon

Please find attached the Findings of Emergency and Statement of Proposed Emergency Regulatory Action to Readopt amendments to sections 5.79, 5.80, 27.90 and 27.92, of Title 14, California Code of Regulations. At its October 11, 2023 meeting, the Fish and Game Commission (Commission) approved an emergency rulemaking amending sections 5.79, 5.80, 27.90, and 29.72, Title 14, CCR, which describe report card and tagging requirements, and seasons and bag limits for White Sturgeon sport fishing in inland waters. The current emergency rule will expire after six months, on May 15, 2024, unless it is readopted for an additional 90 days at the April 18, 2024 Commission meeting. The continuation of the emergency action reducing the bag limit, reducing the size limit, instituting a per-day vessel limit, and closing fishing in migrating and spawning habitat is necessary to protect the White Sturgeon population until a permanent regulation can be implemented.

During July and August 2022, the San Francisco Bay region experienced a major Harmful Algal Bloom (HAB) that resulted in significant mortality of sturgeon. The Department recorded over 850 sturgeon carcasses, the majority legal-sized or larger. Based on carcass studies and fish kills of other species of sturgeon, it is thought that only a small percentage of the fish killed floated long enough to be detected. The absolute magnitude of this impact on the White Sturgeon population is unknown but is thought to be significant.

To protect the surviving population and maintain a recreational fishery into the future, immediate steps are necessary to reduce angler associated harvest of adult White Sturgeon and to minimize harassment and handling on the spawning grounds. Continuing the emergency action directed at reducing exploitation rate and protecting reproduction of the species is necessary until long term regulations are enacted that will adequately protect the remaining White Sturgeon population.

We request submission of this emergency action to the Office of Administrate Law after consideration at the April meeting. If you have any questions or need additional information, please contact Jay Rowan, Chief, Fisheries Branch at fisheries@wildlife.ca.gov. The Department point of contact for this emergency regulation should identify Statewide Sturgeon Coordinator, John Kelly. He can be reached at sturgeon@wildlife.ca.gov.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Jay Rowan, Branch Chief
Fisheries Branch
Wildlife and Fisheries Division

Dan Kratville, Senior Environmental Scientist (Supervisor)
Fisheries Branch
Wildlife and Fisheries Division

John Kelly, Statewide Sturgeon Coordinator
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David Thesell, Program Manager
Fish and Game Commission

Jenn Bacon, Analyst
Fish and Game Commission

State of California
Fish and Game Commission
Finding of Emergency and
Statement of Proposed Emergency Regulatory Action

Readoption of Emergency Action to Amend Sections 5.79, 5.80, 27.90, and 27.92
Title 14, California Code of Regulations
Re: White Sturgeon

Date of Statement: February 15, 2024

Throughout this document, Department or CDFW refer to the California Department of Fish and Wildlife and Commission refers to the California Fish and Game Commission. Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

I. Emergency Regulations in Effect to Date

At its October 11, 2023 meeting, the Commission approved an emergency rulemaking amending sections 5.79, 5.80, 27.90, and 27.92, Title 14, CCR, which describe report card and tagging requirements, and seasons and bag limits for White Sturgeon sport fishing in inland and ocean waters.

Background

White Sturgeon Sport Fishing

White Sturgeon (*Acipenser transmontanus*) are an anadromous species of fish that reside primarily in the San Francisco Bay Delta (SF Bay) and migrate as adults into the major rivers of the Central Valley to spawn. Most spawning occurs in the Sacramento River approximately between Verona and Colusa (Schaffter 1997), with a lesser amount of spawning on the lower San Joaquin River (Jackson et al. 2015). Some additional spawning may occur in tributaries such as the Feather, Bear, and Yuba rivers. White Sturgeon are long lived, potentially in excess of 100 years, with most reaching maturity by approximately 19 years, spawning every two to four years once mature (Chapman et al. 1996; Hildebrand et al. 2016). Successful recruitment to the adult population is uncommon, occurring approximately every six to seven years, highly correlated with above normal water years as measured by high mean daily Delta outflow (CDFW 2023; Fish 2010). The abundance of legal-sized White Sturgeon has declined considerably since the 1980s, when abundance was estimated to be approximately 175,000 fish (CDFW 2023; Danos et al. 2019). In 2015, the Department estimated abundance at about 48,000 fish (Danos et al. 2019), and the most recent estimate was about 33,000 fish (CDFW 2023).

Fishing pressure for White Sturgeon has remained stable at roughly 40,000 to 45,000 anglers per year since 2013 when fees were first charged for the Sturgeon Fishing Report Card (Card). Based on Card returns, the number of fish harvested by anglers has remained relatively stable. However, the number of fish caught and released has declined precipitously, indicating that fewer fish overall are being caught. According to Card data, in 2021, anglers kept 46% of landed fish (Hause et al. 2021). The majority of anglers that harvest fish keep only one a year (75%), with only about 5% of anglers that harvest (1% of Cardholders) keeping the full three-fish limit. Exploitation rate of White Sturgeon is estimated to be very high, ranging from 8 to 29.6% between 2007 and 2015 (Blackburn et al. 2019) and averaging 8.1% in the years since that time (CDFW 2023). It is suggested that the highest exploitation rate that a sturgeon population can sustain is approximately 5 to 10% (Beamesderfer and Farr 1997), and that does not account for other anthropogenic sources of mortality such as habitat loss, altered hydrology, or contaminants. For comparison, Washington and Oregon use 3.8% as a target for management in areas that permit harvest.

Section 5.79, White Sturgeon Report Card and Tagging Requirements for Inland Waters

The emergency regulations amended White Sturgeon report card and tagging requirements for inland waters in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (b): Edit text to reflect that report cards will come with only one tag rather than three. Add subsections (7) and (8) to clarify when anglers can continue to fish catch and release after harvesting a fish. Anglers will not be permitted to fish catch and release the same day they harvest a fish in order to prevent 1) take over the daily possession limit and 2) “high grading” (holding a fish in captivity while continuing to fish in the hopes of catching a larger individual).
- Subsection (c)(1): Add a requirement for anglers to report length of caught fish. This is necessary to provide more data availability on the nature of size to inform future management options related to age.
- Subsection (c)(2): Remove the current language that tells anglers if all lines on the card are filled, any additional sturgeon caught and released do not need to be recorded, and replace with language guiding anglers to report additional sturgeon caught and released on the back of the card. This is necessary in order to track fishing pressure and success. It is valuable to track all fish caught by anglers and this should not be restricted simply by the size of the printed card. This type of data allows the Department to form a better understanding of the fishery as we plan long-term regulations for the fishery.

Section 5.80, White Sturgeon

The proposed regulations will amend the White Sturgeon open season and daily and annual bag limit in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (a); from the west Carquinez Bridge east to the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River the fishing season will

remain open all year. Above the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River, including all tributaries of both rivers, fishing will be allowed from June 1 through December 31 and all fishing for sturgeon will be unlawful from January 1 to May 31. This is necessary to maintain recreational fishing, which has economic and cultural benefits, while preventing additional mortality of the impacted White Sturgeon population and minimizing harassment and handling of migrating and spawning individuals. White Sturgeon are known to handle catch and release fishing with minimal adverse impacts except during migration and spawning season when additional stress of catch can cause fish to abort spawning activities.

- Subsection (b), now (b) and (c); Divide this subsection so there are individual sections for daily and annual limits. This will allow unambiguous clarification of when catch and release angling is permitted. Change the annual bag limit of "three fish per year statewide" to "one fish per calendar year statewide". This is necessary to reduce harvest of White Sturgeon in inland waters to ensure protection of the population impacted by the HAB-induced fish kill and provide protection during migration and spawning.
- Add subsection (d); add vessel daily limit of two fish per day per vessel, regardless of how many sturgeon report card holders are on board. This will help reduce the daily amount of harvest associated with multi-angler vessels, both private and professional, and should contribute to less overall harvest of the adult population.
- Subsection (c), now (e): change the minimum legal size from 40 to 42 in. fork length and the maximum size from 60 to 48 in. fork length. Reducing the slot limit to target a lower size range of adults is expected to reduce overall harvest and provide more protection of the larger, most reproductively valuable fish in the population.
- Subsections (e) through (l) will need to be re-lettered to account for the splitting of subsection (b) and the addition of subsection (d) daily vessel maximum harvest.

Section 27.90, White Sturgeon

These regulations refer to areas west of the Carquinez Bridge, which fall under the jurisdiction of marine fisheries. The emergency regulations will amend the White Sturgeon open season and daily and annual bag limit in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (a): west of the Carquinez Bridge, angling will be allowed all year, except as described in Section 27.95. This note has been added to explicitly draw attention the existing seasonal closure in San Francisco Bay.
- Subsection (b), now (b) and (c); Divide this subsection so there are individual sections for daily and annual limits. This will allow unambiguous clarification of when catch and release angling is permitted. Change the annual bag limit of "three fish per year statewide" to "one fish per calendar year statewide". This is necessary to reduce harvest of White Sturgeon in marine waters to ensure protection of the population impacted by the HAB-induced fish kill and provide protection during migration and spawning.
- Add subsection (d); add vessel daily limit of two fish per day per vessel, regardless of how many sturgeon report card holders are on board. This will help reduce the daily amount of

harvest associated with multi-angler vessels, both private and professional, and should contribute to less overall harvest of the adult population.

- Subsection (c), now (e): change the minimum legal size from 40 to 42 in. fork length and the maximum size from 60 to 48 in. fork length. Reducing the slot limit to target a lower size range of adults is expected to reduce overall harvest and provide more protection of the larger, most reproductively valuable fish in the population.
- Subsections (c) through (h) will need to be re-lettered to account for the splitting of subsection (b) and the addition of subsection (d) daily vessel maximum harvest.

Subsection 27.92, White Sturgeon Report Card and Tagging Requirements for Ocean Waters

The proposed regulations will amend White Sturgeon report card and tagging requirements for ocean waters in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (b): Edit text to reflect that report cards will come with only one tag rather than three. Add subsections (7) and (8) to clarify when anglers can continue to fish catch and release after harvesting a fish. Anglers will not be permitted to fish catch and release the same day they harvest a fish in order to prevent 1) take over the daily possession limit and 2) “high grading” (holding a fish in captivity while continuing to fish in the hopes of catching a larger individual).
- Subsection (c)(1), now subsection (b)(1); add a requirement for anglers to report length of caught fish to provide more data availability to inform future management options. Subsection (c)(2), now subsection (b)(2); remove the current language that tells anglers if all lines on the card are filled any additional sturgeon caught and released do not need to be recorded and replace with language guiding anglers to report additional sturgeon caught and released on the back of the card. This is necessary in order to track fishing pressure and success. It is valuable to track all fish caught by anglers and this should not be restricted simply by the size of the printed card. This type of data allows the Department to form a better understanding of the fishery as we plan long-term regulations for the fishery.

II. Request for Approval of Readoption of Emergency Regulations

At the October 11, 2023 FGC meeting, the Commission voted in support of an emergency action that limited harvest via reductions in the bag and legal slot limits, and instituted per-day vessel limits and seasonal and geographic closures of migrating and spawning habitat. This was intended to protect the existing population in the short term while allowing time for the Department to develop new long-term management measures for the future population.

The current emergency rule will expire after six months, on May 15, 2024, unless it is readopted for an additional 90 days at the April 18, 2024 meeting of the Fish and Game Commission (Commission). The continuation of the emergency action reducing the bag limit, reducing the size limit, instituting a per-day vessel limit, and closing fishing in migrating and spawning habitat is necessary to protect the White Sturgeon population until a permanent regulation can be implemented.

It is anticipated that a standard rulemaking to permanently adopt these White Sturgeon fishery changes will be received by the Commission at its June 14-15, 2024 meeting at which time the Commission may authorize publication of a notice of its intent to adopt the regulations. It is expected that the permanent regulations would become effective in January 2025.

III. Statement of Facts Constituting the Need for Readoption of Regulatory Action

Until the start of the emergency action on November 16, 2023, recreational anglers were permitted to keep one White Sturgeon per day, and a combined total of three per year, between 40 and 60 in. fork length, meaning the measurement of the fish from the front of its head to the fork in its tail. The season was open year-round, with some limited regional and/or seasonal closures. The emergency action accomplished the following:

a) reduced the annual bag limit for White Sturgeon from three to one fish,
b) reduced the legal-sized slot limit from 40-60" total length (TL) to 42-48" TL,
c) placed a limit of two fish per day per boat, and
d) closed White Sturgeon fishing in the migrating and spawning reaches of the Sacramento and San Joaquin rivers from January 1 through May 31.

It is likely to have resulted in the desired effect of reducing exploitation rate and protecting spawning fishes; however, the actual effect of the emergency action will not be quantifiable until summer 2025 due to how data are collected in this fishery. The Department monitors harvest using the Sturgeon Fishing Report Card (card) which must be returned after the end of the calendar year. Card data are analyzed and trends are reported in the summer of the year following the card year (e.g. 2023 data will be reported in summer 2024) after sufficient time is given for cards to be returned to the Department, entered in the database, QA/QC by staff, and then analyzed. The emergency regulations went into effect on November 16, 2023, so only 1.5 months of data under the emergency action will be available for analysis later in 2024. It is possible that trends associated with the emergency action will become apparent in those data, but the Department will not be able to accurately assess the effects of this action until the summer of 2025 when 2024 data are available. The continued emergency action directed at reducing exploitation rate and protecting reproduction of the species is necessary until long term regulations are enacted that will adequately protect the remaining White Sturgeon population.

IV. Existence of an Emergency and Need for Immediate Action

The Commission considered the following factors in determining that an emergency does exist at this time:

The magnitude of potential harm:

During July and August 2022, the SF Bay region experienced a major HAB of *Heterosigma akashiwo* that resulted in significant mortality of fishes, including both White and Green sturgeon. The unprecedented fish kill resulting from the 2022 HAB killed at least 850 sturgeon, primarily

White Sturgeon (CDFW 2023). Of these carcasses, 86% were legal-sized or greater, representing mature, spawning broodstock (CDFW 2023). This estimate represents the minimum mortality experienced, which may have been an order of magnitude greater based on data from other sturgeon populations. This added mortality from the HAB was equivalent to 62% of the mortality due to harvest in 2022. Further, *H. akashiwo* bloomed again in the summer of 2023, resulting in a less intense HAB that resulted in the loss of at least 15 White and one Green sturgeon, suggesting that recuring HABs should be anticipated in the future. The abundance of legal-sized White Sturgeon has already declined considerably in the past forty years, and these HAB fish kills exacerbated the situation considerably. Abundance was estimated to be approximately 175,000 legal-sized fish in the 1980s (Danos et al. 2019). The Department's most recent population estimate of White Sturgeon was around 33,000 fish. Without knowledge of the true size of the population reduction resulting from the HAB fish kills, these mortality events could be impacting a considerable portion of the population.

The existence of a crisis situation:

The fish kill resulting from the HAB exacerbated what the Department believed to be an already unsustainable level of fishery exploitation of White Sturgeon into a crisis situation. In order to protect the surviving population of White Sturgeon and maintain a recreational fishery into the future, immediate steps were necessary to reduce angler associated harvest of adult White Sturgeon and to minimize harassment and handling on the spawning grounds so that these adults can spawn successfully, and new individuals can recruit to the population. The Department recommended that all harvest of White Sturgeon within the recreational fishery be paused until new regulations could be developed to limit exploitation to sustainable rates based on monitoring, which was opposed by the recreational sturgeon fishing industry. Based on carcass studies and fish kills of other species of sturgeon, it is thought that only a small percentage of the fish killed floated long enough to be detected (Fox et al. 2020). A second, less intense HAB of the same organism resulted in additional mortality, indicatingthat HABs are likely to recur in the future. The absolute magnitude of this impact on the White Sturgeon population is unknown, but is thought to be quite significant. Based on fishery data, the White Sturgeon population was already overexploited under current regulations, and updated regulations were needed and were being considered. The mortality from the HAB fish kills elevated an unsustainable situation into a crisis.

The immediacy of the need:

Immediate steps are necessary to reduce harvest of White Sturgeon, and allow the remaining population to persist after the die-offs. Take of White Sturgeon peaks in the fall and winter, so individuals are at risk if action is not taken quickly. Harassment and handling must be eliminated on White Sturgeon spawning grounds to ensure new individuals are recruiting to the population and maintain a recreational fishery in the future. These steps will protect the population while long term fishery changes are implemented, reducing fishery mortality and protecting spawning. Furthermore, In July and August 2023, a new HAB of the same species formed in the Northern San Francisco Bay. As of mid-August, 15 White Sturgeon carcasses and one Green Sturgeon carcass have been reported. It is imperative that we act to mitigate anthropogenic sturgeon mortality during this or future HAB events. These steps will protect the population while long term fishery changes are implemented, reducing fishery mortality and protecting spawning.

Whether the anticipation of harm has a basis firmer than simple speculation:

The Department has monitored the White Sturgeon population since the 1950s, focusing primarily on abundance of legal-sized fish that are targeted in the fishery. Records indicate that the population has declined substantially from ~175,000 legal sized in the 1980s to ~33,000 in the most recent estimate. The historic SF Bay fish kill in 2022 is also known to have killed a large number of mature, spawning-age sturgeon though the absolute magnitude of that impact is unknown. Harvest of the adult population is known to be high, routinely exceeding exploitation rates recommended in the scientific literature and used by other natural resource agencies of management. Recruitment in the population is known to be poor, infrequent, and closely associated with above normal water years, making it difficult for the species to recover from overharvest. Under current environmental and management conditions, the White Sturgeon population cannot handle the current rate of exploitation and is not sustainable. Long term permanent regulation changes are needed to limit harvest to sustainable levels. Until new regulations are in place, the reduction of harvest of White Sturgeon will minimize fishery related impacts to the population and minimize the magnitude of potential harm, while still offering recreational fishing opportunities to anglers.

V. Readoption Criteria

Same as or Substantially Equivalent

Pursuant to Government Code subdivision 11346.1(h), a readoption may be approved only if the text is “the same as or substantially equivalent to an emergency regulation previously adopted by that agency.” The language proposed for this rulemaking is the same as the language of the original emergency regulation.

Substantial Progress

Government Code subdivision 11346.1(h) specifies “Readoption shall be permitted only if the agency has made substantial progress and proceeded with diligence to comply with subdivision (e)” [sections 11346.2 through 11347.3, inclusive].

A regular rulemaking (certificate of compliance) is currently underway and will be presented to the Commission for public notice at its April 17-18, 2024 meeting.

Proposed Action by the Commission

The Commission proposes the readoption of the emergency amendments to sections 5.79, 5.80, 27.90, and 27.92 that are the same as previously effective.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State

None. No costs or savings to state agencies or costs/savings in federal funding to the state are anticipated. The Department's existing level of monitoring and enforcement activities is expected to be unchanged by this emergency action. However, the Department anticipates a reduction in White Sturgeon Report Cards sales revenue estimated to be (-$13,596) over the 90 day emergency readoption period in fiscal year 2023-2024.

(b) Nondiscretionary Costs/Savings to Local Agencies

None.

(c) Programs Mandated on Local Agencies or School Districts

None.

(d) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code

None.

(e) Effect on Housing Costs

None.

IV. Technical, Theoretical, and/or Empirical Studies, Reports, or Documents Relied Upon:

The Department relied on the following documents in proposing this emergency rulemaking action:

California Department of Fish and Wildlife (CDFW). 2023. White Sturgeon 2023 Emergency Regulation Change: Supporting Material. California Department of Fish and Wildlife, Fisheries Branch, West Sacramento, California.

Danos, A., J. DuBois, R. Baxter, J. T. Kelly, and M. L. Gingras. 2019. White Sturgeon, Acipenser transmontanus, Enhanced Status Report. California Department of Fish and Wildlife. https://marinespecies.wildlife.ca.gov/white-sturgeon/

Hause, C. L., C. Parker, D. Kratville, D. Stompe, J. A. Hobbs, and J. T. Kelly. 2023. Sturgeon Fishing Report Card: 2022 Summary Data Report. California Department of Fish and Wildlife, West Sacramento, California. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213586

Hause, C. L., C. Parker, D. Kratville, D. Stompe, J. A. Hobbs, and J. T. Kelly. 2022. Sturgeon Fishing Report Card: 2021 Summary Data Report. California Department of Fish and Wildlife, West Sacramento, California. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=202750

V. Documents Providing Background Information

Beamesderfer, R. C. P., and R. A. Farr. 1997. Alternatives for the protection and restoration of sturgeons and their habitat. Environmental Biology of Fishes 48:407–417.

Blackburn, S. E., M. L. Gingras, J. DuBois, Z. J. Jackson, and M. C. Quist. 2019. Population Dynamics and Evaluation of Management Scenarios for White Sturgeon in the Sacramento–San Joaquin River Basin. North American Journal of Fisheries Management 39(5):896–912.

Chapman, F. A., J. P. Van Eenennaam, and S. I. Doroshov. 1996. The reproductive condition of white sturgeon, Acipenser transmontanus, in San Francisco Bay, California. Fishery Bulletin 94:628–634.

Fish, M. A. 2010. White Sturgeon Year-Class Index for the San Francisco Estuary and its Relation to Delta Outflow. IEP Newsletter 23(2):80–84.

Fox, D. A., E. A. Hale, and J. A. Sweka. 2020. Examination of Atlantic Sturgeon Vessel Strikes in the Delaware River Estuary: Final Report. NOAA-NMFS Award No. NA16NMF4720357.

Halvorson, L. J., B. J. Cady, K. M. Kappenman, B. W. James, and M. A. H. Webb. 2018. Observations of handling trauma of Columbia River adult white sturgeon, Acipenser transmontanus Richardson, 1836, to assess spawning sanctuary success. Journal of Applied Ichthyology 34(2):390–397.

Hildebrand, L. R., A. Drauch Schreier, K. Lepla, S. O. McAdam, J. McLellan, M. J. Parsley, V. L. Paragamian, and S. P. Young. 2016. Status of White Sturgeon (Acipenser transmontanus Richardson, 1863) throughout the species range, threats to survival, and prognosis for the future. Journal of Applied Ichthyology 32:261–312.

Jackson, Z. J., J. J. Gruber, and J. P. Van Eenennaam. 2015. White Sturgeon Spawning in the San Joaquin River, California, and Effects of Water Management. Journal of Fish and Wildlife Management 7(1):171–180.

Lamansky, J. A., K. A. Meyer, J. M. DuPont, B. J. Bowersox, B. Bentz, and K. B. Lepla. 2018. Deep hooking, landing success and gear loss using inline and offset circle and J hooks when bait fishing for white sturgeon. Fisheries Management and Ecology 25(2):100–106.

Schaffter, R. G. 1997. White sturgeon spawning migrations and location of spawning habitat in the Sacramento River, California. California Fish and Game 83(1):1–20.

VI. Authority and Reference

Section 5.79

Authority cited: Sections 200, 205, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

Section 5.80

Authority cited: Sections 200, 205, 265, 275 and 399, Fish and Game Code.
Reference: Sections 110, 200 and 205, Fish and Game Code.

Section 27.90

Authority cited: Sections 200, 202, 205, 220 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 206, Fish and Game Code.

Section 27.92

Authority cited: Sections 200, 205, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

VII. Fish and Game Code Section 399 Finding

In accordance with subdivision (a) of section 399 of the Fish and Game code, the Commission finds that adopting this regulation is necessary for the immediate conservation, preservation, or protection of adult White Sturgeon during the State of Emergency proclaimed to exist in California and directs state officials to take immediate action to prepare for and mitigate the effects of HAB-induced White Sturgeon mortality.

Informative Digest/Policy Statement Overview

White Sturgeon (*Acipenser transmontaus*) are a species of fish native to California which live primarily in the San Francisco Bay Delta and migrate to the rivers of the Central Valley to spawn. White Sturgeon live potentially more than 100 years. Most reach sexual maturity by approximately 19 years of age and spawn every 2-4 years once mature. It is rare for larval sturgeon to survive to adulthood; successful broods occur every 6-7 years and are associated with above-average water flow in the Delta. The population of White Sturgeon has declined considerably in the last forty years. In the 1980s, the abundance of adult White Sturgeon was estimated to be 175,000 fish. The Department's most recent estimate is about 33,000 fish.

Until the emergency action, recreational anglers could keep one White Sturgeon 40-60 inches long per day and a total of three per year. The season was year-round, with some limited exceptions. As of November 16, 2023, the Department of Fish and Wildlife (Department) recommended an emergency action that a) reduced the annual bag limit for White Sturgeon from three to one fish, b) reduced the legal-sized slot limit from 40-60" total length (TL) to 42-48" TL, c) placed a limit of two fish per day per boat, and d) closed White Sturgeon fishing in the migrating and spawning reaches of the Sacramento and San Joaquin rivers from January 1 through May 31. Since the Department established its Sturgeon Fishing Report Card (Card) in 2013, about 40-45,000 recreational anglers have purchased cards every year. Based on data gathered from Cards, the number of fish kept by anglers has remained steady, but the number of fish caught and released has declined significantly, which indicates that fewer fish overall are being caught. The exploitation rate of White Sturgeon is estimated to be very high in California, between 8 and 30% between 2007-2015 and averaging 8.1% since that time. The sustainable exploitation rate of White Sturgeon is likely less than 4%. The Department believes that the current exploitation rate of sturgeon is unsustainable, and has been investigating ways to better manage the population.

The unsustainable exploitation rate of White Sturgeon was exacerbated to a crisis in 2022, when the San Francisco Bay experienced a major Harmful Algal Bloom (HAB) that resulted in significant mortality of many fishes, including White Sturgeon. The Department recorded over 850 sturgeon carcasses, the majority legal-sized or larger. Based on carcass studies and fish kills of other species of sturgeon, it is thought that only a small percentage of the fish killed floated long enough to be detected. The absolute magnitude of this impact on the White Sturgeon population is unknown, but is thought to be quite significant. A less intense HAB in 2023 killed at least 15 White Sturgeon and 1 Green Sturgeon.

Immediate steps are necessary to reduce harvest of White Sturgeon to protect the surviving population after the unprecedented fish kill until revised long-term regulations can be developed. Harassment and handling of fish must be eliminated on their migrating and spawning grounds to allow current adults to spawn successfully, ensuring a recreational fishery into the future.

Benefits of the Regulation:

These harvest restrictions will protect the remaining population while new long-term regulations are developed during proposed re-adoption actions, providing opportunity for surviving fish to spawn unmolested.

Consistency and Compatibility with Existing Regulations

Article IV, Section 20 of the State Constitution specifies that the Legislature may delegate to Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to regulate sport fishing in waters of the state (Fish and Game Code sections 200, 205, and 315). The Commission has reviewed its own regulations and finds that the proposed regulations are consistent with other recreational fishing regulations in Title 14, CCR, and therefore finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the California Code of Regulations and finds no other state agency regulations pertaining to temporarily prohibiting harvest of White Sturgeon due to population decline.

Proposed Emergency Regulatory Language

Sections 5.79, Title 14, CCR, is amended to read as follows:

§ 5.79. White Sturgeon Report Card and Tagging Requirements for Inland Waters (FG 683, See Section 701).

(a) Sturgeon Fishing Report Card Required. All anglers must have a valid Sturgeon Fishing Report Card in their possession while fishing for or taking W~~w~~hite S~~s~~turgeon. Cardholders must complete and return the card pursuant to regulations in this Section and in Section 1.74.

(b) Tagging and Recording Requirements for Retained Fish. A Sturgeon Fishing Report Card includes a detachable ~~tags~~tag that shall be used to tag any W~~w~~hite S~~s~~turgeon that is taken and retained in the sport fishery. Any W~~w~~hite S~~s~~turgeon possessed by any person shall be tagged.

(1) Upon taking and retaining a W~~w~~hite S~~s~~turgeon, the cardholder shall immediately record the following information:

(A) The fishing location, time of catch and length of the fish shall be recorded legibly and permanently in the appropriate spaces on the tag. The cardholder shall immediately and completely punch out the date of catch (month and day) on the sturgeon tag.~~ Tags shall be used in sequential order.~~

(B) The month, day, fishing location and length of the fish shall be recorded in the appropriate space~~s~~ on the Sturgeon Fishing Report Card~~ which corresponds to the number on the tag~~.

(2) Immediately after recording the information above, the cardholder shall remove and completely detach the tag from the card and affix it to the W~~w~~hite S~~s~~turgeon. Cardholders shall not wait until completion of fishing activity to tag any W~~w~~hite S~~s~~turgeon in possession.

(3) The tag shall be securely fastened to the fish. To affix the tag, a “zip tie”, string, line or other suitable material shall be passed through the tag at the location specified on the sturgeon tag and attached to the fish.

(4) ~~Tags~~The tag shall not be removed from the report card until immediately prior to affixing to a W~~w~~hite S~~s~~turgeon. Any tag~~s~~ detached from the report card and not affixed to a W~~w~~hite S~~s~~turgeon shall be considered used and therefore invalid. No person shall possess any used or otherwise invalid sturgeon tags.

(5) Records of Prior Activity. The tag ~~All tags~~ must be accounted for at all times by entry of a record on the Sturgeon Fishing Report Card~~ corresponding to all tags that are not in the cardholder’s possession~~. Any tag that was lost or destroyed shall be recorded as such on the corresponding line on the Sturgeon Fishing Report Card.

(6) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(7) After retaining and tagging a White Sturgeon, a cardholder shall not continue to fish catch and release for White Sturgeon on the same day.

(8) Cardholders that have retained and tagged a White Sturgeon are permitted to catch and release White Sturgeon starting on the day after the tag was used.

(c) Reporting Requirements for Released Fish.

(1) Whenever the cardholder catches and releases a sturgeon, the cardholder shall immediately record the month, day, location code, length, and species of sturgeon.

(2) If all lines in the “sturgeon released” field of the report card are filled, any additional sturgeon caught and released ~~need not be recorded on the card~~may be recorded on the back of the card.

(3) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(d) Sturgeon tags must be left affixed to the fish in place, including while stored at a residence or non-transient location, until the fish is processed for immediate consumption.

(e) The annual fee for the Sturgeon Fishing Report Card is specified in Section 701(c).

NOTE: Authority cited: Sections 200, 205~~ and 265~~, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

Proposed Emergency Regulatory Language

Section 5.80, Title 14, CCR, is amended to read as follows:

§ 5.80. White Sturgeon.

(a) Open season: ~~All year, except for closures listed under special regulations.~~ (1)

All year: from the west Carquinez Bridge east to the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River.

(2) From June 1 through December 31: above the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River, including all tributaries of both rivers. From January 1 through May 31: it is unlawful to take White Sturgeon.

(b) ~~Daily and annual bag limit: One fish per day. Three fish per year statewide.~~

(b) Daily limit: One fish per day. After harvesting a White Sturgeon, anglers shall not continue to catch and release White Sturgeon on the same day. Anglers that have retained and tagged a fish are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.

(c) Annual bag limit: One fish per calendar year statewide.

(d) Daily vessel maximum harvest: All persons aboard a vessel may be cited for violation of a daily vessel maximum harvest limit. No more than two White Sturgeon may be harvested per day on a vessel, regardless of the number of anglers on board. Anglers must have in their possession a report card with a valid tag in order to retain a White Sturgeon. When the daily vessel maximum harvest is reached, only anglers that have not tagged a White Sturgeon that day may continue to fish catch and release for White Sturgeon.

(~~c~~e) Size limit: No fish less than ~~40~~42 inches fork length or greater than ~~60~~48 inches fork length may be taken or possessed.

(~~d~~f) Methods of take: Only one single point, single shank, barbless hook may be used on a line when taking sturgeon. The sturgeon must voluntarily take the bait or lure inside its mouth. No sturgeon may be taken by trolling, snagging or by the use of firearms. Sturgeon may not be gaffed, nor shall any person use any type of firearm or snare to take any sturgeon. For the purposes of this section, a snare is a flexible loop made from any material that can be tightened like a noose around any part of the fish.

(~~e~~g) Removal from water. Any sturgeon greater than 68 inches fork length may not be removed from the water and shall be released immediately.

(~~f~~h) Report card required: Any person fishing for or taking sturgeon shall have in their possession a nontransferable Sturgeon Fishing Report Card issued by the department and shall adhere to all reporting and tagging requirements for sturgeon defined in Sections 1.74 and 5.79, Title 14, CCR.

(~~g~~i) Special North Coast District Sturgeon Closure (Humboldt, Del Norte, Trinity and Siskiyou cos.). It is unlawful to take any sturgeon in the North Coast District at any time.

(~~h~~j) For regulations on take and possession of sturgeon in ocean waters as defined in Section 27.00, see Sections 27.90, 27.91, and 27.95.

(~~i~~k) Special Sierra and Valley District Sturgeon Closure from January 1 to December 31 (Shasta, Tehama, Butte and Glenn cos.).

(1) Sacramento River from Keswick Dam to the Highway 162 Bridge.

(A) It is unlawful to take any sturgeon.

(B) It is unlawful to use wire leaders.

(C) It is unlawful to use lamprey or any type of shrimp as bait.

(~~j~~l) Special Yolo Bypass Flood Control System Sturgeon Closure. It is unlawful to take any sturgeon in the Yolo Bypass, Toe Drain Canal, and Tule Canal upstream of Lisbon Weir at any time.

NOTE: Authority cited: Sections 200, 205, 265~~ and 275~~, 275 and 399, Fish and Game Code.
Reference: Sections 110, 200 and 205, Fish and Game Code.

Proposed Emergency Regulatory Language

Section 27.90,Title 14, CCR, is amended to read as follows:

§ 27.90. White Sturgeon.

(a) Open season: All year except as described in Section 27.95 of these regulations.
~~(b) Daily and annual bag limit: One fish per day. Three fish per year statewide.~~
(b) Daily limit: One fish per day. After harvesting a White Sturgeon, anglers shall not continue to catch and release White Sturgeon on the same day. Anglers that have retained and tagged a fish are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.
(c) Annual bag limit: One fish per calendar year statewide.
(d) Daily vessel maximum harvest: All persons aboard a vessel may be cited for violation of a daily vessel maximum harvest limit. No more than two White Sturgeon may be harvested per day on a vessel, regardless of the number of anglers on board. Anglers must have in their possession a report card with a valid tag in order to retain a White Sturgeon. When the daily vessel maximum harvest is reached, only anglers that have not tagged a White Sturgeon that day may continue to fish catch and release for White Sturgeon.

(~~c~~e) Size limit: No fish less than ~~40~~42 inches fork length or greater than ~~60~~48 inches fork length may be taken or possessed.
(~~d~~f) Methods of take: Only one single point, single shank, barbless hook may be used on a line when taking sturgeon. The sturgeon must voluntarily take the bait or lure in its mouth. No sturgeon may be taken by trolling, snagging or by the use of firearms. Sturgeon may not be gaffed, nor shall any person use any type of firearm or snare to take any sturgeon. For the purposes of this section, a snare is a flexible loop made from any material that can be tightened like a noose around any part of the fish.
(~~e~~g) Removal from water. Any sturgeon greater than 68 inches fork length may not be removed from the water and shall be released immediately.
(~~f~~h) Report card required: Any person fishing for or taking sturgeon shall have in their possession a nontransferable Sturgeon Fishing Report Card issued by the department and shall adhere to all reporting and tagging requirements for sturgeon defined in Sections 1.74 and 27.92, Title 14, CCR.
(~~g~~i) For regulations on take and possession of sturgeon in inland waters as defined in Section 1.53, see Section 5.80 and Section 5.81.
(~~h~~j) Boat limits, as defined in Subsection 27.60(c) and Section 195, are not authorized for sturgeon fishing and shall not apply to the take, possession or retention of W~~w~~hite S~~s~~turgeon.

NOTE: Authority cited: Sections 200, ~~202,~~ 205 ~~and 220~~, 265, 275, and 399, Fish and GameCode.
Reference: Sections 110, 200, and 205, ~~and 206,~~ Fish and Game Code.

Proposed Emergency Regulatory Language

Section 27.92, Title 14, CCR, is amended to read as follows:

§ 27.92. White Sturgeon Report Card and Tagging Requirements for OceanWaters (FG 683, See Section 701).

(a) Sturgeon Fishing Report Card Required. All anglers must have a valid Sturgeon Fishing Report Card in their possession while fishing for or taking W~~w~~hite S~~s~~turgeon. Cardholders must complete and return the card pursuant to regulations in this Section and in Section 1.74.

(b) Tagging and Recording Requirements for Retained Fish. A Sturgeon Fishing Report Card includes a detachable tag~~s~~ that shall be used to tag any W~~w~~hite S~~s~~turgeon thatis taken and retained in the sport fishery. Any W~~w~~hite S~~s~~turgeon possessed by any person shall be tagged.

(1) Upon taking and retaining a W~~w~~hite S~~s~~turgeon, the cardholder shall immediately record the following information:

(A) The fishing location, time of catch and length of the fish shall be recorded legibly and permanently in the appropriate spaces on the tag. The cardholder shall immediately and completely punch out the date of catch (month and day) on the sturgeon tag.~~ Tags shall be used in sequential order.~~

(B) The month, day, fishing location and length of the fish shall be recorded in the appropriate space~~s~~ on the Sturgeon Fishing Report Card~~ which corresponds to the number on the tag~~.

(2) Immediately after recording the information above, the cardholder shall remove and completely detach the tag from the card and affix it to the W~~w~~hite S~~s~~turgeon. Cardholders shall not wait until completion of fishing activity to tag any W~~w~~hite S~~s~~turgeon in possession.

(3) The tag shall be securely fastened to the fish. To affix the tag, a “zip tie”, string, line or other suitable material shall be passed through the tag at the location specified on the sturgeon tag and attached to the fish.

(4) The ~~Tags~~tag shall not be removed from the report card until immediately prior to affixing to a W~~w~~hite S~~s~~turgeon. Any tag~~s~~ detached from the report card and not affixed to a W~~w~~hite S~~s~~turgeon shall be considered used and therefore invalid. Noperson shall possess any used or otherwise invalid sturgeon tags.

(5) Records of Prior Activity. The tag~~ All tags~~ must be accounted for at all times by entry of a record on the Sturgeon Fishing Report Card ~~corresponding to all tags that are not in the cardholder’s possession~~. Any tag that was lost or destroyed shall be recorded as such on the corresponding line on the Sturgeon Fishing Report Card.

(6) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(7) After retaining and tagging a White Sturgeon, cardholders shall not continue to catch and release White Sturgeon on the same day.

(8) Cardholders that have retained and tagged a White Sturgeon are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.

(c) Reporting Requirements for Released Fish.

(1) Whenever the cardholder catches and releases a sturgeon, the cardholder shall immediately record the month, day, location code, length, and species of sturgeon.

(2) If all lines in the "sturgeon released" field of the report card are filled, any additional sturgeon caught and released ~~need not be recorded on the card~~may be recorded on the back of the card.

(3) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(d) Sturgeon tags must be left affixed to the fish in place, including while stored at a residence or non-transient location, until the fish is processed for immediate consumption.

(e) The annual fee for the Sturgeon Fishing Report Card is specified in Section 701, Title 14, CCR.

NOTE: Authority cited: Sections 200, 205~~ and 265~~, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT
(REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

ECONOMIC IMPACT STATEMENT

DEPARTMENT NAME	CONTACT PERSON	EMAIL ADDRESS	TELEPHONE NUMBER
Fish and Game Commission	David Thesell	fgc@fgc.ca.gov	916 902-9291

DESCRIPTIVE TITLE FROM NOTICE REGISTER OR FORM 400	NOTICE FILE NUMBER
Readopt Emergency Action: Amend Section 5.79, 5.80, 27.90, and 27.92, Title 14, CCR, Re: White Sturgeon	Z

A. ESTIMATED PRIVATE SECTOR COST IMPACTS *Include calculations and assumptions in the rulemaking record.*

1. Check the appropriate box(es) below to indicate whether this regulation:

- ☐ a. Impacts business and/or employees
- ☐ b. Impacts small businesses
- ☐ c. Impacts jobs or occupations
- ☐ d. Impacts California competitiveness
- ☐ e. Imposes reporting requirements
- ☐ f. Imposes prescriptive instead of performance
- ☐ g. Impacts individuals
- ☒ h. None of the above (Explain below):

Emergency action: no economic assessment only fiscal impact assessment

If any box in Items 1 a through g is checked, complete this Economic Impact Statement.
If box in Item 1.h. is checked, complete the Fiscal Impact Statement as appropriate.

2. The Fish and Game Commission (Agency/Department) estimates that the economic impact of this regulation (which includes the fiscal impact) is:

- ☒ Below $10 million
- ☐ Between $10 and $25 million
- ☐ Between $25 and $50 million
- ☐ Over $50 million *[If the economic impact is over $50 million, agencies are required to submit a Standardized Regulatory Impact Assessment as specified in Government Code Section 11346.3(c)]*

3. Enter the total number of businesses impacted: ____________

Describe the types of businesses (Include nonprofits): ____________

Enter the number or percentage of total businesses impacted that are small businesses: ____________

4. Enter the number of businesses that will be created: ____________ eliminated: ____________

Explain: ____________

5. Indicate the geographic extent of impacts: ☐ Statewide

☐ Local or regional (List areas): ____________

6. Enter the number of jobs created: ____________ and eliminated: ____________

Describe the types of jobs or occupations impacted: ____________

7. Will the regulation affect the ability of California businesses to compete with other states by making it more costly to produce goods or services here? ☐ YES ☐ NO

If YES, explain briefly: ____________

ECONOMIC IMPACT STATEMENT (CONTINUED)

B. ESTIMATED COSTS *Include calculations and assumptions in the rulemaking record.*

1. What are the total statewide dollar costs that businesses and individuals may incur to comply with this regulation over its lifetime? $ ____________

   a. Initial costs for a small business: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   b. Initial costs for a typical business: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   c. Initial costs for an individual: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   d. Describe other economic costs that may occur: ____________

2. If multiple industries are impacted, enter the share of total costs for each industry: ____________

3. If the regulation imposes reporting requirements, enter the annual costs a typical business may incur to comply with these requirements. *Include the dollar costs to do programming, record keeping, reporting, and other paperwork, whether or not the paperwork must be submitted.* $ ____________

4. Will this regulation directly impact housing costs? ☐ YES ☐ NO

   If YES, enter the annual dollar cost per housing unit: $ ____________

   Number of units: ____________

5. Are there comparable Federal regulations? ☐ YES ☐ NO

   Explain the need for State regulation given the existence or absence of Federal regulations: ____________

   Enter any additional costs to businesses and/or individuals that may be due to State - Federal differences: $ ____________

C. ESTIMATED BENEFITS *Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. Briefly summarize the benefits of the regulation, which may include among others, the health and welfare of California residents, worker safety and the State's environment: ____________

2. Are the benefits the result of: ☐ specific statutory requirements, or ☐ goals developed by the agency based on broad statutory authority?

   Explain: ____________

3. What are the total statewide benefits from this regulation over its lifetime? $ ____________

4. Briefly describe any expansion of businesses currently doing business within the State of California that would result from this regulation: ____________

D. ALTERNATIVES TO THE REGULATION *Include calculations and assumptions in the rulemaking record. Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. List alternatives considered and describe them below. If no alternatives were considered, explain why not: ____________

ECONOMIC IMPACT STATEMENT (CONTINUED)

2. Summarize the total statewide costs and benefits from this regulation and each alternative considered:

   Regulation: Benefit: $ ______ Cost: $ ______

   Alternative 1: Benefit: $ ______ Cost: $ ______

   Alternative 2: Benefit: $ ______ Cost: $ ______

3. Briefly discuss any quantification issues that are relevant to a comparison of estimated costs and benefits for this regulation or alternatives: ______

4. Rulemaking law requires agencies to consider performance standards as an alternative, if a regulation mandates the use of specific technologies or equipment, or prescribes specific actions or procedures. Were performance standards considered to lower compliance costs? ☐ YES ☐ NO

   Explain: ______

E. MAJOR REGULATIONS *Include calculations and assumptions in the rulemaking record.*

California Environmental Protection Agency (Cal/EPA) boards, offices and departments are required to submit the following (per Health and Safety Code section 57005). Otherwise, skip to E4.

1. Will the estimated costs of this regulation to California business enterprises **exceed $10 million**? ☐ YES ☐ NO

If YES, complete E2. and E3
If NO, skip to E4

2. Briefly describe each alternative, or combination of alternatives, for which a cost-effectiveness analysis was performed:

   Alternative 1: ______

   Alternative 2: ______

   (Attach additional pages for other alternatives)

3. For the regulation, and each alternative just described, enter the estimated total cost and overall cost-effectiveness ratio:

   Regulation: Total Cost $ ______ Cost-effectiveness ratio: $ ______

   Alternative 1: Total Cost $ ______ Cost-effectiveness ratio: $ ______

   Alternative 2: Total Cost $ ______ Cost-effectiveness ratio: $ ______

4. Will the regulation subject to OAL review have an estimated economic impact to business enterprises and individuals located in or doing business in California exceeding $50 million in any 12-month period between the date the major regulation is estimated to be filed with the Secretary of State through12 months after the major regulation is estimated to be fully implemented?

   ☐ YES ☐ NO

   If YES, agencies are required to submit a Standardized Regulatory Impact Assessment (SRIA) as specified in Government Code Section 11346.3(c) and to include the SRIA in the Initial Statement of Reasons.

5. Briefly describe the following:

   The increase or decrease of investment in the State: ______

   The incentive for innovation in products, materials or processes: ______

   The benefits of the regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, and the state's environment and quality of life, among any other benefits identified by the agency: ______

FISCAL IMPACT STATEMENT

A. FISCAL EFFECT ON LOCAL GOVERNMENT *Indicate appropriate boxes 1 through 6 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year which are reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________

☐ a. Funding provided in ______________

Budget Act of ______________ or Chapter ______________ , Statutes of ______________

☐ b. Funding will be requested in the Governor's Budget Act of ______________

Fiscal Year: ______________

☐ 2. Additional expenditures in the current State Fiscal Year which are NOT reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________

Check reason(s) this regulation is not reimbursable and provide the appropriate information:

☐ a. Implements the Federal mandate contained in ______________

☐ b. Implements the court mandate set forth by the ______________ Court.

Case of: ______________ vs. ______________

☐ c. Implements a mandate of the people of this State expressed in their approval of Proposition No. ______________

Date of Election: ______________

☐ d. Issued only in response to a specific request from affected local entity(s).

Local entity(s) affected: ______________

☐ e. Will be fully financed from the fees, revenue, etc. from: ______________

Authorized by Section: ______________ of the ______________ Code;

☐ f. Provides for savings to each affected unit of local government which will, at a minimum, offset any additional costs to each;

☐ g. Creates, eliminates, or changes the penalty for a new crime or infraction contained in ______________

☐ 3. Annual Savings. (approximate)

$ ______________

☐ 4. No additional costs or savings. This regulation makes only technical, non-substantive or clarifying changes to current law regulations.

☒ 5. No fiscal impact exists. This regulation does not affect any local entity or program.

☐ 6. Other. Explain ______________

FISCAL IMPACT STATEMENT (CONTINUED)

B. FISCAL EFFECT ON STATE GOVERNMENT *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________________

It is anticipated that State agencies will:

☐ a. Absorb these additional costs within their existing budgets and resources.

☐ b. Increase the currently authorized budget level for the ______________ Fiscal Year

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________________

☐ 3. No fiscal impact exists. This regulation does not affect any State agency or program.

☒ 4. Other. Explain White Sturgeon Report Card sales are anticipated to drop resulting in a $13,596 decline in CDFW revenue for the remainder of fiscal year 2023-24.

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________________

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________________

☒ 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.

☐ 4. Other. Explain ______________________

FISCAL OFFICER SIGNATURE	DATE

The signature attests that the agency has completed the STD. 399 according to the instructions in SAM sections 6601-6616, and understands the impacts of the proposed rulemaking. State boards, offices, or departments not under an Agency Secretary must have the form signed by the highest ranking official in the organization.

AGENCY SECRETARY	DATE

Finance approval and signature is required when SAM sections 6601-6616 require completion of Fiscal Impact Statement in the STD. 399.

DEPARTMENT OF FINANCE PROGRAM BUDGET MANAGER	DATE

STD399 ADDENDUM

Emergency Action to Amend Sections 5.79, 5.80, 27.90, and 27.92
Title 14, California Code of Regulations
Re: White Sturgeon

Readopt I

Economic Impact Statement

Under the 90-day extension of this emergency regulation, take will still be permitted to anglers that purchase a Sturgeon Report Card, but harvest will be limited by 1) reduction of the legal slot limit, 2) reduction of the annual bag limit, 3) adding a vessel limit of two fish per day, and 4) protecting critical migrating and spawning behavior via a seasonal and geographic closure of river habitat. Catch and release angling will be permitted after anglers reach their annual harvest limit to preserve recreational angling opportunities.

This emergency action is necessary to maintain current and future recreational fishing's economic and cultural benefits, while preventing additional mortality of the impacted White Sturgeon population and minimizing harassment of spawning individuals.

A. ESTIMATED PRIVATE SECTOR COST IMPACTS

1. Answer: h. None of the above. (Explain below):

Emergency regulations do not require an economic impact statement; only fiscal impacts must be evaluated (California Government Code Section 11346.1).

Fiscal Impact Statement details are provided below.

Fiscal Impact Statement

A. FISCAL EFFECT ON LOCAL GOVERNMENT

Answer: 5. No fiscal impact.

The proposed amendment to Section 5.79, Title 14, CCR will not have the potential for a fiscal effect on local governments.

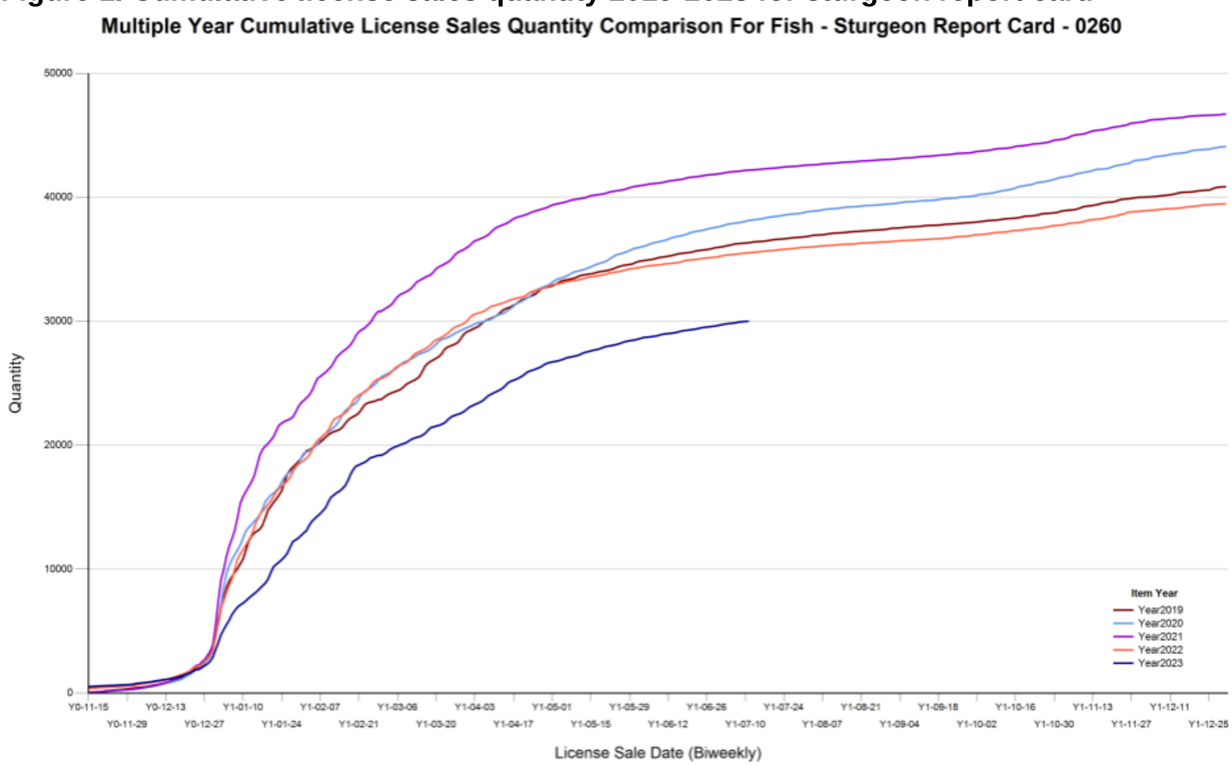
B. FISCAL EFFECT ON STATE GOVERNMENT

Answer: 4. Other.

The Fish and Game Commission (Commission) anticipates that the readoption of the proposed emergency action for another 90 days will not introduce new costs or savings for state agencies. The Department of Fish and Wildlife's (Department) existing level of monitoring and enforcement activities is expected to be unchanged. However, the Department anticipates that the continued reduced take limits may result in a continued drop in White Sturgeon Report Cards sales revenue estimated to be (-$13,596) over the 90-day emergency readoption period during that later part of fiscal year 2023-2024.

Sales of Sturgeon report cards since a fee has been charged are plotted in Figure 1, showing purchases throughout the year. Most cards are sold in the first months of the year, with a small bump in sales in the later months of the year. Sales in years 2020 and 2021 may have been elevated due to the Covid-19 pandemic surge in outdoor recreation. For this fiscal year, as of July 2023, Sturgeon card sales have reached about 30,000, which is about 17% less than the amount sold in 2022, and 19% less than 2019, which are more historically-typical years with no pandemic affects. While difficult to discern with certainty, the lower 2023 numbers to date may be a result of the new 365-day sportfish license and the recent closure of the salmon fishery. Many other states with 365-day licenses experienced absolute declines in license sales and for some sport fishers, no s~~S~~almon opportunity induces them to forego all fishing trips for any other fish. Thus, acknowledging the probable influence of those factors, 2023-24 fiscal year total sales were already projected to be about ~~32,929~~33,491 or 18 percent less than the 40,851 average sold during a typical year.

Figure 1. Cumulative license sales quantity 2019-2023 for sturgeon report card



A Department survey of White Sturgeon fishery participants reveals that while over 67 percent report the main reason to fish for White Sturgeon is recreation and 70 percent state that their goal is only or mostly catch and release; approximately 27 percent state their goal is to fish for food and 43 percent answer that they would not participate in a catch and release only fishery. These sentiments have been recognized in the proposed emergency action in efforts to balance resource protection with recreational fishery opportunity.

Recent spatial and temporal take patterns suggest that the emergency action's proposed January to May upper spanning ground closure is the one component that may induce a small decline in report card sales during the 180-day emergency period.

The evidence that six percent of the seasonal catch has occurred in the area of the proposed January to May spanning ground closure, may induce those individual fishers to not purchase a Sturgeon Report Card, if that is the only time and area that they fish. Many may pursue Sturgeon in other areas at different times as well as the spawning grounds. But for some, that may be the only area and time for Sturgeon fishing, so it is reasonable to project a six percent drop in card sales revenue in 2024. This amounts to an estimated 1,025 fewer cards sold in 2023 and 1,320 fewer in 2024.

Table 1. White Sturgeon Report Card Price 2023 and 2024

2023 Base Fee	ALDS 3% Surcharge	2023 DFG Revenue per Card	2024 Base Fee	2024 DFG Revenue per Card
$9.50	$0.29	$9.79	$10.00	$10.30

The 2023 Department revenue per card is $9.79 and $10.30 in 2024. The projected revenue losses to the Department for reduced White Sturgeon report card sales are $10,037 for the calendar year 2023, and $13,596 for 2024. The fiscal year 2023-2024 losses are projected to total $23,633.

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS

Answer: 3. No fiscal impact.

The proposed emergency action will not have the potential for a fiscal effect on the federal funding of state programs.

State of California
Department of Fish and Wildlife

Signed original on file,
received March 26, 2024

Memorandum

Date: March 25, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Request for 6-Month Extension, Greater Sage-Grouse Status Review Report

The Department of Fish and Wildlife (Department) requests a 6-month extension of time pursuant to Fish and Game Code section 2074.6 to produce and make publicly available the final peer reviewed greater sage-grouse (*Centrocercus urophasianus*) status review report. The Department anticipates receiving substantial comments and/or scientific information from tribes, stakeholders, and other interested parties regarding the petition to list greater sage-grouse as threatened or endangered under the California Endangered Species Act (CESA). The Department has determined that an extension is necessary to complete independent peer review of the status review report and to provide a minimum of 30 days for public review prior to the public hearing specified in Fish and Game Code section 2075.5. The requested extension would change the due date of the Department's status review report to December 28, 2024, which is 18 months from the date the Fish and Game Commission published the Notice of Findings (Cal. Reg. Notice Register 2023, No. 26-Z, p. 852).

If you have any questions or need additional information, please contact Scott Gardner, Wildlife Branch Chief at wildlifemgt@wildlife.ca.gov or (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Scott Gardner, Chief
Wildlife Branch

Pete Figura
Environmental Program Manager
Wildlife Branch

Katrina Smith
Senior Environmental Scientist (Specialist)
Wildlife Branch

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County Administration Office
221 S. Roop Street, Suite 4
Susanville, CA 96130
Phone: 530-251-8333
Fax: 530-251-2663

April 1, 2024

Samantha Murray, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Wade Crowfoot, Secretary
California Natural Resources Agency
715 P Street, 20th Floor
Sacramento, CA 95814

Charlton "Chuck" Bonham, Director
California Department of Fish and Wildlife
Wildlife Diversity Program
ATTN: CESA UNIT
P.O. Box 944209
Sacramento, CA 94244-2090

Dear Secretary Crowfoot, President Murray and Director Bonham:

On behalf of the County of Lassen, I offer Lassen County's comments in response to the "notice and request for information: Greater Sage-Grouse is a candidate for listing under the California Endangered Species Act."

The issue of the Greater Sage Grouse and its habitat is a significant issue for economic, recreational and business interest in Lassen County for decades and continues to be a primary concern of the Lassen County Board of Supervisors; I write to urge your leadership in supporting and expediting locally important conservation efforts that will be further delayed or terminated by a listing under the CESA by the California Fish and Game Commission. Conservation efforts are planned for the next few years. For these reasons, I ask that you strongly recommend against a proposed listing of the Greater Sage Grouse until such conservation efforts can be implemented and such efforts be monitored and adjusted for success.

The primary pathway supporting sage grouse conservation in Lassen County is via the Buffalo-Skedaddle Sage-Grouse Working Group[1], of which CDFW is a member.

The Buffalo-Skedaddle Sage-grouse Working Group, is comprised of federal, state, and local agencies, industry organizations, and other stakeholders and has been actively engaged in collaborative conservation efforts for over two decades. The group is solution-oriented and focused on completing on-the-ground work at a meaningful scale.

Notable conservation accomplishments from recent years are listed below:

Juniper removal: In the Buffalo-Skedaddle Population Management Unit (PMU), juniper encroachment threatens priority sage-grouse habitat. Collaborative efforts have successfully treated juniper at a landscape scale, covering over 15,000 acres of public, state, and private land since 2021.

Spring enhancement and protections: Fencing installations around fragile spring ecosystems within the Buffalo-Skedaddle PMU enhance water availability, cover, and forage diversity for sage-grouse. Over 30 spring systems have been protected through new or maintained fence enclosures in recent years.

Riparian restoration: Restoration techniques such as Beaver Dam Analog and Zeedyk rock structures have been implemented to rehabilitate degraded spring and stream systems. Over 300 low-tech stream restoration structures have been constructed at 10 locations, fostering healthy riparian habitats essential for sage-grouse survival.

Invasive annual grass control and restoration seeding: Efforts to control annual grasses through aerial herbicide sprays and subsequent re-seeding have enhanced habitat structure and diversity, benefiting sage-grouse populations. Since 2021, over 20,000 acres have been treated with herbicide and 15,000 acres have been seeded.

Sagebrush plantings: Native sagebrush seedling plantings have been conducted to further improve sage-grouse habitat. Over 26,000 sagebrush seedlings have been planted since 2021.

Continued conservation efforts are planned for the next few years, including extensive juniper removal (30,000+ acres), riparian restoration projects (~15 locations), new spring fencing initiatives (~5 locations), and the planting of thousands of sagebrush seedlings. More information on conservation efforts can be found in the Conservation Strategy for Greater Sage-grouse in the Buffalo-Skedaddle Population Management, updated in 2021.

The limiting factors are limited human capacity, logistical challenges to conduct projects at meaningful scale and the deflection of workforce and time required to overcome the existing regulatory framework. The current institutional bottlenecks reducing the pace and scale of conservation work include slow and onerous permitting from state and federal agencies to do stream restoration projects, limited capacity to conduct archaeological clearances necessary to conduct large scale vegetation management and habitat restoration projects.

Most recently, CDFW's bureaucratic processes which are restricting the well-documented necessity to conduct raven population control measures, is working against sage grouse nesting success. The current raven population is well above that threshold that significantly reduces sage grouse nest success therefore restricting sage

[1] https://ucanr.edu/sites/buff-sked-rangeland-project//
[2] https://www.usgs.gov/publications/a-spatially-explicit-modeling-framework-guide-management-subsidized-avian-predator
[3] https://ucanr.edu/sites/buff-sked-rangeland-project/files/381538.pdf

grouse population recovery (O'Neill, et al 2023[2]). In conjunction with the implementation of the Buffalo-Skedaddle Sage Grouse Conservation Strategy[3], raven control, similar to what is done in support of the desert tortoise, is needed.

The consequences of state CESA listing are difficult to quantify, but there is no evidence that such a listing will provide any additional capacity to implement work on the ground. To the contrary, experience has consistently demonstrated that once such state-level actions are taken, energy is redirected into arguments about the regulatory program itself rather than completing conservation projects that would benefit sage grouse and other wildlife. Furthermore, CESA listings work against the collaborative efforts such as Buffalo-Skedaddle as many partners will be reluctant to participate in conservation processes with CESA listed species.

A CESA listing will not improve regulatory efficiency to cut "green tape" to expedite beneficial environmental conservation and restoration efforts such as the Buffalo-Skeddle strategy. CDFW does not have the staffing and funding capacity itself, nor the credibility with local partners or federal agencies to overcome the loss of the multi-partner collaborative conservation work that currently exists. The pace, scale, and quality of on-the-ground conservation work in Lassen County will be significantly reduced or cease to exist in California in the event of a CESA listing by the California Fish and Game Commission.

Loss of planned conservation investments in Lassen County from CESA restrictions could result in the loss of jobs, revenue and tax base for Californians. According to the U.S. Census, 19 percent of our residents live in poverty, and per capita income is approximately $21,214 in the unincorporated communities and $14,002 in the City of Susanville. The countywide labor force has declined approximately 35 percent over the past decade and that situation has not been helped by the State's recent closure of the California Correctional Center; an estimated net loss of 600 State jobs and $160 million in local payroll. The February 2024 preliminary unemployment rate is 7.8% in Lassen County, which is 3.6% higher than the U.S. Unemployment Rate and 2.2% higher than the California Unemployment Rate.

Thank you for your time and attention to this matter.

Sincerely,

Richard Egan, County Administrative Officer

cc: Lassen County Board of Supervisors
Assembly Member Megan Dahle
Senator Brian Dahle
Rural County Representatives of California (RCRC)
California State Association of Counties (CSAC)
City of Susanville, City Council

[1] https://ucanr.edu/sites/buff-sked-rangeland-project//
[2] https://www.usgs.gov/publications/a-spatially-explicit-modeling-framework-guide-management-subsidized-avian-predator
[3] https://ucanr.edu/sites/buff-sked-rangeland-project/files/381538.pdf

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COUNTY ADMINISTRATIVE OFFICER

DARCY ELLIS
ASST. CLERK OF THE BOARD

April 2, 2024

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 95814

Re: The Greater Sage-Grouse being a candidate for listing under California Endangered Species Act (CESA)

Dear Commissioners:

The Inyo County Board of Supervisors supports the California Department of Fish and Wildlife (CDFW) in its management of the greater sage-grouse. As verified by the information in the most recent ten-year (2014-2024) CDFW study results (study attached), there has been a substantial 39% increase in the Bi-State Greater Sage-Grouse population levels. The information demonstrates the effectiveness of the Department's activities to ensure the continued success of the greater sage-grouse in the Eastern Sierra. The Commission believes that the Department's successes should be used to improve, enhance, and protect all species of sage-grouse throughout the state.

The study results show that the greater sage-grouse populations are recovering thus the need to list the species as endangered is not needed. CDFW has done an exceptional job in the past ten years of managing the local populations. The study confirms that recovery is in progress. Any effort to list the species as endangered may detrimentally affect the success of the current management activities and adversely impact ongoing improvements. The listing of this species as endangered is not warranted.

The Commission commends CDFW and supports its continued management of the greater sage-grouse. The success of the Department's program will ensure a strong future for the greater sage-grouse in California.

Sincerely,

Chairperson Matt Kingsley,
Inyo County Board of Supervisors

Attachment: Ten Year (2014-2024) Greater Sage-grouse Study

Bi-State Sage-Grouse 10-Year Accomplishment Report 2012-2021

BISTATESAGEGROUSE.COM

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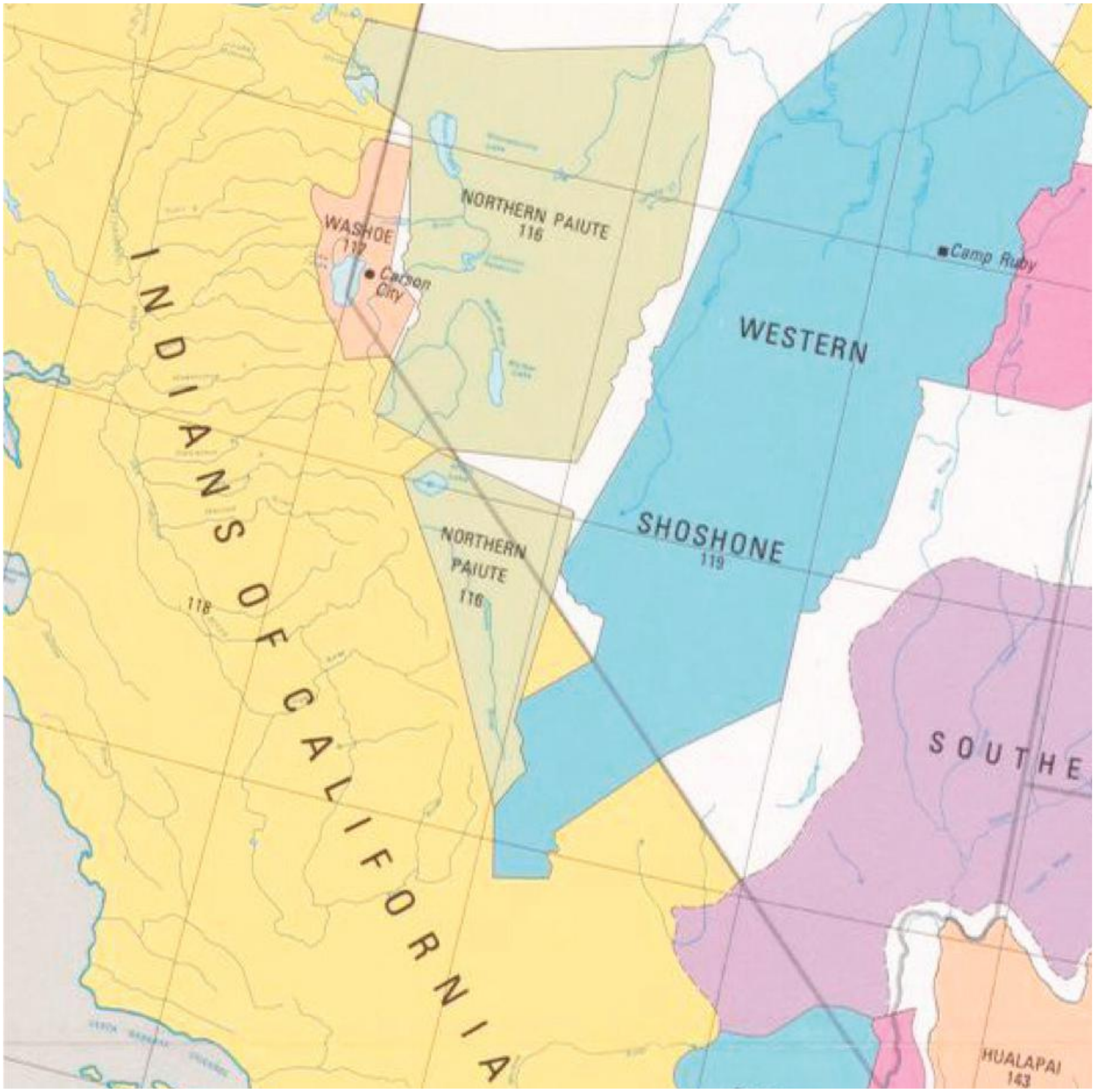

Figure 1: Ancestral lands of the Bi-State area (map source: Indian Claims Commission)

ANCESTRAL LANDS ACKNOWLEDGEMENT

The Bi-State area is located in the heart of the Northern Paiute (Numu) territory and extends to include the lands of the Washoe (Wa She Shu) in the north, and Western Shoshone (Newe) in the south. We honor the Indigenous caretakers who have stewarded these lands, waters, and animals since time immemorial and pay respect to the elders who lived before, the people of today, and the generations to come.

CONSERVATION HISTORY

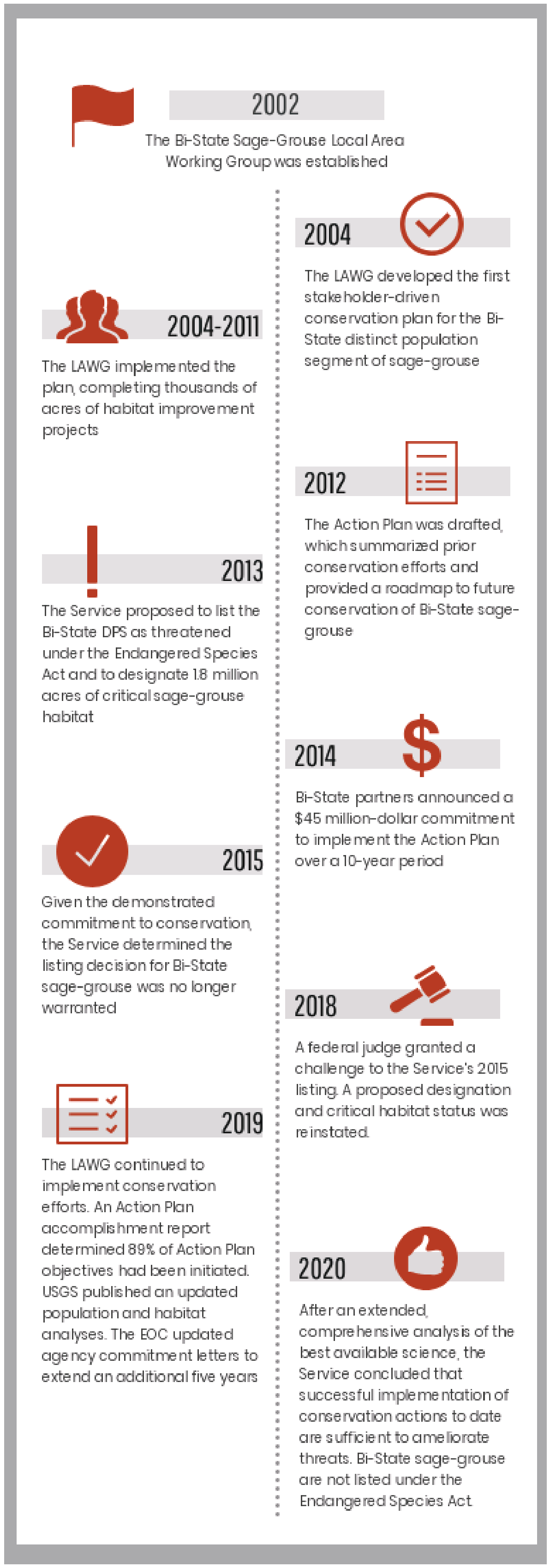

Figure 2: Timeline of Bi-State conservation efforts and USFWS listing decisions

Bi-State sage-grouse, habitat, and people

EXECUTIVE SUMMARY

The Bi-State Sage-Grouse Conservation Action Plan was written in 2012 to provide a roadmap to conservation for the Bi-State greater sage-grouse distinct population segment (Bi-State DPS). The Bi-State area, located along the California and Nevada state border, is divided into six Population Management Units (PMUs) (Figure 4). In each PMU, threats were identified and ranked, and unique conservation strategies were created to address threats (Table 3). The Action Plan called out priority actions deemed necessary to protect sage-grouse populations and their habitats. Projects in the Action Plan sought to:

- implement a coordinated interagency approach,
- incorporate science-based adaptive management,
- increase regulatory mechanisms,
- minimize and eliminate risk,
- improve and restore habitat,
- monitor sage-grouse populations,
- and maintain stakeholder involvement.

At every step it was assumed that projects would be altered or added as priorities change based on new information, and new priorities occur that were unknown when the Action Plan was written.

Action Plan strategies and objectives are implemented through the Bi-State Local Area Working Group (Bi-State LAWG), a collaborative conservation network of federal, state, and local government agencies, Native American tribal members and representatives, nonprofits organizations, and private landowners.

The Bi-State LAWG receives guidance from a team of agency scientists and biologists that make up the Technical Advisory Committee (TAC), as well as support from agency directors and leadership that make up the Executive Oversight Committee (EOC). Each year projects outlined in the Action Plan are implemented utilizing a science-based adaptive management and collaborative conservation approach. In 2014, agency partners announced a $45 million dollar commitment to implement the Action Plan over a 10-year period.

The purpose of this report is to provide a 10-year summary of Bi-State Action Plan implementation which includes population monitoring, vegetation monitoring, and the implementation of a wide variety of habitat improvement projects. Understanding Action Plan implementation and the effectiveness of conservation actions will help Bi-State partners to prioritize future conservation actions for Bi-State sage-grouse.

ACCOMPLISHMENTS

Much has been accomplished since the implementation of the Action Plan in 2012 (Figure 3). Bi-State partnerships remain strong and active and the Action Plan, while flexible, remains the guiding framework for Bi-State conservation efforts. Additionally, partners are well on their way to meeting the $45 million dollar funding commitment established in 2014. To date, approximately 84% of that funding has been allocated with a total of $37.6 million dollars spent on sage-grouse conservation efforts over the last eight years.

The objectives, strategies, and actions outlined in the Action Plan include population monitoring, habitat monitoring, and the implementation of a wide variety of conservation actions to maintain healthy sage-grouse populations and habitat in the Bi-State conservation planning area. Population monitoring includes sage-grouse capture, intensive monitoring of survival, nest success, and brood success, and annual lek monitoring. The collection of these data provides information on habitat selection and utilization as well as factors influencing sage-grouse population trends. Vegetation monitoring efforts aim to evaluate habitat quality and the effectiveness of completed conservation actions including post-fire restoration and conifer treatment. Finally, Action Plan directed conservation projects are carried out to address the following threats to Bi-State sage-grouse and their habitats:

- Wildfire
- Urbanization
- Conifer expansion
- Invasive species
- Infrastructure
- Loss of sagebrush/ meadows
- Small populations
- Human disturbance
- Wild horse grazing
- Permitted livestock grazing
- Predation

Since 2012, 945 sage-grouse have been captured and fitted with very high frequency (VHF) or Global Positioning System (GPS) transmitters across all Bi-State Population Management Units (PMUs) (Table 2, Figure 6). Population monitoring has occurred through annual lek counts and through the tracking of marked birds to better understand survival, reproduction, and recruitment. Vegetation monitoring has been completed at 816 sites to measure vegetation response to habitat improvement projects including changes in sagebrush cover, perennial grass cover, species richness and presence of non-native and invasive species. A total of 141 of the 159 actions identified in the Action Plan have been implemented. These projects have improved habitat conditions for sage-grouse on more than 143,000 acres of land in the Bi-State.

Over the last ten years, the Action Plan has provided a clear framework to guide this collaborative conservation effort. It has helped the Bi-State LAWG increase their understanding of sage-grouse population trends, gain a better understanding of factors influencing populations, and learn how and where to implement conservation actions to provide the greatest benefit to sage-grouse and their habitats. Recent USGS research suggests the implementation of the Action Plan has bolstered Bi-State sage-grouse populations by 3.9% annually and 31.1% since 2012 (Bi-State TAC, 2022). Bi-State partners are currently evaluating the most recent science and working to update the Action Plan so that it may continue to act as a guiding document for sage-grouse related conservation efforts in the Bi-State.

Bi-State sage-grouse

Bi-State partners

Conservation Highlights

$37.6 million dollars allocated to BSSG conservation effort since 2014

945 sage-grouse monitored within all PMUs

816 Vegetation monitoring plots completed

89% of Action Plan identified projects implemented

143,000 acres of sage-grouse habitat improved

31% increase in Bi-State sage-grouse population success as a result of Bi-State conservation efforts

Figure 3: Bi-State highlights

Bi-State sage-grouse on lek

INTRODUCTION

The Bi-State Local Area Working Group (Bi-State LAWG) was formed in 2002 to establish a landscape-level approach to conservation and management of the Bi-State greater sage-grouse distinct population segment (Bi-State DPS). This diverse group of stakeholders includes, federal, state, and local government agencies, Tribal members and representatives, non-profit organizations, and private landowners.

This group has been striving to implement a collaborative approach to sage-grouse conservation and management for twenty years and has been lauded nationally as a model of collaborative conservation success. Together they developed the first Bi-State sage-grouse conservation plan in 2004. In 2012, the Bi-State LAWG organized a planning and strategy approach to build and improve upon the multi-pronged effort to affect the conservation of the Bi-State DPS. While an important milestone, it was not the beginning of the Bi-State LAWG's effort but a continuation of efforts that began a decade before.

Encouraged by a potential listing of the species under the Endangered Species Act, the Bi-State LAWG set out to evaluate threats to Bi-State sage-grouse and identify tangible on-the-ground actions to alleviate these concerns. This effort culminated in the 2012 Bi-State Conservation Action Plan (Action Plan), which provided a 10-year adaptable scope of work, grounded in the best available science, and supported by funding commitments provided by local, state, and federal agency partners. The Action Plan summarized relevant threats and prior conservation efforts and outlined a comprehensive set of strategies, objectives, and actions designed to achieve conservation of sustainable populations and habitats for the Bi-State DPS (Bi-State TAC, 2012).

Each year projects outlined in the Action Plan are implemented utilizing a science-based adaptive management and collaborative conservation approach. Understanding Action Plan implementation and the effectiveness of conservation actions will help Bi-State partners to update the Action Plan and prioritize future conservation actions for Bi-State sage-grouse. The purpose of this report is to provide a 10-year summary of Bi-State Action Plan implementation which includes population monitoring, vegetation monitoring, and the implementation of a wide variety of habitat improvement and conservation projects.

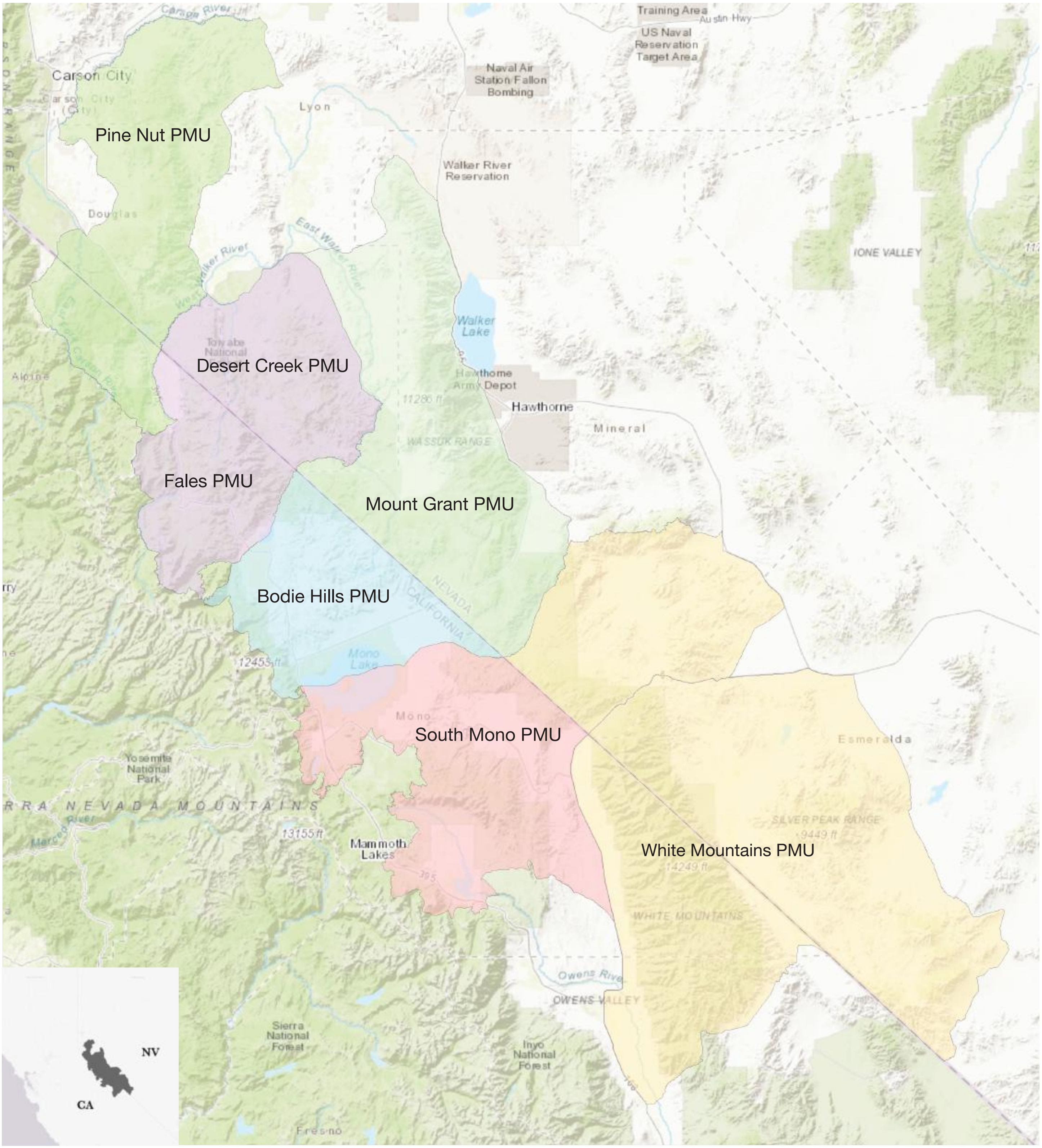

Figure 4: Bi-State Population Management Units

POPULATION MONITORING

There are six Population Management Units (PMUs) within the Bi-State, including the Bodie Hills, Desert Creek/Fales, Mount Grant, Pine Nut, South Mono and White Mountains (Figure 4). Research and monitoring projects detailed in the Action Plan include telemetry, habitat and vital rate data collection, and the coordination of annual lek counts to better understand population demographics and improve predictive models and adaptive management capabilities.

Monitoring efforts were in place in 2012 when the Action Plan was written but a cooperative plan to intensively monitor sage-grouse populations was initiated during the fall of 2015. This monitoring plan allows partners to identify long-term population trends, understand key habitat characteristics, and ultimately allows for a before and after study design to quantify sage-grouse response to management actions (Table 1).

Since 2012, 945 sage-grouse have been captured in the spring and fall seasons and fitted with Very High Frequency (VHF) collars or Global Positioning Satellite (GPS) transmitters (Table 2, Figure 6). Sage-grouse movement and survival is tracked in consecutive years. Intensive monitoring is conducted during nesting and brood-rearing periods to track reproduction and recruitment (Mathews et al., 2018). These vital rates provide data for the Integrated Population Model (IPM) which can characterize population growth rate and isolate factors affecting that rate for individual sub-populations and the Bi-State DPS.

Bi-State sage-grouse capture and monitoring

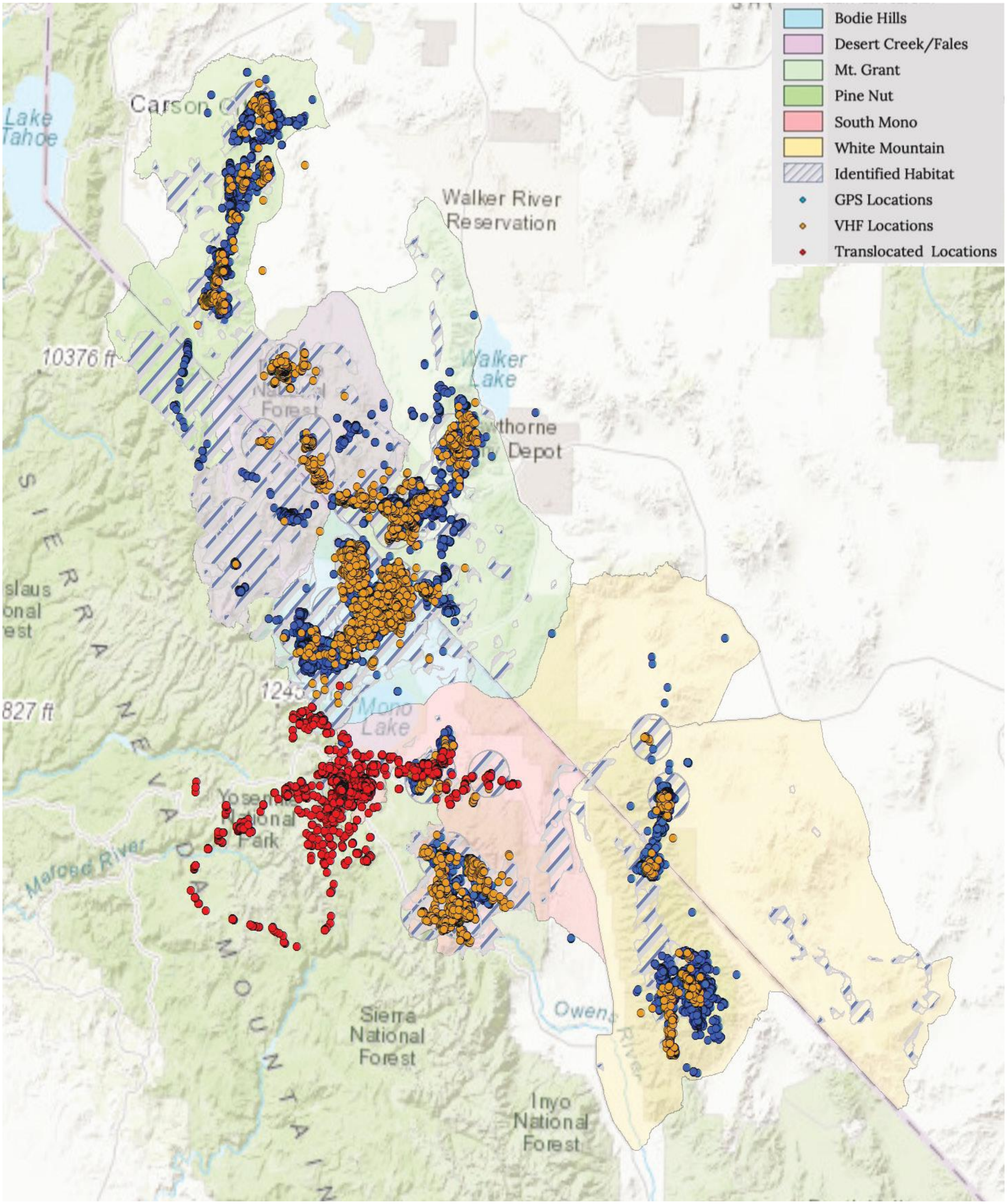

Figure 5: Bi-State sage-grouse locations and identified habitat

PMU	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Pine Nut	●	●	●	●						
Desert Creek-Fales	●			●	●	●	●			
Bodie Hills	●	●	●	●	●	●	●	●	●	●
Mount Grant	●	●	●	●	●	●	●			●
South Mono			●	●	●	●	●	●	●	●
Parker Meadows *	●				●	●	●	●		●
White Mountains		●			●	●	●	●	●	●

Table 1: Bi-State monitoring schedule
** South Mono PMU*

PMU	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Mount Grant	20	10	1	14	32	27	18			23	145
Desert Creek-Fales	6			12	31	20	10				79
Pine Nut	39	14	9	3							65
South Mono			9	39	12	33	26	11	9	33	172
Parker Meadows *	5				2	28	20	20		5	80
White Mountains		2			4	23	46	26	28	22	151
Bodie Hills	2	1	9	29	14	60	51	35	26	26	253
Bi-State Total	72	27	28	97	95	191	171	92	63	109	945

Table 2 Number of sage-grouse captured and marked each year within each Population Management Unit in the Bi-State.
** Birds were captured in Bodie Hills PMU and translocated to Parker Meadows (South Mono PMU)*

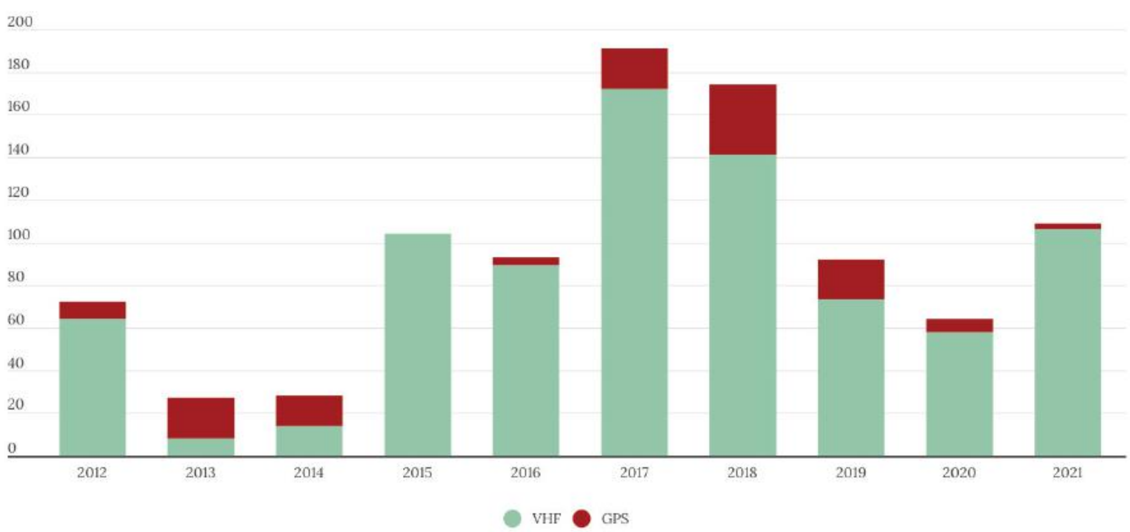

Figure 6: Sage-grouse marked annually by collar type

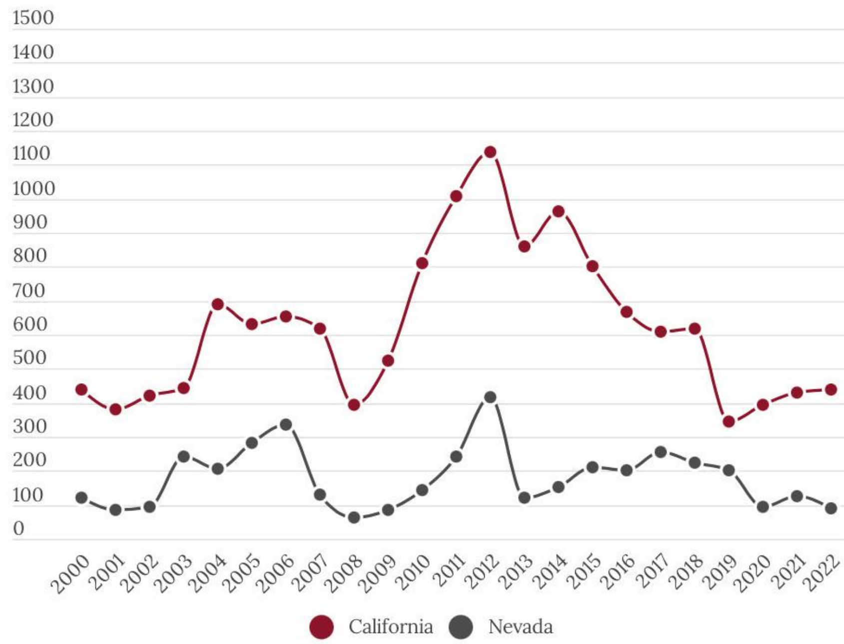

Figure 7: Bi-State sage-grouse lek attendance trends

LEK MONITORING

Each spring, between the months of March and May, Bi-State partners collaborate to monitor known leks to count sage-grouse when they congregate and visibly display on lekking grounds. These counts generate annual population estimates which help Bi-State partners understand population trends over time. These population trends are cyclical and count results fluctuate year to year. To determine long-term trends, annual lek count data is incorporated into an Integrated Population Model which accounts for low counts or leks not counted and generates modeled population estimates.

Within the Bi-State area, there are a total of 101 documented lek locations between California and Nevada, of which 49 are considered currently active (Figure 8) . The active lek status is defined by two or more males present for at least two of five recorded years (Connelly et al., 2003). The total number of documented leks may be somewhat misleading due to the presence of “satellite leks” within many of the PMUs. Satellite leks are small leks that often occur near larger active leks during years of relatively high abundance. The “active” definition is sometimes difficult to apply to satellite leks that are utilized sporadically and do not persist each year. State agencies including NDOW and CDFW are currently working on delineating satellite leks as autonomous or connected, thereby removing some uncertainty surrounding lek counts as an index of population change.

CALIFORNIA LEK SURVEYS

California sage-grouse lek counts are conducted by CDFW, USFS, USGS, LADWP, BLM, Mono County, and others. The primary method used to obtain lek count data in California involves saturation counts which is the simultaneous survey of all leks within a breeding complex on a minimum of three separate days spaced throughout the survey period. The peak male count is represented by the survey having the highest cumulative number of grouse counted on all leks within a breeding complex on any one day.

NEVADA LEK SURVEYS

Lek counts in the Nevada portion of the Bi-State are conducted by NDOW, USFS, BLM, USGS personnel, and volunteers using on-the-ground survey and aerial survey methods. Because many leks in Nevada are remote in nature and difficult to access, saturation counts are not attempted. Lek counts are attempted at all known active leks multiple times during the lekking season, and the highest recorded number of males is documented as the annual count. Remote leks are often surveyed aerially by helicopter.

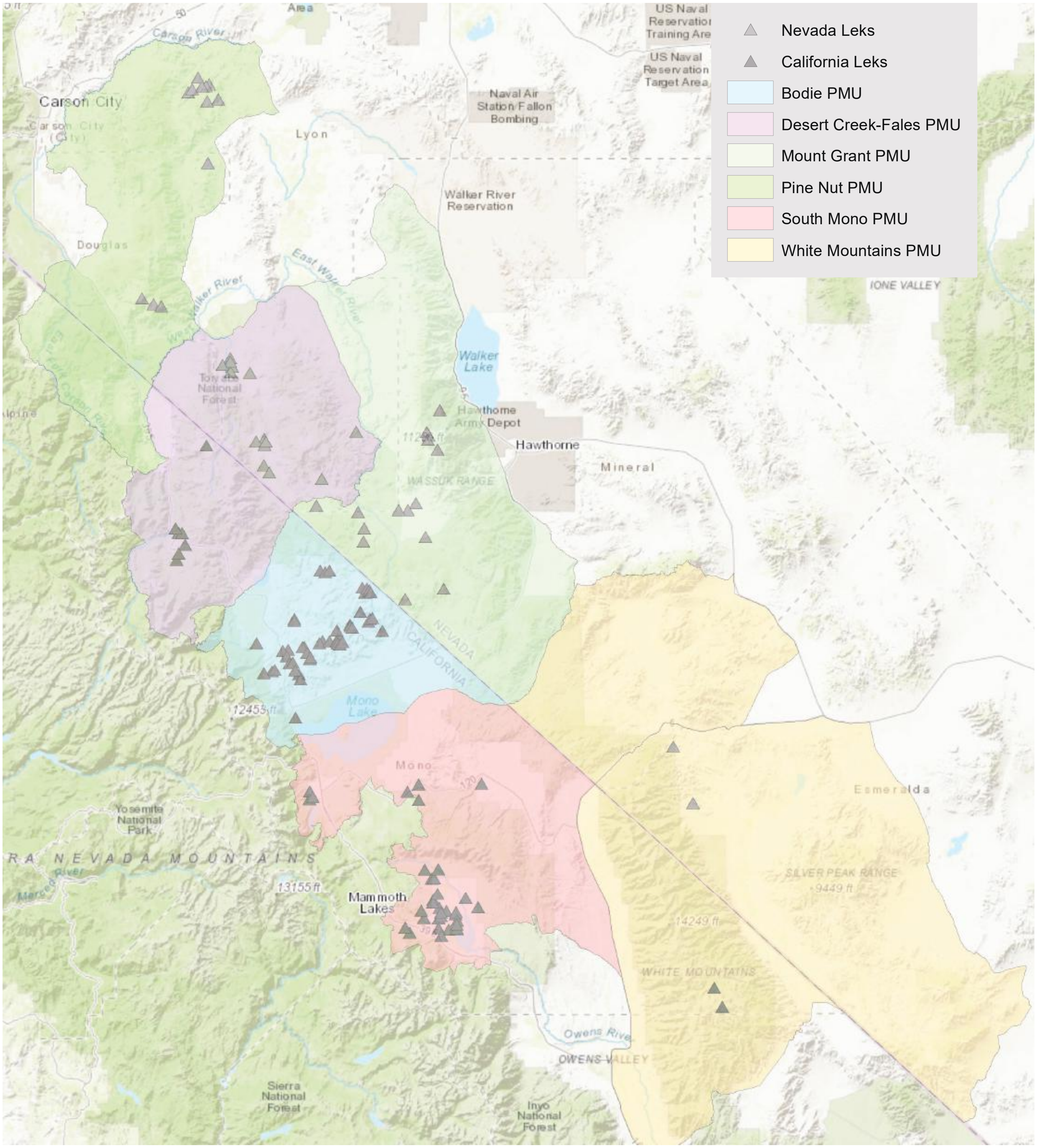

Figure 8: Known Bi-State lek locations

POPULATION MANAGEMENT UNIT SUMMARY

Sage-grouse population trends are cyclical and typically mirror climatic conditions. During periods of adequate moisture, sage-grouse populations often do well, while periods of drought bring population declines (Blomberg, 2012). The five-year period between 2012 and 2016 saw extreme drought conditions, with record-high temperatures and record-low snow pack and precipitation (Gleick, 2017). Since 2012, there have only been two years that California reached or surpassed long-term average precipitation levels and sage-grouse population trends have reflected this. (Figure 9). The following PMU sections summarize scientific research modeled by USGS' IPM. The population demographic descriptions that follow are for the reporting period between 2012 and 2021. They are heavily influenced by recent climactic conditions and do not accurately represent long-term population trends in the Bi-State.

PINE NUT

The Pine Nut PMU is in the northernmost region of the Bi-State. This area contains 574,373 acres of BLM, USFS, Tribal, private, and state or county managed lands (Bi-State Action Plan, 2012). This population of sage-grouse is relatively isolated from the rest of the Bi-State and with population estimates of 48 birds it is the smallest in the Bi-State area (Coates, 2022). Monitoring efforts took place from 2012 through 2015. Over that time 109 birds were captured, marked, and monitored for survival, nest, and brood success. Monitoring efforts were planned to initiate again in 2020 but halted due to concerns around capturing birds within such a small population.

The greatest threats to sage-grouse populations and their habitats in the Pine Nut PMU are wildfire, conifer encroachment, invasive species, recreational use impacts, infrastructure, and energy development (Table 3). Examples of completed conservation actions to address identified threats include:

- 11,704 acres of post-wildfire restoration
- 20,837 acres of conifer expansion treatment
- 838 acres of invasive species monitoring and removal
- 651 acres of meadow restoration and improvement
- 14.8 miles of fence removal and fence marking
- 3 wild horse gathers to maintain AML
- 4 projects to improve livestock grazing management
- 7 education and outreach events

Since 2012, sage-grouse populations in the Pine Nut PMU have been in decline. The likelihood that this population will become extirpated within the next ten years is 67.7% (Coates, 2019). Drought, wildfire, and wild horse impacts have all played a role in limiting habitat and reproductive success. Telemetry data between 2013 and 2015 indicates that some birds have moved from the Pine Nuts to the Bodie Hills PMU (Coates et al., 2016). Considering the Pine Nut subpopulation only makes up approximately 1% of the entire Bi-State population, changes in the overall total of birds in this area will not have great effects on the Bi-State as a whole, however, loss of population distribution is concerning (Coates, 2019).

	Pine Nut	Desert Creek/ Fales	Bodie Hills	Mount Grant	South Mono	White Mtns.
Wildfire	high	high	high	high	high	moderate
Conifer Encroachment	high	high	high	high	moderate	high
Invasive Species	high	low	low	moderate	low	low
Sagebrush Habitat Conditions		moderate				
Urbanization	high	high	moderate		high	moderate
Human Disturbance & Recreation	high	moderate	low	low	high	moderate
Infrastructure	high	high	moderate	high	moderate	low
Landfill					high	
Surface Water Management					moderate	
Licensed Hunting					low	
Poaching						
Grazing-Wild Horses	moderate		low	moderate	low	moderate
Grazing-Permitted Livestock	low	low	low	low	low	low
Predation	moderate	moderate	low	low	low	low
Disease		moderate				
Energy Development	high				low	low
Wind Energy Testing	low					
Geothermal Development			low	high	low	

● low ● moderate ● high

Table 3: Identified threats to sage-grouse by PMU

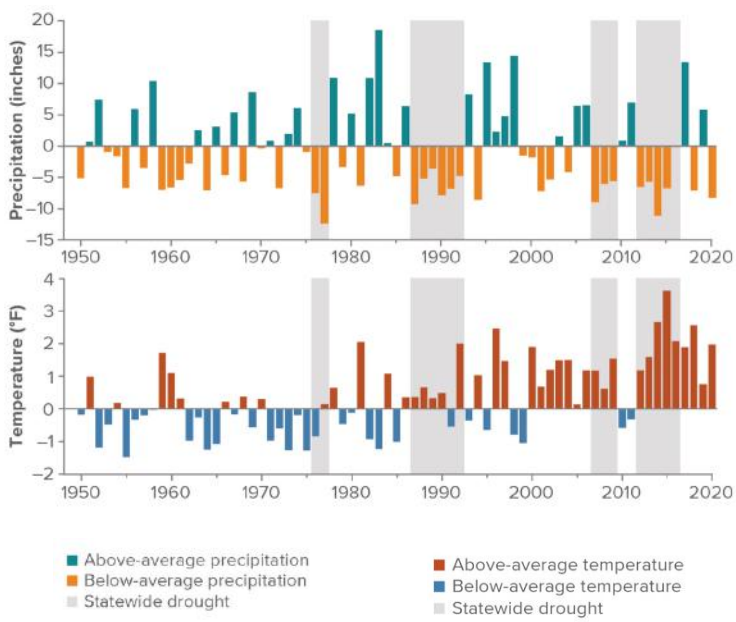

Figure 9: California drought and temperature data (Source: Western Regional Climate Center California Climate Tracker)

DESERT CREEK-FALES

The Desert Creek subpopulation is on the Nevada side of the Bi-State and is bordered to the west by the Fales subpopulation in California. These subpopulations are managed as one PMU. The Desert Creek-Fales PMU contains 567,992 acres of USFS, private, BLM, state or country, and Department of Defense managed lands (Bi-State Action Plan, 2012). IPM population estimates for Desert Creek total 237 birds while Fales is estimated at 88 (Coates, 2022). Monitoring in Desert Creek occurred in 2012 and between 2015 through 2018. During that time 79 birds were captured, marked, and monitored for survival, nest success, and brood success.

The greatest threats to sage-grouse populations and their habitats in the Desert Creek-Fales PMU are urbanization, conifer encroachment, wildfire, and infrastructure (Table 3). Examples of completed conservation actions to address identified threats include:

- 6,578 acres protected through conservation easements
- 21,016 acres of conifer expansion treatment
- 26 miles of fence marking
- 218 acres of sagebrush and meadow restoration
- 453 acres of invasive species removal
- 6 projects to improve livestock grazing management
- 1 education and outreach event

Since 2012, sage-grouse populations in the Desert Creek-Fales PMU have been in a slight decline. The most recent IPM estimates suggest that decline to be 4.5% annually (Coates, 2019). The ten-year extirpation estimates were 23.4% for Desert Creek and 38.4% for Fales (Coates, 2019). Sage-grouse in Desert Creek are located in lower elevation, drier habitats. Impacts from drought have likely caused these declines. However, recent lek counts suggest that sage-grouse numbers have been improving in the Fales PMU.

BODIE HILLS

The Bodie Hills PMU is west of the Mount Grant PMU on the California side of the Bi-State. It contains 349,630 acres of BLM, USFS, private, state, county, and Tribal lands (Bi-State Action Plan, 2012). This subpopulation is the largest in the Bi-State. Recent IPM estimates suggest there are 819 birds in the Bodie Hills PMU, which represents 36.6 percent of all sage-grouse within the Bi-State DPS (Coates, 2022). The Bodie Hills are higher in elevation compared to the rest of the Bi-State and habitat and bird populations tend to fare better during periods of drought as a result. Because the Bodie Hills subpopulation accounts for the bulk of population abundance, Bodie Hills PMU trends substantially influence overall trends across the Bi-State DPS (Coates, 2022). Capture and monitoring in the Bodie Hills occurred between 2012 and 2021. During that time 253 birds were collared and monitored for survival, nest success, and brood success.

Bodie Hills PMU in spring

The greatest threats to sage-grouse populations and their habitats in the Bodie Hills PMU are wildfire and conifer encroachment (Table 3). Examples of completed conservation actions to address identified threats include:

- 825 acres of post-wildfire restoration
- 7,713 acres of conifer expansion treatment
- 1,690 acres of sagebrush and meadow restoration
- 32 miles of fence removal, modification, and marking
- 11,624 acres protected through conservation easements
- 170 acres of invasive species removal
- Annual monitoring of the Montgomery Pass wild horse herd
- 32 projects to improve livestock grazing management
- 3 education and outreach events

In 2012, sage-grouse populations were at an all-time high in the Bodie Hills PMU. Since then, coincident with a long period of drought, populations have declined slightly but population estimates in the Bodie Hills PMU still remain four times higher than they were two decades ago (Coates, 2019). The IPM estimates the likelihood of ten-year extirpation to be low at 2.4% (Coates, 2019). The Bodie Hills PMU is higher in elevation relative to other Bi-State PMUs and can withstand the effects of drought longer than other lower elevation sites (Coates, 2019). Bodie Hills also contains a relatively large amount of late brood-rearing habitat in the Bi-State, which has led to higher recruitment rates for this reporting period (Coates, 2019).

Sage-grouse in Long Valley meadow

MOUNT GRANT

The Mount Grant PMU is east of the Bodie Hills on the Nevada side of the Bi-State. This area contains 699,079 acres of USFS, BLM, Department of Defense, private, and Tribal managed lands (Bi-State Action Plan 2012). IPM estimates suggest there are 230 sage-grouse in the Mount Grant PMU (Coates, 2022). Capture and monitoring in Mount Grant occurred between 2012 and 2018, and in 2021. During that time 145 birds were captured and monitored for survival, nest, and brood success.

The greatest threats to sage-grouse populations and their habitats in the Mount Grant PMU are wildfire, conifer encroachment, infrastructure, mineral exploration and development, and energy development (Table 3). Examples of completed conservation actions to address identified threats include:

- 1,562 acres of post-wildfire restoration
- 8,862 acres of conifer expansion treatment
- 60 acres of sagebrush and meadow restoration
- 47 sites monitored to assess meadow conditions
- 26 miles of fence marking
- 2,607 acres of invasive species monitoring and removal
- 1 wild horse gather to maintain AML
- 2 projects to improve permitted livestock grazing management
- 3 projects to limit recreational use impacts
- 2 education and outreach events

Between 2012 and 2018, sage-grouse populations in the Mount Grant PMU remained very close to stable. Since 2019 there have been sharper declines in male lek attendance, which is likely a result of long-term drought in the higher elevations of the Mount Grant PMU. USGS has documented movement of birds from Mount Grant to the Bodie Hills PMU. The IPM estimates the likelihood of ten-year extirpation to be moderate at 24.6% (Coates, 2019). More intensive monitoring of this population will begin in 2022, which may provide more understanding of the demographic rates associated with population declines.

SOUTH MONO

The South Mono PMU contains 579,483 acres of BLM, USFS, private, county, and Tribal managed lands (Bi-State Action Plan, 2012). This subpopulation is the second largest in the Bi-State and includes the Parker Meadows, Sagehen, and Long Valley subpopulations. Recent IPM estimates suggest there are 769 birds in the South Mono PMU, the majority of which utilize the Long Valley area (Coates, 2022). As of spring 2021, the Long Valley subpopulation represents 31 percent of all sage-grouse within the Bi-State DPS. Because of its large size, population changes at Long Valley have large impacts on the overall Bi-State DPS trends (Coates, 2022). Capture and monitoring in the Sagehen subpopulation occurred in 2014 and 2015. Capture and monitoring in the Parker Meadows subpopulation occurred in 2012 and between 2017-2021. Capture and monitoring in the Long Valley subpopulation occurred from 2015 to 2021. During that time a total of 250 birds were collared and monitored for survival, nest success, and brood success.

The greatest threats to sage-grouse populations and their habitats in the South Mono PMU are wildfire, infrastructure, recreation and human disturbance, and urbanization (Table 3). Examples of completed conservation actions to address identified threats include:

- 2,926 acres of post-wildfire restoration
- Progress has been made to close the Benton Crossing landfill by 2023
- 1,246 acres of seasonal road closures to limit recreational use impacts during lekking season
- 52.8 miles of permanent road closures in critical sage-grouse habitat
- 2,305 acres protected through conservation easements
- 5.7 miles of fence removal, modification, and marking
- 6,275 acres of conifer expansion treatment
- Implementation of LADWP's Adaptive Management Plan for watering in Long Valley
- Raven monitoring and egg oiling efforts to reduce predation impacts
- 5 acres of invasive weed treatment
- 4 projects to improve permitted livestock grazing management
- 16 education and outreach events

The South Mono population has experienced slight declines over the reporting period likely associated with drought, predation, and high levels of recreational activity in the Long Valley area.

White Mountain PMU

Sage-grouse and pronghorn

The 10-year extirpation probability remained low at 3.8 %. Birds in the Long Valley portion of the South Mono PMU rely heavily on wet meadows and irrigated pastures near Crowley Lake during nesting and brood rearing periods. During long periods of drought, birds may venture further out in those irrigated pastures with little overhead protection from avian predators (Coates, 2022). Although the effect of outdoor recreation pressure on sage-grouse has not been quantified, recreational use has increased significantly over the reporting period and may be affecting habitat selection patterns (Coates, 2022). Birds in the Sagehen area have sharply declined, it is presumed that they have joined the core population in the Long Valley area during the drought period. Birds in the Parker Meadows area have experienced a large increase after experimental translocation efforts were implemented between 2017 and 2021 (see translocation section).

WHITE MOUNTAINS

The White Mountains PMU is the highest elevation sage-grouse habitat in the Bi-State area and contains 1,753,875 acres of BLM, USFS, and privately managed lands (Bi-State Action Plan, 2012). Recent IPM estimates suggest there are 40 birds in this population (Coates, 2022). However, the White Mountains are remote and difficult to access in the spring, sage-grouse in the PMU have not been extensively monitored, and historic lek count data is lacking. Therefore, the IPM should be interpreted with caution as bird numbers could be much higher than the model suggests (Coates, 2022). Capture and monitoring efforts took place in 2013, 2015 and from 2017 to 2021. During that period 196 birds were collared and monitored for survival, nest success, and brood success.

The greatest threats to sage-grouse populations and their habitats in the White Mountains PMU are conifer expansion and wild horses (Table 3). Examples of completed conservation actions to address identified threats include:

- TAC members evaluated 5 conifer treatment sites
- Monitoring of White Mountain and Silver Peak wild horse herds
- Coordinated management of Crooked Creek grazing allotment
- 1.7 miles of fence marking
- 4 education and outreach events

Sage-grouse in the White Mountains were relatively understudied, largely because these sage-grouse reside at high elevations that are often inaccessible until mid-summer. The subpopulation represents the most southwestern, and potentially highest elevation occupancy of greater sage-grouse across the species range, representing a unique and potentially extreme study site. Thus, less is known about this population compared to other Bi-State populations (Coates, 2022). Capture and monitoring efforts will continue in an effort to increase understanding of demographic rates and population trends in the White Mountains PMU.

Parker Meadow brood translocation

PARKER MEADOW TRANSLOCATION

One management action specifically listed in the Action Plan was the addition of birds, through translocation, from other PMUs to critically small and isolated sub-populations of sage-grouse. Translocations are designed to: 1) bolster population size to reduce the eminent likelihood of local extinction that would negatively impact the overall stability and persistence of the DPS; and 2) infuse genetic variation to 'rescue' this population from the harmful effects of low genetic diversity within the subpopulation.

Ongoing research conducted by the USGS highlighted the potential for population declines within the Parker Meadow subpopulation in the South Mono PMU to critically low levels. It was determined that intervening management efforts were necessary to maintain and increase the Parker Meadow subpopulation.

After three years of planning, the first of a multi-year translocation effort began in March 2017. That year, 28 sage-grouse (20 females, 8 males) were captured at Bodie Hills and translocated to Parker Meadows. All captured birds were fitted with VHF or GPS (male only) transmitters. As part of an experimental design, a subset of females was artificially inseminated prior to release to help increase the probability of nest initiation that spring. Additionally, three post-hatch broods, females with newly hatched chicks, were translocated. These were the first greater sage-grouse brood translocations attempted range-wide. The expectation is that these reproductive conditions would help "anchor" the female to the release area, and their surviving chicks would add new recruits to the population at Parker Meadows.

Data from 2017 efforts suggested that brood translocations are more successful because they bypass the effects of low nest initiation and success associated with the translocation of pre-nesting females. In 2018, 20 more sage-grouse (13 females, 7 males) were translocated from Bodie Hills to Parker Meadows, five of which were pre-nesting hens and eight were females with broods. In 2019, a total of 20 birds (10 females with broods, 5 pre-nesting females, 5 males) were translocated from the Bodie Hills PMU. Fifteen were outfitted with VHF transmitters and 5 with GPS transmitters to track movement and monitor survival. No translocations took place in 2020 due to the covid-19 pandemic. In 2021, five hens with their broods were translocated to Parker Meadows.

Given what has been learned during the initial years of translocation efforts, measures have been identified to minimize morality and dispersal rates. Design changes to transport boxes and increasing the emphasis on brood translocations promise to reduce the number of individuals required to be handled and improve success of the translocation overall (Figure 10). Moving forward USGS will be using a new protocol that involves mixed brood translocations, where one hen is translocated with her brood and part of another hen's brood. The purpose of this method is to limit the number of adults removed from the source population, decreasing negative demographic impacts to that population. The translocation effort in Parker Meadows will continue in the coming years. Changes to protocols and methods will continue to utilize a science based, adaptive approach to allow this effort to be as successful as possible.

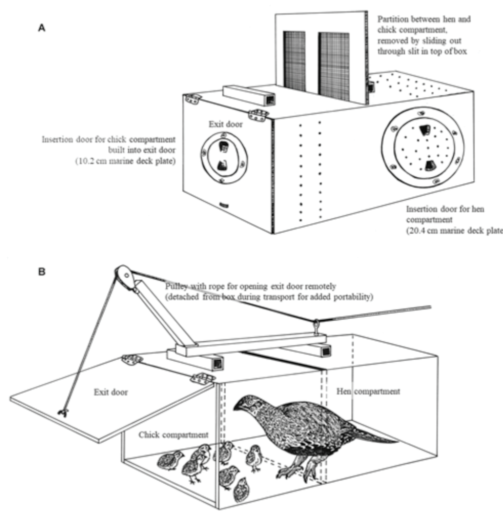

Figure 10: Schematic of translocation release boxes. IIllustration credit: Diana Muñoz

	2017	2018	2019	2020	2021	Total
Males	8	7	5	_	_	20
Females (pre-nesting)	17	5	5	_	_	27
Females (w/ broods)	3	8	10	_	5	26
Chicks	17	39	70	_	20	146
Total	45	59	90	0	25	219

Table 4: Sage-grouse translocated to Parker Meadows annually

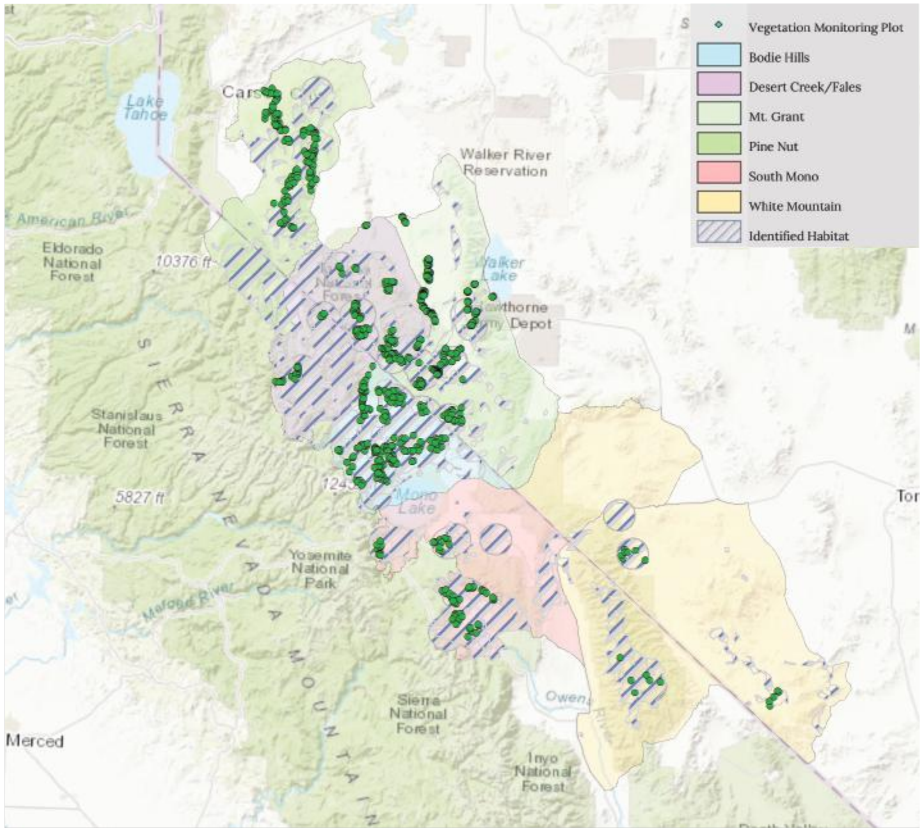

Figure 11: Vegetation monitoring plot locations

VEGETATION MONITORING

The Nevada Partners for Conservation and Development (NPCD), housed within the Nevada Department of Wildlife (NDOW), has been collecting vegetation data across numerous sites across all Bi-State PMUs since 2011.

In areas identified for conifer removal and at sites that have experienced episodes of wildfire, the NPCD establishes monitoring plots both within and outside of treatment and wildfire boundaries. Sampling is conducted prior to treatment to establish baseline conditions and sites are revisited post treatment to determine treatment and fire restoration effectiveness. Plots outside of treatment and wildfire boundaries serve as controls against which the restoration projects' effectiveness can be compared. The methods NPCD employs are consistent with the BLM's Assessment, Inventory and Monitoring protocols (AIM; Taylor et al. 2014) and are designed to be easily replicated, requiring little or no expensive equipment.

Since the Action Plan was implemented, 816 vegetation plots have been monitored across the Bi-State. Monitoring measures vegetation response to treatment including changes in sagebrush cover, perennial grass cover, species richness and presence of non-native and invasive species (Figure 12). Vegetation response to treatment is often slow; however, preliminary results from selected sites suggest that species richness, sagebrush, perennial grass, and forb cover are elevated in treatment plots compared to control sites. These results suggest that conifer treatment and post wildfire restoration efforts are improving habitat conditions for sage-grouse.

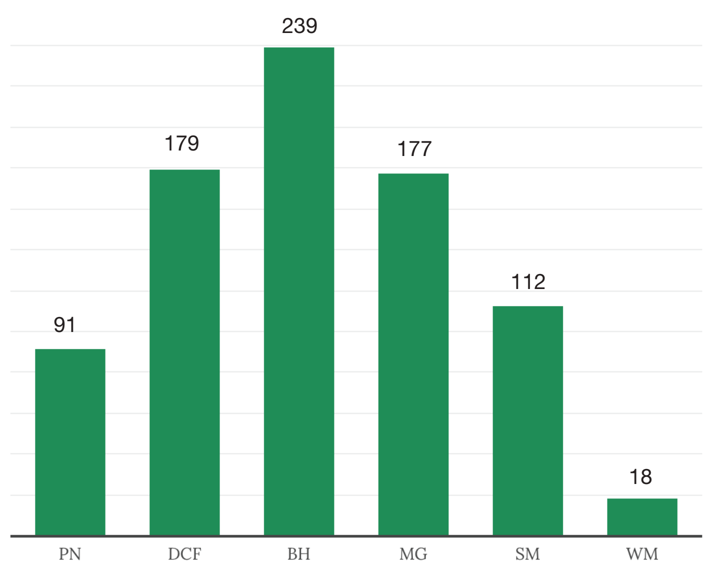

Figure 12: Completed vegetation monitoring plots

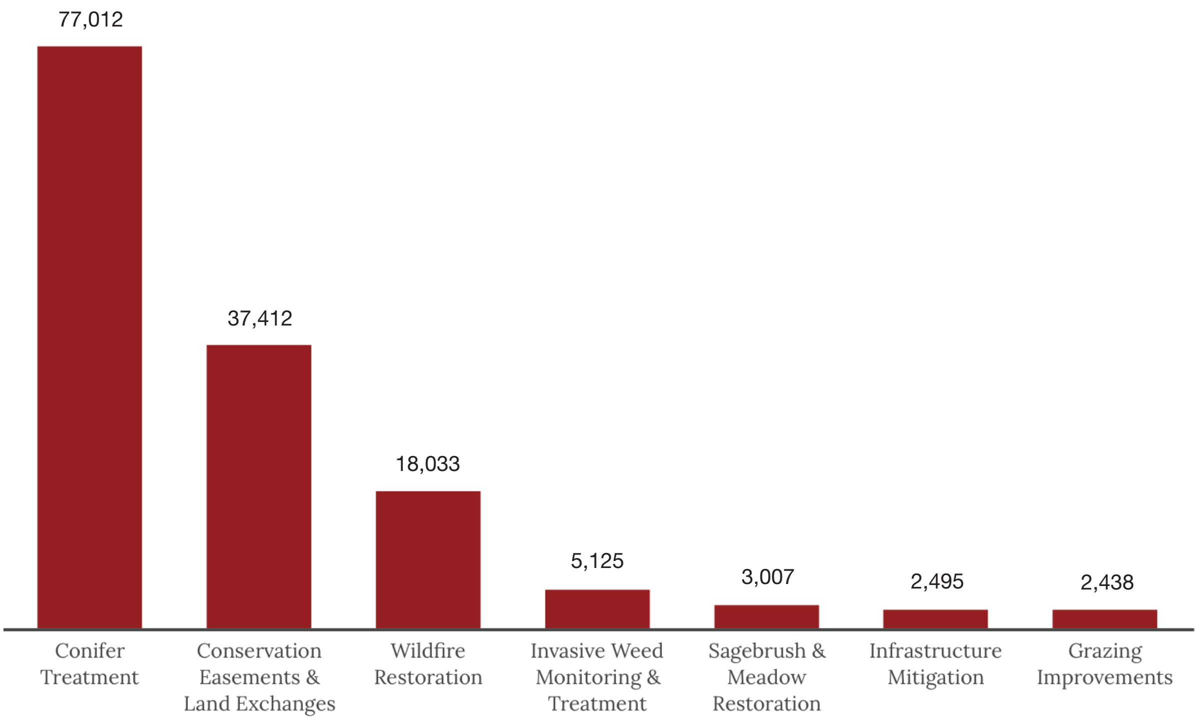

Figure 13: Acres of work completed to address identified threats to Bi-State sage-grouse

CONSERVATION ACTION IMPLEMENTATION

The Action Plan intended to provide a foundation and vision for a coordinated and cooperative management approach for conservation of the Bi-State sage-grouse, to ensure healthy population levels, and to maintain and improve sage-grouse habitat.

Individual objectives, strategies, and actions outlined in the Plan provide a strategic framework designed to achieve these overall conservation goals. Conservation actions are outlined using a hierarchal approach that identifies each action relative to the broader conservation objectives and strategies identified in the Plan (Bi-State Action Plan, 2012). The highest priority threats were identified and prioritized for each individual PMU.

In the last ten years, on-the-ground conservation efforts have been initiated to improve habitat conditions on more than 143,000 acres in the Bi-State (Figure 13). The following pages identify threats to Bi-State sage-grouse and their habitats and detail actions taken to address those threats. Work completed represents the highest priority actions in the Bi-State informed by research, a conservation planning tool developed by USGS, input from the Bi-State Local Area Working Group, and common-sense realities of implementing projects.

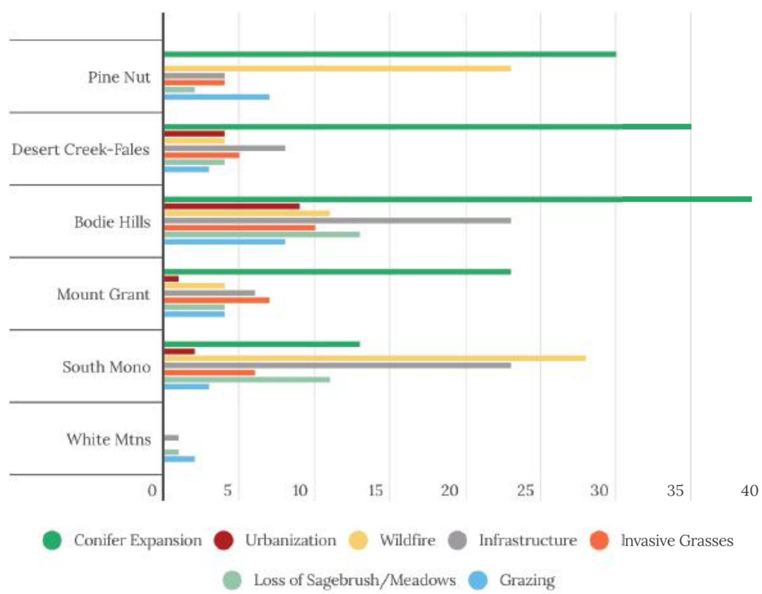

Figure 14: Number of completed projects by PMU

Post fire conifer removal

Wind fencing to improve soil stabilization

WILDFIRE

Large, intense wildfires are an increasing issue across the West and the Bi-State is not immune to this threat. Addressing wildfire is identified as a high priority in the Pine Nut, Desert Creek-Fales, Mt. Grant, Bodie and South Mono PMUs.

Changing climate, periods of drought, encroaching conifer, and the proliferation of non-native weeds, such as cheatgrass, alter sagebrush ecosystems and increase the likelihood of ignition and fuel load available for wildfire that can quickly devastate large expanses of important sage-grouse habitat.

A disturbed ecosystem post-fire is more susceptible to further invasion of non-native plant species and conversion of sagebrush to annual grass monocultures, which in turn increases potential for fire. This cycle alters fire regimes, causing more frequent and intense fires that perpetuate loss of habitat and threats to sage-grouse. Actions employed to address the threat of wildfire include, strategic fire suppression, fuel breaks, conifer removal, fuel reduction and post-fire rehabilitation. The removal of encroaching conifer reduces fuel availability for wildfires in sagebrush ecosystems and can act as a fuel break to halt or slow the progress of a spreading wildfire. Fuel reduction entails thinning thick stands of conifer, mosaic mowing and prescribed burns to limit the spread and decrease the intensity of wildfires while promoting native plant species production. Post-fire rehabilitation helps avoid ecosystem type conversion and promotes the return of suitable sage-grouse habitat though erosion control and seeding of native shrubs and grasses.

ACCOMPLISHMENTS

- To address the threat of wildfire, Bi-State LAWG partners communicate across jurisdictional boundaries to implement coordinated fire-management strategies that minimize the loss of suitable sage-grouse habitat.
- A concerted effort is made to ensure that fire personnel are informed and respond to wildfire with consistency across management boundaries. This requires the ability to: 1) identify locations that provide current or potential habitat for sage-grouse and 2) prioritize fire suppression and management actions in these areas to minimize sage-grouse habitat loss.
- Interagency fire management and suppression agreements were established between the BLM and USFS. Existing fire management plans were updated to include conservation measures identified by the National Sage-Grouse Technical Team to reduce long-term loss of sagebrush.
- Since 2012, a total of 18,034 acres of work, including conifer removal, fuel breaks, fuels reduction and post-fire rehabilitation has occurred in the Pine Nut, Desert Creek-Fales, Mount Grant, Bodie and South Mono PMUs.
- Resource advisor kits are updated annually to provide the most recent information on sage-grouse populations and all fire personnel receive training on fire protocols specific to sage-grouse habitat.
- Wildfire prevention activities include patrols to locate fire starts, document campfires and educate the public on fire regulations.
- LADWP prohibits camping on their lands and has adopted a no campfire policy to reduce the potential for human caused fire.

Bi-State conservation easement

URBANIZATION

Biomes in the arid west have uneven distributions of food and cover, thus fragmentation can be particularly acute for the wildlife that depend on these environments. Many sagebrush obligate species have evolved to require very large areas of intact habitat to meet their seasonal and annual resource needs. Therefore, disturbance of a relatively small number of fragmented sagebrush acres can have a disproportionate impact on the species that need that habitat to survive (Crist, 2015).

Maintaining high quality, intact habitat conditions into the future and addressing the risks associated with urbanization is a high priority in the Desert Creek-Fales, Pine Nut, and South Mono PMUs.

Conservation easements are implemented to limit urban development that may fragment habitat. These are voluntary legal agreements between a landowner and a qualified organization, like a land trust, which places some conservation restrictions on the use of a property to protect its natural values. These agreements provide benefits to both landowners and wildlife. They protect large quantities of suitable habitat from further development and allow landowners to pursue available funding to implement conservation projects on their land.

In addition to conservation easements on private lands, land purchases or exchanges have occurred that resulted in public, state, or federal ownership of occupied sage-grouse habitat. These acquisitions ensure that land remains intact for generations and managed in a way that will maintain quality habitat and provide conservation value to Bi-State sage-grouse.

ACCOMPLISHMENTS

- The Action Plan identifies 12 actions to address the threat of urbanization in the Desert-Creek Fales, Bodie Hills, and White Mountain PMUs, seven of which are complete. In total, 37,412 acres have been entered into conservation easement agreements or have been acquired through land purchase or exchange since 2012. These completed projects insure that connected, high-quality habitat is available for sage-grouse and other wildlife species well into the future.

- Partners have implemented new policies, plans and programs to promote land conservation and to reduce development and human disturbance impacts.

- In 2014 the NRCS designated the Bi-State region as "Grasslands of Special Environmental Significance." This designation raised the amount of funds NRCS contributes to the acquisition of easements from 50 percent to 75 percent.

- In 2017, the Eastern Sierra Land Trust secured $8 million dollars in funding through the USDA's Regional Conservation Partnership Program (RCPP) which allowed ranchers and landowners to apply for conservation funding for projects on their lands that benefit both working lands and wildlife.

- Mono County implemented new policies in their County Plan to reduce the impact of development in sage-grouse habitat.

Actions not completed include the following:

- MER2-2: Secure a conservation easement or agreement with the Desert Creek Ranch to maintain essential brood rearing habitat in proximity to lek # 2 in the Desert Creek-Fales PMU.

- MER2-5: Secure a conservation easement or agreement with the Mormon Ranch to maintain essential brood rearing habitat in proximity to the Bridgeport Canyon/ Little Mormon lek complex in the Bodie Hills PMU.

- MER2-6: Secure a conservation easement or agreement for the Aurora Meadow complex to maintain brood rearing habitat in proximity to the Aurora lek in the Mount Grant PMU.

- MER2-8: Secure conservation easements or agreements with willing landowners in the Burcham Flat, Wheeler Flat and Fales Hot Springs vicinities to prevent further development impacts in proximity to leks in the Fales breeding complex in the Desert Creek Fales PMU.

- MER2-12: Secure conservation easements or agreements with willing landowners to maintain key nesting or wintering habitats along the east side of the White Mountains in the White Mountains PMU.

CONIFER ENCROACHMENT

The loss and fragmentation of high-quality, intact sage-grouse habitat to encroaching conifer is a high priority threat in the Pine Nut, Desert Creek-Fales, Mt. Grant, Bodie and White Mountain PMUs. Pinyon pine, juniper, and Jeffery pine are native species in the Bi-State but expansion beyond historical limits due to fire suppression, historic overgrazing by domestic livestock and favorable climate conditions has become problematic (Brockway et al. 2002). Across the Bi-State area, it is estimated that approximately 40 percent of the historically available sagebrush habitat has experienced woodland expansion over the past 150 years (USGS, 2012). Conifer encroachment into sagebrush systems is problematic as it may increase fire severity and size, deplete soil water and nutrients, reduce native understory, provide perches for avian predators, and alter sage-grouse habitat selection. All of which can affect behavioral decisions, distribution, and population dynamics of sage-grouse.

Previous studies have shown that sage-grouse experience population-level impacts at low levels of encroachment and that leks are less likely to be active near small, dispersed trees (Baruch-Murdo et al. 2013). In 2017, the USGS published a study, conducted in the Bi-State, that demonstrated changes in sage-grouse habitat selection and negative effects to vital rates directly associated with encroaching conifer (Coates et al. 2017). To address the threat of conifer encroachment, the USGS and TAC developed a spatially explicit Conservation Planning Tool (CPT). The CPT is a model that ranks the relative benefit of individual conifer removal projects. Bi-State partners can utilize this tool to select and prioritize conifer removal projects that will provide the most conservation value to sage-grouse and maximize benefit from dollars spent. Addressing conifer encroachment and infill provides a myriad of benefits to sage-grouse that include increasing habitat connectivity, maintaining native understory, eliminating perches for predators, conserving soil water and nutrients, and increasing ecosystem resilience to fire and resistance to cheatgrass invasion.

Conifer projects within the Bi-State are ranked using the CPT and the TAC's expertise regarding areas of occupied sage-grouse habitat being impacted by conifer encroachment. Conifer removal projects aim to improve habitat, increase connectivity, and reduce risk to sage-grouse. Phase I conifer cover is targeted to provide the most benefit at the lowest cost. Post-treatment maintenance is often required in the years following initial treatment to ensure that small seedlings and saplings were not missed in the original treatment.

Parker Meadows pre conifer treatment

Parker Meadows post conifer treatment

ACCOMPLISHMENTS

- The Action Plan contains 20 actions that call for the evaluation and implementation of conifer removal projects as a method to restore and maintain intact sagebrush habitat for sage-grouse. Of those 19 have been initiated and are in various states of completion.

- In total, 64,697 acres of conifer treatment and 12,315 acres of conifer treatment maintenance have been completed.

Actions not completed include the following:

MER4-2: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Masonic Gulch, Red Wash, and Chinese Camp vicinities in the Mount Grant PMU.

Native seed collection

Cheatgrass

Aerial seeding with native seed source post fire

INVASIVE AND NOXIOUS SPECIES

Non-native plants are not overly abundant in the Bi-State area, except for cheatgrass, which occurs in all PMUs throughout the range. It is most prevalent in the Pine Nut PMU, where it is identified as a high priority threat and in the Mt. Grant PMU where it is listed as a moderate threat. The infiltration of cheatgrass into sagebrush systems can increase fire potential size and severity, out-compete native understory species after fires, and perpetuate a devastating disturbance cycle.

To counter the threat of habitat loss, Bi-State land management agencies and their partners have implemented numerous conservation actions and strategies. These include strategic fire suppression to avoid ecosystem-type conversion, utilization of native plant species to rehabilitate burned areas, and mechanical and chemical weed treatments.

ACCOMPLISHMENTS

- Since 2012, monitoring to detect invasive annual grasses has occurred on 3,325 acres across multiple PMUs in the Bi-State.
- Post fire restoration and conifer treatment sites are assessed prior to treatment to select appropriate methods to minimize site disturbance that could result in the establishment of non-native plant species.
- Chemical and mechanical treatment of non-native plant species have occurred on 1,786 acres in the Pine Nut, Desert Creek-Fales, Bodie Hills, and South Mono PMUs.
- Native seeds are collected for future Bi-State restoration and rehabilitation projects.

Bi-State meadow habitat

LOSS OF SAGEBRUSH AND MEADOWS

Healthy sagebrush and meadow conditions are necessary components of sage-grouse habitat, crucial to supporting sage-grouse throughout their life cycle. Land managers make every effort to implement best management practices to avoid the degradation of intact sage-grouse habitat through adopted regulatory mechanisms. When sagebrush and meadow conditions are compromised, improvements are made through restoring native hydrology, installing check dams to stabilize stream head-cuts, fencing areas to allow recovery from livestock grazing, prescribed fire, and irrigation.

ACCOMPLISHMENTS

- Through the completion of 40 projects within all Bi-State PMUs, 3,008 acres of meadow and sagebrush were restored or enhanced through irrigation, meadow improvement, and vegetation restoration.
- Meadow habitat improvement efforts on public and private lands in upper Aurora Canyon in the Bodie Hills PMU have been implemented.
- The Bishop BLM installed check dams to stabilize stream area headcuts in 2010, since then additional check dams have been installed in subsequent years and maintenance of these structures occurs annually.
- Hydrological function was returned to Wheeler Creek through restoration efforts to increase plant cover and diversity on adjacent brood meadows.
- The Eastern Sierra Land Trust cleaned up two dump sites and cleared out irrigation ditches in sage-grouse habitat located on privately owned property.
- In 2018 and 2019, the Nevada State Parks conducted proper functioning condition surveys to evaluate and assess stream health within the Walker River State Recreation Area. The objective of these projects is to gather information on creeks and their associated meadows to develop restoration projects designed to reconnect fragmented habitat and restore summer brooding habitat in the Mt. Grant PMU.
- Assessment, inventory, and monitoring (AIM) vegetation plots are completed throughout the Bi-State annually to evaluate ecosystem health.
- Through the Seeds of Success program native seeds were collected at multiple sites to provide a local seed source for restoration projects.
- Between 2015 and 2021, partners met seven times to complete assessments for future wet meadow and stream restoration sites in multiple PMUs.
- LADWP developed an adaptive management plan for irrigating meadows in the Long Valley area of the South Mono PMU to maintain important sage-grouse habitat.

Actions not completed include the following:

HIR1-5-PN: Manage high elevation wet meadows in the southern portion of the Pine Nut PMU. Maintain existing fences and mark with diverters.

HIR2-1-PN: Restore previously burned sagebrush habitat within a three mile radius of Mill Canyon Lek.

HIR2-2-PN: Maintain meadows in Mount Seigal and Bald Mountain areas in proper functioning condition or improve through livestock management.

HIR2-3-PN: Improve sagebrush habitat quality west of Big Meadow.

HIR2-3-MG: Evaluate meadow habitat conditions in the Aurora and Gregory Flat vicinities.

Converting Bodie Hills fence to let down

INFRASTRUCTURE & HUMAN DISTURBANCE

Infrastructure is identified as a high priority threat in the Pine Nut, Desert Creek- Fales and Mount Grant PMUs. The threat of human disturbance is high in the Pine Nut and South Mono PMUs and moderate in the Desert Creek-Fales PMU.

Infrastructure features impacting sage-grouse in the Bi-State region include linear features such as roads, power lines and fences and location specific features like landfills, communication towers and windmills. Impacts from linear features include fragmentation of habitat (Braun 1998), direct mortality through collisions and increased available perches for predators (Connelly et al. 2000). Roads not only fragment habitat but also increase potential for human access and disturbance. Site specific infrastructure, such as landfills, attract and increase predator populations. Recent studies found that transmission lines in central Nevada affected multiple demographic rates of sage-grouse and influenced raven abundance and habitat selection, which had cascading effects to associated sage-grouse populations (Gibson, 2018).

To address threats posed by infrastructure, fences in occupied sage-grouse habitat are evaluated for strike hazards and are either removed, modified, or marked as necessary. Permanent and seasonal road closures serve to reduce disturbance and potential fragmentation. Location specific infrastructure threats are evaluated, and steps are taken to remove structures that increase risk to sage-grouse.

Threats associated with human disturbance include illegal hunting and recreational use impacts to sage-grouse habitat. These threats have been addressed through increased law enforcement, public education and the adoption of land management policies that restrict access to key habitat through road closures, regulation of new road development, and seasonally enforced regulations.

ACCOMPLISHMENTS

The Action Plan identifies 12 actions to decrease infrastructure threats to Bi-State sage-grouse. Since 2012, 11 of these 12 actions have been addressed and include, fence evaluation, the removal of the site-specific hazards, and the following actions:

- Fourteen miles of fence have been removed in the Bodie Hills, Pine Nut, and South Mono PMUs. An additional 7.5 miles of fencing was converted to “let down”. Many miles of fence across the Bi-State were marked with flight diverters.

- LADWP imposes seasonal closures of their land near Crowley Lake during the peak lekking period to reduce the potential for human disturbance. 2,420 acres of land near leks and nesting habitat benefit from seasonal road closures annually.

- Four windmills in Adobe Valley located within the South Mono PMU were removed and converted to solar in 2014. Over six miles of the Fletcher power line located in the Bodie Hills PMU was decommissioned and removed. This project was completed in 2014. Progress toward the closure and relocation of the Mono County landfill has been made through planning and funding acquisition. Closure is on track to be completed in 2024.

- With the new designation of the Walker River State Recreation Area in the Mt. Grant PMU, law enforcement patrols to deter poaching and manage recreational use have increased.

- Partners worked together to develop public lek viewing guidelines and produced outreach material to disseminate information to the public.

- The BLM adopted a land use amendment that regulates the development of new roads or OHV trails in Bi-State sage-grouse habitat. Recreation monitoring and management activities have increased in the South Mono and Bodie Hills PMUs.

Actions not completed include the following:

MER3-7: Minimize impacts from traffic near the Aurora Borealis mine in the Mount Grant PMU.

Converting Bodie Hills fence to let down

GRAZING PERMITTED LIVESTOCK

The grazing of permitted livestock is listed as a low priority threat in all PMUs across the Bi-State. To address the threat of habitat degradation caused by grazing and to implement beneficial livestock management strategies, the NRCS and ESLT provided $8 million in funding for habitat improvement and enhancement projects on private lands through the Regional Conservation Partnership Program. Land management agencies monitor active grazing allotments on their land for compliance with permit terms and conditions within all Bi-State PMUs.

ACCOMPLISHMENTS

- USGS completed livestock surveys in conjunction with sage-grouse monitoring efforts.
- Grazing management tactics to improve sage-grouse habitat were employed across 1,127 acres in the Bodie Hills PMU.
- Fences were erected around the area burned during the Hot Creek Fire in the South Mono PMU to limit grazing impacts to recovering resources.
- Seven range improvement inspections were completed in the Pine Nut and Mount Grant PMUs.
- A 15-year USDA Conservation Reserve Program lease in the Bodie PMU was signed this year protecting 1,054 acres of land.

GRAZING WILD HORSES

Grazing of wild horses and burros are listed as a low or moderate threat in the Pine Nut, Bodie Hills and Mt. Grant PMUs. Each year the USGS documents the presence of wild horses and burros through the completion of raptor, raven, horse, and livestock surveys. Land management agencies make efforts to monitor Bi-State wild horse and burro populations to establish and maintain Appropriate Management Levels (AML) to protect their health as well as that of the habitat they and other species rely upon.

ACCOMPLISHMENTS

- The U.S. Forest Service and BLM completed aerial surveys of the Montgomery Pass Wild Horse Territory to generate a minimum count and assess the herds size compared to the established AML in the Desert Creek Fales PMU.
- USFS staff completed wild horse surveys in the Powell Mountain herd in the Mt. Grant PMU.
- Bishop BLM completed wild horse surveys in the South Mono and Bodie Hills PMUs.
- Horses were gathered in the Wassuk range to maintain AML in the Mt. Grant PMU.
- Carson City BLM District Office organized and implemented a wild horse gather in the Pine Nut Mountain PMU to meet AML, a total of 404 horses were gathered. Animals gathered were made available for adoption at Palomino Valley Wild Horse and Burro Center in Reno through the Wild Horse and Burro Adoption Program. Those that were not adopted are cared for in off-range pastures, where they retain their “wild” status and protection under 1971 Wild Free-Roaming Horses and Burros Act.
- USFS and BLM employees attended the Wild Horse and Burro National Overview meeting, held in Reno, Nevada, to discuss new science and facts, public involvement, ongoing and future planning regarding the management of wild horses and burros.
- The Inyo National Forest filled a rangeland specialist position whose duties include the management of wild horse and burro territories on National Forest lands.

Bi-State partners

COLLABORATIVE CONSERVATION

Additional actions to improve sage-grouse conservation efforts are completed each year to implement a coordinated interagency approach, incorporate a science-based adaptive management plan, improve regulatory mechanisms, and maintain stakeholder involvement.

INTERAGENCY APPROACH

The Action Plan identifies three actions designed to implement a coordinated interagency approach to sage-grouse conservation, all of which have been initiated. These actions include:

- Development of a "Sage-Grouse Service Team" approach to support the conservation and management of sage-grouse populations in the Bi-State. This requires that partners work collaboratively and provide multi-jurisdictional funding to facilitate the conservation of Bi-State sage-grouse and its habitats.
- Each year, Bi-State partners work together to leverage expertise and develop conservation strategies to develop a proposed program of work based on priority, staff availability and funding. Agencies work across jurisdictional boundaries to monitor population demographics, complete vegetation monitoring plots, and carry out Action Plan projects.
- In 2014, Bi-State partners announced a $45 million-dollar commitment to implement the 2012 Action Plan over a 10-year period (Table 5). Under the direction of the Executive Oversight Committee, each partnering agency drafted a commitment letter to the Service, stating their acknowledgment of responsibility and dedication to implement a coordinated interagency approach to conservation.
- Since 2014, approximately 84% of that funding has been allocated with a total of $37.6 million agency dollars spent on sage-grouse conservation efforts over the last eight years (Figure 15).

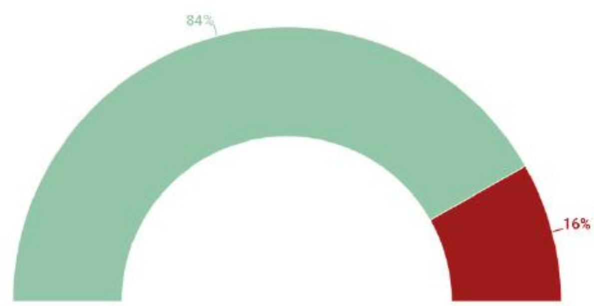

Figure 15: Allocated funding for sage-grouse conservation 2014-2021

Agency	Funding Commitment	Conservation Role
NDOW	$3.6M	Vegetation monitoring, population monitoring
CDFW	$1M	Translocation, population monitoring, predator monitoring, habitat acquisition
USFS	$13.9M	NEPA planning for projects, planting and irrigation plans, grazing management, meadow restoration, population monitoring
NRCS	$12M	Land owner outreach on easement and habitat restoration opportunities, conservation easements, matching funds for partners, utilize program funding to implement projects
BLM	$6.5M	NEPA planning for projects, conifer removal, meadow enhancement, infrastructure evaluation, wild horse assessment, population monitoring
USGS	$2.5M	Develop and apply modeling and science to inform adaptive management, CPT, IPM, population monitoring
Mono County	$5.9M	Coordinate on easement development and provide matching funds, relocate landfill, landowner education and outreach, general plan update
USFWS	$1M	Science and capacity support, landowner engagement and outreach, implementation of private lands restoration opportunities

Table 5: Partner funding commitment and conservation role

SCIENCE-BASED ADAPTIVE MANAGEMENT

Bi-State partners utilize a science-based adaptive management approach to generate a strategic process for guiding sage-grouse management. This approach integrates the best available science to inform local and landscape-level management and conservation decisions for Bi-State sage-grouse.

Science-based adaptive management guides management decisions based on data-driven models, implementation of actions, outcome evaluation and modification of management practices based on this iterative learning process (Bi-State Action Plan, 2012). This management strategy provides insight into what management actions should be conducted and which areas should be targeted, while reducing the chances of carrying out actions in areas where the effects are inconsequential and not meaningful. The Action Plan identifies seven actions necessary to manage sage-grouse populations and implement projects through adaptive, science-based methods. These actions include:

- Establishment of inter-agency agreements and funding mechanisms to support a USGS Science Adviser. The primary duty of the Science Adviser was the development of the Conservation Planning Tool (CPT) to prioritize conservation projects (Bi-State Action Plan, 2012). Funding for this position was initially acquired in 2012 and has been secured annually.

- The six remaining actions detail necessary information to be acquired and incorporated into the CPT to increase its function and management value. These actions include defining habitat, ranking risks, integrating population performance, and identifying factors that influence population vital rates. Each of these actions is carried out annually to improve the predictive power of the CPT and inform management decisions to maximize benefit to Bi-State sage-grouse populations.

- The USGS has also furthered science based adaptive management initiatives through additional research and the development of analytical tools beyond those originally identified in the Action Plan. Those accomplishments include furthering research on sage-grouse response to conifer density and conifer treatment, appropriate normalized difference vegetation index (NDVI) levels for irrigated meadows in sage-grouse habitat, and by developing a targeted annual warning system that helps to identify when sage-grouse subpopulations are experiencing declines that should trigger management actions.

IMPROVED REGULATORY MECHANISMS

The Action Plan outlines 13 actions for improved regulatory mechanisms, 12 of which have been completed. These actions provide consistent land management direction across jurisdictional boundaries to conserve Bi-State sage-grouse and their habitats into the future. Considering the majority of sage-grouse habitat in the Bi-State is on federally managed public lands, effective conservation of Bi-State DPS and its habitats requires strong land use management plans.

Plans are implemented by land management agencies in close coordination with state and federal wildlife agencies to ensure there is seamless regulatory direction for all sage-grouse related issues across management boundaries. These amendments aim to minimize or eliminate threats affecting the status of sage-grouse and to improve habitat conditions. Ongoing plan maintenance occurs to incorporate the most recent information ensuring that public lands containing Bi-State sage-grouse and sage-grouse habitat are adequately protected.

Bi-State land management agencies agreed to adopt plan amendments to incorporate best management practices, standardize operating procedures, implement conservation measures, and mitigate threats to increase regulatory effectiveness and provide direction specific to conservation of the Bi-State DPS. These plan amendments require that agencies consider sage-grouse populations and habitat in land use planning and activity plan analysis to limit potential impacts on sage-grouse or their habitat.

Since the Action Plan was implemented:

- The Humboldt-Toiyabe National Forest has signed an amendment to their Land Use Plan.

- The Carson District and Tonopah Field Offices of the NV BLM have signed ammendments to their Land Use Plans.

- The Inyo National Forest updated their Land Management Plan.

- Mono County has updated their General Plan to better manage Bi-State habitat and protect sage-grouse populations.

Actions not completed include the following:

IRM2-2: Coordinate with local and county governments in Nevada to incorporate sage-grouse conservation guidance.

MAINTAINING STAKEHOLDER INVOLVEMENT

Relationships built on trust and cooperation among stakeholders are essential to the goal of long-term conservation of sage-grouse and its habitats. Participants involved in this conservation effort include federal, state, and local governments; Native American tribes; non-profit organizations; ranchers and landowners; among others. The Action Plan identifies six priorities for maintaining stakeholder involvement, all of which are implemented annually. Actions include conducting Local Area Working Group meetings developing outreach materials to facilitate the sharing and distribution of information, and maintaining a Bi-State website that provides accessible information to partners and the public.

Together, partners conduct Action Plan maintenance, carry out identified actions and track implementation progress to ensure the Action Plan is effectively guiding conservation and management efforts.

Since 2012, considerable progress has been made toward maintaining stakeholder involvement. Accomplishments include:

- Formation of the Bi-State Tribal Natural Resource Committee (BTNRC),20 BTNRC meetings, and two Traditional Ecological Knowledge Summits.
- Thirteen Local Area Working Group meetings.
- Creation of the Bi-State Sage-Grouse website.
- Production of LAWG newsletters to provide sage-grouse related updates and notifications to partners and public.
- 183 education and outreach accomplishments.

Bi-State partners

Bi-State sage-grouse, habitat, and conservation efforts

EFFECTIVENESS MONITORING

The 2012 Action Plan was designed to provide a “road-map” to conservation. It contains 159 actions intended to be implemented over a ten-year span. The implementation of multiple projects is often required to achieve the intended goal of a single action. These projects represent the highest priority actions deemed necessary to conserve Bi-State sage-grouse populations and their habitats. Projects are prioritized through a science-based adaptive management process that utilizes on-the-ground evaluation to inform management decisions and prioritize conservation actions. This process incorporates the best available science and key lessons learned from prior efforts to: 1) identify the most critical issues; 2) develop projects that address those issues and 3) assess and adjust project implementation as necessary to improve the probability of benefiting sage-grouse.

Population monitoring provides the basis of understanding for what types of projects should be implemented and where they should be placed. Utilizing monitoring data, the USGS developed a resource selection function that identified key sage-grouse habitat in the Bi-State. The highest priority projects are in this identified habitat to provide the most ecological benefit to sage-grouse. Published research regarding habitat selection, population models, genetics and conservation strategies all contribute to effective adaptive management. In 2014, the USGS incorporated completed research into the development of a Conservation Planning Tool (CPT), which measures ecological benefits to sage-grouse for a given management action using resource selection functions and estimates of abundance and space use (Ricca et al., 2017). The CPT informs and prioritizes habitat improvement project design and is especially valuable for prioritizing conifer treatment and wildfire restoration projects. Boundaries of these projects are initially drawn as a best guess based on bird use, aerial imagery, and knowledge of the habitat. The CPT then ranks these projects based on benefit to grouse and cost effectiveness. Each year additional research and monitoring data is incorporated into the CPT, and it becomes more valuable as a result.

In 2015 and again in 2017, the TAC used the CPT results as the basis for re-prioritizing Bi-State conifer projects. This planning tool has proven to be incredibly valuable when combined with other information, such as on-the-ground knowledge of an area, logistics of planning and implementing projects and professional expertise. Combined, these tools provide the basis for prioritization of conservation projects.

Another important scientific tool used to help direct conservation efforts and understand their impacts is USGS' Integrated Population Model (IPM). The IPM helps partners understand the demographic rates that are driving population trends and aids in the development of targeted actions to improve those rates and overall population trends.

Efforts to implement conservation projects across the Bi-State have increased annually since 2012. Currently, 141 of 159 identified actions in the Action Plan have been initiated, meaning they are in progress, ongoing or occur annually, or have been evaluated as part of the planning process. These actions represent 89% of all identified actions in the Action Plan.

The completion of these projects illustrates the effectiveness of long-held and time-tested partnerships between stakeholders. Together, they established and implemented a framework that fostered ongoing problem solving and proactive engagement. This collaborative process effectively integrates multiple perspectives and interests and has proven to be more successful in providing durable solutions to complex issues and challenges.

Over the last ten years, the Action Plan has provided a clear framework to guide this collaborative conservation effort. The Bi-State LAWG increased their understanding of sage-grouse population trends, gained a better understanding of factors influencing populations, and learned how and where to implement conservation actions to provide the greatest benefit to sage-grouse and their habitats. Recent USGS research suggests the implementation of the Action Plan has bolstered Bi-State sage-grouse populations by 3.9% annually and 31.1% since 2012 (Bi-State TAC, 2022).

Moving forward with maintained momentum, Bi-State stakeholders will continue to conduct collaborative conservation efforts at the landscape scale to benefit sage-grouse populations and the sagebrush ecosystem in the Bi-State. The group is currently working to expand the partnership to include the diversity of stakeholders necessary to find solutions to these large-scale and often complex ecological challenges. Together the group will evaluate the most recent science and work to update the Action Plan so that it may continue to act as a guiding document for future sage-grouse related conservation efforts in the Bi-State.

Bi-State sage-grouse lekking in spring

Action Type	Actions Identified	Actions Initiated	Total Projects
Coordinated Interagency Approach	3	3	46
Science Based Adaptive Management	7	7	16
Increased Regulatory Mechanisms	13	12	24
Wildfire	9	9	154
Urbanization	12	7	24
Infrastructure & Human Disturbance	12	11	85
Conifer Encroachment	13	13	85
Disease and Predation	4	4	12
Wild Horses	5	5	13
Small Populations	6	6	8
Habitat Restoration & Improvement	41	35	216
Research and Monitoring	28	27	94
Maintaining Stakeholder Involement	6	6	125
Total	159	145	902

Table 6: Compelted Action Plan associated projects

Action ID	PMU	Action Description
HIR1-5-PN	Pine Nut	Manage high elevation wet meadows in the southern portion of the Pine Nut PMU. Maintain existing fences and mark with diverters
HIR2-1-PN	Pine Nut	Restore previously burned sagebrush habitat within a three mile radius of Mill Canyon Lek
HIR2-2-PN	Pine Nut	Maintain meadows in Mount Seigal and Bald Mountain areas in proper functioning condition or improve through livestock management
HIR2-3-PN	Pine Nut	Improve sagebrush habitat quality west of Big Meadow
MER2-2	Desert Creek/Fales	Secure a conservation easement with Desert Creek Ranch
MER2-8	Desert Creek/Fales	Secure conservation easements with willing landowners in the Burcham Flat, Wheeler Flat and Fales Hot Springs vicinities
HIR2-4-DCF	Desert Creek/Fales	Determine the feasibility for improving perennial grass and forb cover in proximity to Desert Creek Lek #2 in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results
HIR2-6-DCF	Desert Creek/Fales	Evaluate nesting habitat and brood meadow condition on Burcham/Wheeler Flats in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results
HIR2-7-DCF	Desert Creek/Fales	Improve meadow habitat on private lands in Huntoon Valley, Swauger Creek, and north Bridgeport Valley
RAM3-6	Desert Creek/Fales	Continue and supplement ongoing telemetry effort in Fales PMU
MER2-6	Mount Grant	Secure conservation easement or agreement for Aurora Meadows complex
HIR2-3-MG	Mount Grant	Evaluate meadow habitat conditions in the Aurora and Gregory Flat vacinities
MER3-7	Mount Grant	Minimize impacts from traffic near the Aurora Borealis mine
MER4-2	Mount Grant	Evaluate pinyon-juniper encroachment and potential connectivity issues in the Masonic Gulch, Red Wash, and Chinese Camp vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results
HIR1-7-B	Bodie Hills	Complete the Lime Kiln windmill removal and solar pump replacement project in the southern portion of the Bodie PMU
MER2-5	Bodie Hills	Secure conservation easement or agreement with Mormon Ranch
MER2-12	White Mountain	Secure conservation easements or agreements along the eastside of the White Mountains
IRM2-2	Multiple PMUs	Coordinate with local and county governments in Nevada to incorporate sage-grouse conservation guidance

Table 7: Action Plan associated projects not yet completed

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APPENDIX A: ACTION PLAN IMPLEMENTATION

Strategy	Identified Actions	Completed Projects
Coordinated Interagency Approach: Implement a coordinated interagency approach towards conservation and management of greater sage-grouse populations and habitats within the Bi-State Plan area.		
	CIA1-1: Implement a "Sage-Grouse Service Team" approach to support sage-grouse conservation and management in the Bi-State area. Provide cross-jurisdictional staff support to facilitate the coordinated interagency effort to conserve the Bi-State DPS and its habitat.	
		Executive Oversight Committee meetings
		Development of the Bi-State coordinator position
		Updated Bi-State MOU
	CIA1-2: Provide multi-jurisdictional funding to support sage-grouse conservation and management in the Bi-State area. Establish a process to identify and support cross-jurisdictional funding opportunities to facilitate the coordinated interagency effort to conserve the Bi-State DPS and its habitat.	
		2014 Partner funding commitment letters
		2019 update of funding commitment letters
		Interagency funding agreements to support on-the-ground projects, USGS science and research, lek monitoring, vegetation monitoring, Bi-State coordinator position, translocation efforts, and the Traditional Ecological Knowledge Summit
	CIA1-3: Annually engage the Bi-State Local Area Working Group (LAWG) via the Technical Advisory Committee (TAC) to develop a proposed program of work for the upcoming calendar year based on available staff and funding. The proposed annual program of work should be completed by January 31 each calendar year.	
		Technical Advisory Committee meetings
		Annual accomplishment reporting
Science Based Adaptive Management: Implement scientifically and economically sound management strategies to conserve greater sage-grouse populations and habitats within the Bi-State Plan area.		
	SAM1-1: Establish interagency agreements and funding mechanisms needed to provide funding and logistical support to secure the services of a USGS Science Advisor.	
		Annual funding provided to USGS
	SAM2-1: Acquire high resolution (5 meter or less), multi-spectral (7 band minimum), imagery for the entire Bi-State area and begin the image classification and field verification process required to model sage-grouse habitat selection and suitability based on resource availability and use.	
		Bi-State Sage-Grouse resource selection function and map developed
		Critical habitat map created
		Pinyon-juniper layer acquired to model habitat
		Life-stage habitat selection maps generated
	SAM2-2: Continually incorporate new sage-grouse telemetry, habitat, and vital rate data into the CPT to improve predictive modeling and adaptive management capabilities.	
		Telemetry data has been incorporated into the CPT

	SAM2-3: Incorporate the CPT into habitat improvement project design and population augmentation and reintroduction evaluation processes to provide managers with an interactive, spatially-explicit tool to choose the most appropriate areas for management action, as well as to evaluate and quantify project effectiveness following implementation.	
		CPT was created and published in Ecological Applications
		CPT used to rank conifer treatment projects in 2015 and 2017
		Meetings held regarding updated and automated CPT
	SAM2-4: Incorporate hypothesized risk factors into the CPT to model and quantify the relative importance of each risk factor by life-history stage for each PMU.	
		In progress
	SAM2-5: Incorporate sage-grouse vital rates into the CPT to identify which environmental factors are likely exerting the greatest influence on sage-grouse persistence to determine the probability of population performance for each PMU.	
		Integrated Population Models completed and updated
		Incorporating the IPM into CPT in progress
	SAM2-6: Incorporate the vital rate adjusted CPT into habitat improvement project design and population augmentation and reintroduction evaluation processes to further improve managers abilities to choose the most appropriate areas for management action, as well as to evaluate and quantify project effectiveness following implementation.	
		Life-stage habitat selection maps generated
		Incorporating the IPM into CPT in progress
Improved Regulatory Mechanisms: Improve regulatory effectiveness and consistency for discretionary agency actions that may affect the Bi-State DPS and its habitats.		
	IRM1-1: Develop and issue interim BLM/USFS guidance designed to increase the regulatory effectiveness and consistency for Federal land management actions that may affect the Bi-State DPS and its habitat until land use plans are updated to include additional guidance specific to sage-grouse conservation in the Bi-State area. Land use plan updates are identified by relative priority in this section.	
		2012 Inyo NF supervisors letter
		2012 BLM NV Instructional Memorandum
	IRM1-2: Coordinate and informally confer with state wildlife agencies and the FWS when evaluating Federal land management actions that may affect the Bi-State DPS and its habitat or when developing and implementing policies or land use plan objectives designed to avoid or minimize impacts to the Bi-State DPS and its habitat.	
		Inter-Agency Coordination for Land Management Actions
		USFWS Coordination and Conferencing
	IRM1-3: Implement BLM Manual 6840 to increase conservation efforts for the Bi-State DPS and its habitat.	
		All projects for BLM follow guidance in Manual Policies

	IRM1-4: Implement National Forest Manual 2670 to increase conservation efforts for the Bi-State DPS and its habitat.	
		BSSG designation as USFS Sensitive Species for Region 4
		Implementation of National Forest Plan Policies
		Implement BSSG in policy and in LMP as “At Risk Species”
		Inyo Land Use Plan Implementation
	IRM1-5: Revise the Carson City District Consolidated RMP (Sierra Front and Stillwater Field Offices) to incorporate additional land use plan guidance specific to greater sage-grouse conservation.	
		Land Use Planning Amendment for the Bi-State DPS in the Carson City District RMP
	IRM1-6: Revise or amend the Toiyabe National Forest LRMP (Bridgeport and Carson Ranger Districts) according to the Region 4 schedule.	
		The “Greater Sage-grouse Bi-state Distinct Population Segment Forest Plan Amendment Record of Decision” was signed in May 2016, revising the Forest Plan with new conservation measures for the Bi-state sage-grouse.
	IRM1-7: Revise the Tonopah RMP (Tonopah Field Office) to incorporate additional land use plan guidance specific to greater sage-grouse conservation	
		Land Use Planning Amendment for the Bi-State DPS in the Tonopah RMP
	IRM1-8: Revise the Inyo National Forest LRMP (Mono Lake, Mammoth, White Mountain and Mount Whitney Ranger Districts) according to the Region 5 schedule.	
		Inyo NF Land Use Plan revised and updated
	IRM1-9: Implement actions in support of the Bishop RMP.	
		Implementation of Bishop BLM Supplemental Rules to Land Use Plan
	IRM1-10: Revise or amend the Bishop RMP according to the California BLM schedule.	
		Current plan deemed adequate
	IRM1-11: Annually conduct plan maintenance on applicable RMPs (Carson City, Tonopah, and Bishop) to incorporate the most recent information specific to sage-grouse populations and habitats on public lands administered by the BLM to insure the Bi-State DPS and its habitats are adequately protected	
		Annual and ongoing incorporation of relevant science into Annual Plans
	IRM2-1: Coordinate with Mono County to develop and incorporate sage-grouse conservation guidance into applicable plans and programs.	
		Mono County General Plan update
		Mono County review projects for consistency with grouse policies
	IRM2-2: Coordinate with county and local governments in Nevada to develop and incorporate sage-grouse conservation guidance into applicable plans and programs.	
		Efforts have been made to reach out to county and local government but successful engagement is still lacking

Minimize and Eliminate Wildfire Risk: Implement a coordinated interstate/interagency approach towards management of wildfire incidents and suppression activities designed to minimize the risk of catastrophic wildfire and the associated loss of sage-grouse habitat in the Bi-State area.		
	MER1-1: Develop and implement an interagency fire management and suppression agreement specific to the management of wildland fire incidents within and immediately adjacent to known occupied and potential sage-grouse habitats in the Bi-State area prior to the 2012 fire season.	
		Inter-agency fire agreement was signed for the Inyo National Forest and the Bishop BLM
		Inter-agency fire agreement was signed between Carson BLM and H-T National Forest
	MER1-2: Update existing Fire Management Plans (FMPs) to incorporate fire and fuels management conservation measures identified by the National Sage-Grouse Technical Team prior to the 2012 fire season.	
		Fire management plans were updated to incorporate suppression direction to minimize loss of suitable sage-grouse habitat.
	MER1-3: Annually update dispatch systems and protocols to include line officer and resource advisor notifications and requirements for all wildland fire incidents within and immediately adjacent to known occupied and potential sage-grouse habitats in the Bi-State area.	
		Annual Bishop BLM dispatch updates for fire protocols in sage-grouse habitat
		Annual Carson BLM dispatch updates for fire protocols in sage-grouse habitat
		Annual Inyo NF dispatch updates for fire protocols in sage-grouse habitat
	MER1-4: Annually update resource advisor kits to include to the most recent information specific to sage-grouse populations and habitats within the Bi-State area to insure the DPS and its habitat are adequately protected.	
		Resource Advisor Kit Updates- BLM Bishop/ Inyo NF
		Resource Advisor Kit Updates- Humboldt-Toiyabe NF
		Resource Advisor Kit Updates- BLM Carson
	MER1-5: Develop and provide sagebrush and sage-grouse habitat sensitivity training during required annual fireline refreshers for federal fire personnel in the Bi-State area. Focus training on sagebrush habitat identification, basic sagebrush habitat ecology, and initial attack strategies and tactics designed to minimize long-term impacts to sagebrush ecosystems.	
		Bishop BLM annual fire refresher for sage-grouse SOPs
		Inyo NF annual fire refresher for sage-grouse SOPs
	MER1-6: Establish an interagency cadre of sagebrush/sage-grouse habitat resource advisors (READs) to support fire suppression, burned area emergency rehabilitation (BAER), and fuels management projects in the Bi-State area. Include NDOW, CDFG, FWS, NRCS, and NDF representation on this team.	
		Resource Advisor Development and Cadre

	MER1-7: Prioritize fire suppression actions, fire rehabilitation efforts, and fuels treatments to minimize sagebrush habitat loss or type conversions in and immediately adjacent to known occupied and potential sage-grouse habitats in the Bi-State area.	
		Alpine County forest restoration project
		Burbank fire rehabilitation seeding
		Ray May fire rehabilitation seeding
		TRE fire rehabilitation seeding
		Como fire rehabilitation seeding
		Preacher fire rehabilitation seeding
		Doe Ridge fire rehabilitation, restoration, and planting
		Indian fire rehabilitation, seeding, planting, and erosion control
		Mono fire restoration seeding
		Spring Peak fire rehabilitation and conifer removal
		Spring Peak fire rehabilitation, seeding, sagebrush planting, and conifer removal
		Walker fire Sage-Grouse SOPs implemented
		Bodie fire invasive plant removal
		Indian fire seeding
		Green Creek fire rehabilitation
		Pine Nut Land Health Project (sunrise unit)
		Fuel breaks on private land
		Bodie State Park fuels reduction
		Green Creek fire restoration
		Owens River fire restoration
		Slinkard post fire restoration, planting, seeding, invasive species removal, and mowing
		Buckskin Valley post-fire rehabilitation
		Pipeline conifer thinning
		Sunrise Pass firewood stewardship contract
		Illinois Unit, Thinning/Pile Burning
		Seeding of dozer lines on Hot Creek fire
		Hot Creek fire restoration, grazing enclosure, seeding, and planting
		West Antelope fuel break maintenance
		East Antelope fuel break maintenance
		Mono City and Conway Ranch Estates fuel break maintenance
		Tufa fire suppression
		Lyon Fire sagebrush seedling planting
		Mountain View Fire ESR plan and treatment
		Slink Fire soil stabilization, seeding, and planting
		Topaz Marine Corps housing fuel break
	MER1-8: Increase wildfire prevention activities and programs in and adjacent to known occupied and potential sage-grouse habitats in the Bi-State area.	
		LADWP policy restricting campfires and stoves
		Fire prevention patrols
		Bodie State Park Fire Plan
		Targeted wildfire prevention

		Fire related public education events
	MER1-9: Develop and implement a native species seed bank program for the Bi-State DPS. Establish a seed storage facility and conduct seed collections to insure the availability of locally adapted seed for fire rehabilitation efforts in important sage-grouse habitats. Coordinate with the Nevada Division of Forestry (NDF) and other interested agencies to collect and store locally adapted seed for use in fire rehabilitation efforts.	
		Seeds of Success program
		Post fire native seeding contracts
		Seed storage facility for native plants
		Bishop native plant nursery
		Native seed collection
Minimizing and Eliminating Urbanization Risk: Secure conservation easements or agreements with willing landowners to maintain private lands and associated sage-grouse habitats values and minimize the risk of future development impacts to important sage-grouse habitats in the Bi-State area.		
	MER2-1: Provide technical assistance to willing landowners to develop Conservation Agreements or Candidate Conservation Agreements with Assurances.	
		Private Lands Conservation Plan
		CDFW and Mono County workshop to share information and develop project conditions/mitigations for sage grouse
		Designation of Walker River State Recreation Area
		Funding aquisition for Black Lake Preserve easement
		Annual conservation easement planning
		Mono County conservation easement assistance
	MER2-2: Secure a conservation easement or agreement with the Desert Creek Ranch to maintain essential brood rearing habitat in proximity to Desert Creek Lek #2 in the Desert Creek-Fales PMU.	
		Incomplete
	MER2-3: Secure a conservation easement or agreement with the Sceirine Ranch to maintain current land use practices and associated sage-grouse brood rearing/late summer habitat values in the Bodie, Mount Grant and Desert Creek-Fales PMUs.	
		Easements secured in the Bodie Hills and Desert Creek-Fales PMUs
	MER2-4: Secure a conservation easement or agreement with the Sweetwater Ranch to maintain essential brood rearing habitat in proximity to the Wiley Ditch/Sweetwater Summit lek complex in the Desert Creek-Fales PMU.	
		Easements secured near Sweetwater Summit
	MER2-5: Secure a conservation easement or agreement for the Mormon Ranch to maintain essential brood rearing habitat in proximity to the Bridgeport Canyon/Little Mormon lek complex in the Bodie PMU.	
		Incomplete
	MER2-6: Secure a conservation easement or agreement for the Aurora Meadows complex to maintain brood rearing habitat in proximity to the Aurora lek in the Mount Grant PMU.	
		Incomplete

	MER2-7: Secure a conservation easement or agreement for Sinnamon Meadows to maintain brood rearing/late summer habitat values in the western portion of the Bodie PMU.	
		Easement secured
	MER2-8: Secure conservation easements or agreements with willing landowners in the Burcham Flat, Wheeler Flat and Fales Hot Springs vicinities to prevent further development impacts in proximity to leks in the Fales breeding complex in the Desert Creek-Fales PMU.	
		Incomplete
	MER2-9: Secure conservation easements or agreements with willing landowners for important brood meadow habitat in the Green Creek area.	
		Green Creek land donation
		CDFW aquired lands
		Conservation easement secured
	MER2-10: Secure conservation easements or agreements with willing landowners to maintain key brood rearing/late summer habitats in Bodie Hills portion of the Bodie PMU.	
		Easements secured
	MER2-11: Secure conservation easements or agreements with willing landowners in Huntoon Valley, Swauger Creek and northern Bridgeport Valley to maintain brood rearing/late summer habitat values in the southwest portion of the Desert Creek-Fales PMU.	
		Easement secured in Huntoon Valley
	MER2-12: Secure conservation easements or agreements with willing landowners to maintain key nesting or wintering habitats along the eastside of the White Mountains in the White Mountains PMU.	
		Incomplete
Minimize and Eliminate Infrastructure and Human Disturbance Risk: Implement site-specific conservation measures designed to minimize or eliminate risks associated with existing infrastructure and human disturbance in the Bi-State area.		
	MER3-1: Install flight diverters on the existing non-let down fence adjacent to Long Valley Lek 2 to deter documented fence strikes.	
		Fence near lek 2 converted to lek down
		Flight diverters installed in surrounding area
	MER3-2: Identify and provide an alternate location for the Mono County landfill and work towards removing the existing landfill out of the Long Valley portion of the South Mono PMU.	
		Mono County continued planning and funding acquisition for the closure of the Benton Crossing landfill. The project is projected to be completed by 2023
	MER3-3: Design and implement public lek viewing guidelines and other management strategies to reduce human disturbance in the vicinity of Desert Creek Lek #2 in the Desert Creek-Fales PMU.	
		Developed lek viewing guidelines consistent with widely accepted policies to ensure minimization of potential human impacts. Produced brochure for public education and outreach

	MER3-4: Evaluate existing fences in the Bodie PMU for fence strike hazards. Remove extraneous fences or mark existing fences with flight diverters to deter fence strikes in areas where fence strike hazards are documented. Focus initial efforts in the vicinity of Bodie State Historic Park, 7-Troughs, and Lower Summers Meadow.	
		Race Track fence removal and fence marking
		Lower Summers meadow fence marking
		Bodie Creek Electric Fence Removal
		Sinnamon Meadows fence removal and fence marking
		Bodie Bowl fence removal
		Conway Ranch fence removal and fence marking
		Private lands fence marking in Bodie
		Bodie State Park Volunteer Day - fence and corral Removal
		Bodie Hills fence marking near Beideman lek
		Big Flat fence marking
		Bodie Hill fence maintenance
		Potato Peak exclosure fence converted to let down
		Converted Fence to Let Down in the Bodie Hills
		BLM annual maintenance of all let down fencing in Bodie Hills PMU
	MER3-5: Work with private landowners in the Long Valley portion of the South Mono PMU to evaluate existing fences for fence strike hazards. Provide assistance to modify or mark existing fences with flight diverters to deter fence strikes in areas where fence strike hazards are documented.	
		Cashbaugh fence marking
	MER3-6: Remove or relocate the existing fence near Wiley Ditch Lek #3 in the Desert Creek-Fales PMU if flight diverters are ineffective at preventing fence strikes.	
		Flight diverters installed in surrounding area
	MER3-7: Develop and implement stipulations to minimize disturbance impacts associated with increased traffic from the Aurora-Borealis mine in the Mount Grant PMU.	
		Incomplete
	MER3-8: Increase warden presence during the sage-grouse breeding season in the lower elevations of the Mount Grant PMU to deter poaching.	
		Walker River State Recreation law enforcement and park patrols
	MER3-9: Avoid the construction of new roads and other infrastructure within known occupied and potential sage-grouse habitat in the Mount Siegel and Bald Mountain vicinities in the Pine Nut PMU unless these features are designed to improve habitat conditions.	
		BLM Resource Management Plans contain actions and best management practices to address new road construction. Future planned Travel Management will take into consideration limiting any new roads/OHV trails in this area as well
	MER3-10: Design and implement public lek viewing guidelines to address potential human disturbance impacts if demand increases in the Long Valley portion of the South Mono PMU.	

		Developed lek viewing guidelines consistent with widely accepted policies to ensure minimization of potential human impacts. Produced brochure for public education and outreach
	MER3-11: Install "grouse crossing" signs at strategic locations along the Owens River Road in the Long Valley portion of the South Mono PMU where birds are known to roost and road kills have been documented.	
		CDFW, BLM and Mono County met to discuss "grouse crossing sign". Action deemed not necessary in Long Valley. Signs were installed in Parker Meadow area
	MER3-12: Provide educational opportunities to landowners about the importance of sage-grouse habitat and the need to reduce predation caused by pets in areas where sage-grouse occur.	
		NRCS, federal land management agencies, and ESLT all interact with private landowners to stress the importance of sage-grouse habitat
Minimize and Eliminate Conifer Encroachment Risk: Map and quantify the spatial juxtaposition and level of pinyon-juniper encroachment that has occurred in relation to known occupied and potential sage-grouse habitat in the Bi-State area. Develop and implement site specific treatments designed to maintain, improve, or restore key seasonal ranges and habitat connectivity within and among breeding populations based on restoration potential.		
	MER4-1: Evaluate pinyon-juniper encroachment and potential connectivity issues between upper elevation sagebrush habitats in the Bodie PMU and adjacent low elevation habitats including the Bridgeport Valley and East Walker River in the Bodie and Desert Creek-Fales PMUs and the East Walker River, Ninemile Flat, Aurora, and Alkali Valley portions of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		East Walker Landscape Habitat Improvement Project NEPA
		East Walker Landscape Habitat Improvement Project Units A & C
		East Walker Landscape Habitat Improvement Project Units F & B
		East Walker Landscape Habitat Improvement Project Unit D
		East Walker Landscape Habitat Improvement Project Unit B East
		East Walker Landscape Habitat Improvement Project Unit B
		East Walker Landscape Habitat Improvement Project Unit C
		East Walker Landscape Habitat Improvement Unit E
		East Walker Landscape Habitat Improvement Unit K
		East Walker Landscape Habitat Improvement Unit L
		East Walker Landscape Habitat Improvement Unit N
		Mormon Meadows Conifer Removal and pile scattering
		Bridgeport Canyon Conifer Removal
		Bridgeport Canyon Sagebrush Restoration through Conifer Removal
		Big Flat Conifer Removal

		Bodie Hills Upland Vegetation Restoration Conifer Removal DNA 2015
		Bodie Hills Upland Vegetation Restoration Conifer Removal DNA 2016
	MER4-2: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Masonic Gulch, Red Wash, and Chinese Camp vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		Incomplete
	MER4-3: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Huntoon Valley, Swauger Creek and Mount Jackson vicinities of the Desert Creek-Fales PMU. Design and implement site-specific tree removal projects based on the results.	
		The TAC evaluated these areas in 2015 (CPT reranking reports) and determined they were a lower priority than other work in the northern half of the Bi-State. After high priority work is completed the TAC will reevaluate using the CPT and local knowledge
	MER4-4: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Aurora and Gregory Flats vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		The TAC evaluated these areas in 2015 (CPT reranking reports) and determined they were a lower priority than other work in the northern half of the Bi-State. After high priority work is completed the TAC will reevaluate using the CPT and local knowledge
	MER4-5: Evaluate pinyon-juniper encroachment and potential connectivity issues in the lower Rough Creek and Del Monte Canyon vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		Rough Creek Sage-Grouse Habitat Improvement Project NEPA
		Rough Creek Unit 5
		Rough Creek Unit 1
		Rough Creek Unit 2
		Rough Creek Unit 3
		Rough Creek Unit 6
		Rough Creek Unit 7
		Rough Creek Unit 8
	MER4-6: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Spring Peak, Mount Hicks, and Powell Mountain vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		Field evalutation determined that there were only about 10 trees to cut in a drainage. Other trees were in true conifer areas.
	MER4-7: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Baldwin Canyon and Lapon Canyon vicinities of the Mount Grant PMU. Design and implement site-specific tree removal projects based on the results.	
		Hawthorne Army Depot meeting
		Baldwin Canyon PJ NEPA
		Baldwin Canyon Habitat Improvement

	MER4-8: Evaluate pinyon-juniper encroachment and potential connectivity issues between upper elevation sagebrush habitats in the Bodie PMU and adjacent low elevation habitats in the Mono Basin portion of the Bodie PMU. Design and implement site-specific tree removal projects based on the results.	
		Bodie Hills Upland Vegetation Restoration Conifer Removal 2015
		Bodie Hills Upland Vegetaion Restoration Conifer Removal 2016
		Sinnamon Cut Sagebrush Restoration through Conifer Removal
		Bodie Hills Pinyon-Juniper Removal NEPA 2021
		Bridgeport Canyon Conifer Pile Burning
	Action MER4-9: Evaluate pinyon-juniper encroachment and potential connectivity issues along the northern flank of the Sweetwater Mountains between Burcham Flat and Jackass Flat in the Desert Creek-Fales PMU. Design and implement site-specific tree removal projects based on the results.	
		Sweetwater P-J Re-treatment
		Jackass Flat Pinyon-Juniper Removal NEPA
	MER4-10: Evaluate pinyon-juniper encroachment and potential connectivity issues along the eastside of the White Mountains and Palmetto Mountains in the White Mountains PMU. Design and implement site-specific tree removal projects based on the results.	
		TAC evaluated these areas in 2015 and determined they were lower priority than other work in the southern half of the Bi-State. Additional data from telemetry studies will help define these areas
		TAC evaluated these areas in 2017 and determined they were lower priority than other work in the southern half of the Bi-State. Additional data from telemetry studies will help define these areas
	MER4-11: Evaluate pinyon-juniper encroachment and potential connectivity issues along the eastside in the Truman Meadows portion of the White Mountains PMU. Design and implement site-specific tree removal projects based on the results.	
		TAC evaluated these areas in 2015 and determined they were lower priority than other work in the PMU
		TAC evaluated these areas in 2017 and determined they were lower priority than other work in the PMU
	MER4-12: Evaluate pinyon-juniper encroachment and potential connectivity issues between Long Valley and Adobe Valley in the South Mono PMU. Design and implement site-specific tree removal projects based on the results.	
		Arcularius Jeffrey Pine Removal
		Long Valley Habitat Enhancement NEPA
		INF Parker Jeffrey Pine Removal NEPA
		Long Valley - Jeffery Pine Removal
		South Mono Conifer Treatment Site Visits
		Pre-NEPA Planning: Hilton and Clover Patch Conifer Treatment
	MER4-13: Evaluate pinyon-juniper encroachment and potential connectivity issues in the Waterson draw area and at the base of south slope of Glass Mountains in the South Mono PMU. Design and implement site-specific tree removal projects based on the results.	

		Long Valley Unit 4 Habitat Enhancement
Minimize and Eliminate Disease and Predation Risk: Monitor, and quantify where possible, the extent of disease and predation risks to greater sage-grouse populations in the Bi-State area. Take appropriate management action where causal effects can be identified and effectively mitigated.		
	MER5-1: Evaluate raptor and raven use of the DC Intertie transmission line in the Mount Grant PMU. Install perch deterrents if the data indicate facilitated predation is adversely affecting sage-grouse population performance.	
		Raptor raven surveys were completed in Mount Grant in association with telemetry efforts in 2016, 2017, 2018, and 2021
	MER5-2: Evaluate raptor and raven use of the double wood transmission line that crosses brood meadows along the upper Owens River east of Lek 9x at Inaja Ranch. Install perch deterrents if the data indicate facilitated predation is adversely affecting sage-grouse population performance.	
		A field trip occurred to evaluate this transmission line. No mitigation was implemented
		Raptor raven surveys were completed in Long Valley in association with telemetry efforts between 2014 and 2021
		USGS implemented raven egg oiling effort to reduce predation
	MER5-3: Evaluate raptor and raven use of the westside transmission lines in the Bodie PMU. Install perch deterrents if the data indicate facilitated predation is adversely affecting sage-grouse population performance.	
		Raptor raven surveys were completed annually in the Bodie Hills in association with telemetry efforts
	MER5-4: Develop and implement a West Nile virus surveillance and detection program. Implement mosquito abatement measures and/or Best Management Practices (BMPs) designed to minimize or prevent the potential for a West Nile virus outbreak if the data indicate that West Nile virus is prevalent in the Bi-State area.	
		Investigation of Inyo guzzlers resulted in their design that prohibit larval development due to the enclosed systems, lack of light, routine maintenance at off-site drinker. County Abatement Program confirmed that such guzzlers do not pose a risk to west Nile virus
Minimize and Eliminate Wild Horse Grazing Risks: Maintain wild horse populations at the appropriate management levels (AMLs) and within designated herd management areas (HMAs) or wild horse territories (WHTs) to minimize the risk of excessive use levels and range expansion		
	MER6-1: Implement captures or contraceptive methods to maintain the Powell Mountain Wild Horse Herd at or below AML and within the designated WHT.	
		Annual monitoring of the Powell Mountain herd for horses outside boundary
	MER6-2: Implement captures or contraceptive methods to maintain the Pine Nut Wild Horse Herd at or below AML and within the designated HMA.	
		Pine Nut Mountains Herd Management Area Plan EA
		Pine Nut wild horse gather
		Pine Nut wild horse sterilization efforts

	MER6-3: Evaluate the status of the White Mountain and Silver Peak Wild Horse and Burro herds. Establish AML and implement captures or contraceptive methods if needed to maintain the herds at or below AML and within the designated WHT.	
		Wild Horse monitoring in White Mountain and Silver Peak herds in White Mountains PMU
	MER6-4: Implement captures or contraceptive methods to maintain the Wassuk Wild Horse Herd at or below AML and within the designated HMA.	
		Wassuks Mountain wild horse gather
	MER6-5: Evaluate the status of the Montgomery Pass Wild Horse Herd. Establish AML and implement captures or contraceptive methods if needed to maintain the herd at or below AML and within the designated WHT.	
		2014 Montgomery Pass wild horse herd survey
		2015 Montgomery Pass wild horse population estimate completed
		Annual wild horse monitoring in Sagehen
		2020 aerial survey of the Montgomery Herd Wild Horse Territory
		2020 Montgomery Pass wild horse ground survey
Minimize and Eliminate Small Population Size Risks: Identify potential sage-grouse population augmentation and re-introduction sites and develop translocation guidelines to support potential augmentation and reintroduction efforts in the Bi-State area.		
	MER7-1: Develop a contingency plan for emergency augmentation of small breeding populations at Parker Meadows and Gaspipe Spring in the South Mono PMU if the need arises.	
		Parker Meadow translocation efforts 2017, 2018, 2019, and 2021
	MER7-2: Develop a contingency plan for emergency augmentation of small breeding populations in the Pine Nut Range in the Pine Nut PMU if the need arises.	
		TAC met to discuss translocations 2015. It was determined that only the Parker population was in need of a translocation until the IPM or other data suggested that there was an clear reason to begin translocation elsewhere. Leks in the pine nuts are monitored yearly to track the status of the population
	MER7-3: Evaluate the need for augmentation of the Fales population in the Desert Creek- Fales PMU.	
		Discussions within the TAC have occurred , but translocations have not been implemented at this time?
	MER7-4: Evaluate the Powel Mountain area in the Mount Grant PMU as a potential sage-grouse habitat restoration and reintroduction area.	
		BSSG TAC met to discuss translocations 2015. It was determined that only the Parker population was in need of a translocation until the IPM or other data suggested that there was an clear reason to begin translocation elsewhere
	MER7-5: Evaluate the McBride Flat/Sagehen Spring area in the Truman Meadows portion of the White Mountains PMU as a potential sage-grouse habitat restoration and reintroduction area.	

		BSSG TAC met to discuss translocations 2015. It was determined that only the Parker population was in need of a translocation until the IPM or other data suggested that there was an clearn reason to begin translocation elsewhere. Telemetry work in the White Mountain PMU will help determine if this is necessary
	MER7-6: Evaluate Coyote Flat as a potential sage-grouse habitat restoration and reintroduction area.	
		BSSG TAC met to discuss translocations 2015. It was determined that only the Parker population was in need of a translocation until the IPM or other data suggested that there was an clear reason to begin translocation elsewhere. Telemetry work in the White Mountain PMU will help determine if this is necessary
Habitat Improvement and Restoration: Implement habitat improvement and restoration projects designed to ensure the long-term viability of greater sage-grouse populations within the Bi-State Plan area. Continue to implement on-going habitat improvement and restoration projects on public and private lands in the Bi-State area. Design and implement additional site-specific sage-grouse habitat improvement and restoration projects on public and private lands in the Bi-State area in cooperation with the Bi-State Local Area Work Group.		
	HIR1-1-PN: Continue to implement pinyon and juniper removal projects in appropriate areas adjacent to occupied sage-grouse habitat in Upper Mill Canyon in the Pine Nut PMU.	
		Mill Canyon conifer treatment Lyon Unit
		Mill Canyon conifer treatment unit 1
		Mill Canyon conifer treatment unit 2
		Mill Canyon conifer treatment Big Lake unit
		Mill Canyon conifer treatment maintenance
		Mt Siegel conifer treatment
	HIR1-2-PN: Continue to implement pinyon and juniper removal in the Buckskin Valley Vegetation Treatment project area in the Pine Nut PMU.	
		EQIP contract to treat a portion of the BLM land in Buckskin Valley project area (3 sites: 411, 147, 747)
		2012 Buckskin Valley Vegetation Management Project
		2013 Buckskin Valley Vegetation Management Project
		Private Lands EQIP/WHIP program: PJ Removal in Buckskin Valley area
		2013 EQIP contract to treat a portion of the BLM land in Buckskin Valley project area
		2014 EQIP contract to treat a portion of the BLM land in Buckskin Valley project area
		2015 EQIP contract to treat Crest Unit of Pine Nut Land Health Project
		Buckskin Valley conifer treatment
		2013 private lands conifer treatment
		Crest 2 conifer treatment
		Lyons Fire conifer removal
		Crest 3 conifer treatment
		Buckskin Valley conifer treatment maintenance
		Pine Nut Mountain Powerline Project

		2020 Buckskin Valley conifer treatment
		2021 Buckskin conifer treatment
	HIR1-3-PN: Maintain the existing fence around the Big Meadow complex in the Pine Nut PMU and mark with flight diverters to deter fence strikes.	
		Big Meadow fence marking
		Big Meadow fence maintenance
	HIR1-4-PN: Continue to manage livestock to maintain proper functioning condition of the Big Meadow complex in the Pine Nut PMU.	
		Churchill Canyon grazing permit written with flexibility to change grazing if probems arise
	HIR1-5-PN: Manage high elevation wet meadows in the southern portion of the Pine Nut PMU for proper functioning condition and forb abundance and diversity. Maintain existing fences and mark with flight diverters to deter fence strikes.	
		Incomplete
	HIR2-1-PN: Restore previously burned sagebrush habitat within a three-mile radius of the Mill Canyon lek in the Pine Nut PMU.	
		Incomplete
	HIR2-2-PN: Maintain meadows in the Mount Siegel/ Bald Mountain area in proper functioning condition or improve through livestock management or fencing in the Pine Nut PMU.	
		Incomplete
	HIR2-3-PN: Evaluate options to improve sagebrush habitat quality west of the Big Meadow complex in the Pine Nut PMU. Design and implement site specific habitat improvement projects based on the results.	
		Incomplete
	HIR2-4-PN: Control noxious weeds within and surrounding the Big Meadow complex in the Pine Nut PMU.	
		Ongoing weed treatments completed by Carson City BLM
	HIR1-1-DCF: Continue pinyon and juniper removal across Sweetwater Flat and in adjacent pinyon and juniper encroached sagebrush habitats in the Desert Creek-Fales PMU.	
		2013 Sweetwater Summit conifer treatment maintenance
		2016 Sweetwater Summit conifer treatment
		2017 Sweetwater Summit conifer treatment maintenance
	HIR1-2-DCF: Implement the Long Doctor pinyon-juniper removal project in the Desert Creek-Fales PMU.	
		Long Doctor pinyon removal-Sweetwater Summit area 2012
		Long Doctor pinyon removal - Sweetwater Summit Area 2013
		Long Doctor pinyon removal - Sweetwater Summit Area 2014
		Long Doctor pinyon removal maintenance 2015
	HIR1-3-DCF: Continue to work with the permittees on Wheeler Flat to develop and implement grazing management strategies that reduce the impacts of early season grazing on key brood meadows in the Desert Creek-Fales PMU.	

		Wheeler Flat fence marking
		Wheeler Flat trough installation
	HIR1-4-DCF: Continue to develop and implement an interagency restoration plan for Wheeler Creek to restore hydrologic function and increase forb cover and diversity on adjacent brood meadows in the Desert Creek-Fales PMU.	
		Wheeler Creek restoration NEPA
		Wheeler Creek meadow restoration
	HIR2-1-DCF: Design and implement site specific projects to improve meadow habitat conditions on Wheeler Flat in the Desert Creek-Fales PMU.	
		Wheeler Flat enclosure fence construction, marking, and maintenance
	HIR2-2-DCF: Investigate opportunities to implement habitat improvement projects on the Sweetwater Ranch in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects where feasible.	Private Lands-EQIP/WHIP conifer treatment
		Sweetwater Flat fence marking
	HIR2-3-DCF: Evaluate options to reduce cheatgrass densities southeast of Desert Creek Lek #2 in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results.	
		2013 Smith Valley Conservation District weed treatments
	HIR2-4-DCF: Determine the feasibility for improving perennial grass and forb cover in proximity to Desert Creek Lek #2 in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results.	
		Incomplete
	HIR2-5-DCF: Determine the feasibility for improving perennial grass and forb cover across Sweetwater Flat to improve pre-laying and nesting habitat conditions in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results.	
		Private Lands-EQIP/WHIP program irrigation project
		Private Lands-EQIP/WHIP program rabbit brush removal project
	HIR2-6-DCF: Evaluate nesting habitat and brood meadow condition on Burcham/Wheeler Flats in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects based on the results.	
		Incomplete
	HIR2-7-DCF: Investigate opportunities for meadow habitat improvement on private lands in the Huntoon Valley, Swauger Creek and north Bridgeport Valley vicinities in the Desert Creek-Fales PMU. Design and implement site specific habitat improvement projects where feasible.	
		Incomplete
	HIR1-1-MG: Continue pinyon and juniper removal in the China Camp area and adjacent public and private lands in the Mount Grant PMU.	
		China Camp pinyon removal 2012
		China Camp pinyon removal 2013
		China Camp pile burning 2016

		Flying M conifer treatment
		China Camp (Long Meadow) conifer treatment
		Private lands conifer treatment
	HIR2-1-MG: Develop and implement a management strategy to restore brood habitat on the Rosachi Ranch in the Mount Grant PMU.	
		2012 Meadow restoration Rosaschi Ranch
		2014 Rosaschi Ranch brood rearing habitat improvement
		Rosachi Ranch annual irrigation
		2013 Meadow Restoration Rosaschi Ranch
		Rosaschi Ranch upland field restoration (east field)
		Rosaschi Ranch upland field restoration (west field)
	HIR2-2-MG: Work with Flying M Ranch to maintain and improve brood habitat conditions in the Rough Creek and lower Bodie Creek vicinities of the Mount Grant PMU. Design and implement site specific habitat improvement projects where feasible.	
		Flying M Ranch project demonstration sites (seeding and fuel break)
		FM Ranch sage-grouse habitat enhancement
		Meadow and stream proper functioning condition surveys completed
		UAV surveys in Walker River State Recreation Area
		9 Mile Ranch fence marking
		Installed HOBOs on Bodie and Rough Creeks
		Streamflow monitoring
	HIR2-3-MG: Evaluate meadow habitat conditions in the Aurora and Gregory Flats vicinities of the Mount Grant PMU. Design and implement meadow habitat restoration projects based on the results.	
		Incomplete
	HIR2-4-MG: Work with the Hawthorne Army Depot to maintain and improve brood habitat quality at Lapon Meadows in the Mount Grant PMU. Design and implement site specific habitat improvement projects where feasible.	
		2013 Hawthorne Army Depot meeting
	HIR2-5-MG: Investigate options to control noxious weeds and cheatgrass within and around the Ninemile Ranch Unit in the Mount Grant PMU. Design and implement site specific habitat restoration projects based on the results.	
		2012 Smith Valley Conservation District weed monitoring and treatment
		2013 Smith Valley Conservation District weed monitoring and treatment
		2015 Smith Valley Conservation District weed monitoring and treatment
		2016 Smith Valley Conservation District weed monitoring and treatment
		2017 Smith Valley Conservation District weed monitoring and treatment
		2019 Nine Mile weed monitoring and treatment
		2020 Nine Mile weed monitoring and treatment
	HIR1-1-B: Complete ongoing pinyon and juniper removal projects in the Lower Summers (Lek 10), Green Creek, Stringer Meadows (Lek 9A), and Upper Aurora Canyon vicinities in the Bodie PMU.	

		Lek 9a conifer treatment maintenance
		Lower Summers conifer treatment
		Lower Summers conifer treatment East Unit
		Lower Summers conifer treatment Meadow Unit
		Lower Summers conifer treatment maintenance
		2012 Upper Aurora conifer treatment maintenance
		2013 Upper Aurora conifer treatment maintenance
		2014 Upper Aurora conifer treatment maintenance
		Stringer Meadow Unit conifer treatment
		Green Creek conifer treatment
		Green Creek conifer treatment
		2012 Green Creek conifer treatment maintenance
		2014 Green Creek conifer treatment maintenance
		2018 Green Creek conifer treatment maintenance
		2017 Greeen Creek pile burn
	HIR1-2-B: Maintain existing meadow habitat protective enclosures in the Bodie Hills portion of the Bodie PMU. Incorporate targeted short-duration grazing to improve brood meadow forb production where appropriate.	
		Murphy Meadow #1 fence conversion and yearly exclosure maintenance
		Upper Bodie Creek riparian pasture
		Aspen B1072 exclosure
		Artesian Spring exclosure
		Murphy Meadows exclosure #2
		Aspen P1094 exclosure
		7 Troughs Riparian Pasture
		Fourway Meadow exclosure
		N. Potato Peak Meadow exclosure
		Aspen P1094A exclosure
		Aspen B1075 exclosure
		Aspen B1076 exclosure
		Upper Geiger meadow exclosure
		Geiger Meadow #1 exclosure maintenance
		Geiger Meadow #2 exclosure maintenance
		Kirkwood Meadow restoration
	HIR1-3-B: Continue meadow habitat improvement efforts on public and private lands in Upper Aurora Canyon in the Bodie PMU.	
		Private Lands-EQIP/WHIP program rabbitbrush control
		Upper Aurora Canyon meadow improvement
		Aurora meadow owing
		Aurora Canyon electric fence
		Aurora Canyon headcut stabilization
		Aurora Canyon exclosure maintenance
	HIR1-4-B: Complete the planned removal of the Bodie to Fletcher transmission line that traverses portions of both the Bodie and Mount Grant PMUs.	
		Bodie sub to Fletcher sub power line removal

	HIR1-5-B: Continue to manage permitted livestock grazing to maintain current nesting habitat quality in the Bodie Hills breeding complex in the Bodie PMU.	
		Bodie Mountain Allotment
		Dog Creek Allotment
		Green Creek Allotment
		Mono Sand Flat Allotment
		Mormon Ranch Allotment
		Potato Peak Allotment
		Rancheria Gulch Allotment
		Aurora Canyon Allotment
		15 Year CRP Lease
	HIR1-6-B: Complete the ongoing NEPA analysis to support implementation of sage-grouse habitat improvement projects in the Bodie PMU consistent with the findings of the Bodie Hills Conservation Action Plan (Provencher et al. 2009).	
		Bodie Hills Upland Vegetation Restoration Programmatic NEPA
	HIR1-7-B: Complete the Lime Kiln windmill removal and solar pump replacement project in the southern portion of the Bodie PMU.	
		Incomplete
	HIR2-1-B: Evaluate stringer meadows, spring complexes, and irrigated meadows in the Bodie PMU as potential brood habitat improvement sites. Design and implement site specific habitat improvement projects based on the results.	
		Warm Springs meadow improvement
		Private Lands - EQIP/WHIP program project-watering facility to redistribute livestock
		Field tour with Sherm Swanson to assess riparian areas
		Drafted EA and NEPA for Bodie Hills meadow restoration
	HIR2-2-B: Evaluate mid-elevation sagebrush habitats in the Bodie Hills breeding complex for potential early brood habitat improvement sites in the Bodie PMU. Design and implement site specific habitat improvement projects based on the results.	
		Noxious weed survey and treatment
	HIR1-1-SM: Continue to implement and enforce seasonal road closures designed to reduce human disturbance on public lands in the vicinity of Lek 1, Lek 5, and Lek 8 in the Long Valley portion of the South Mono PMU.	
		Lek 8 nesting habitat seasonal closure
		Lek 1 nesting habitat seasonal closure
		Lek 5 nesting habitat seasonal closure
		Long Valley seasonal road closure
	HIR1-2-SM: Continue to monitor for illegal vehicle use and camping within the Long Valley portion of the South Mono PMU. Increase law enforcement presence and enforcement activities were required to minimize or eliminate recreation impacts.	
		Shepherd's Tub vegetation restoration
		Habitat protection through boulder placement
		Inyo NF Long Valley recreation monitoring
		Long Valley restoration project

		Bishop BLM Long Valley recreation monitoring
	HIR1-3-SM: Implement the proposed tree encroachment removal project near Sagehen Summit in the South Mono PMU.	
		2014 Sagehen Summit conifer treatment
		Sagehen II Sage-Grouse Habitat Enhancement Project NEPA
		2018 Sagehen II conifer treatment
	HIR1-4-SM: Continue to monitor implementation of new grazing permit terms and conditions in the Long Valley portion of the South Mono PMU. Identify priorities for more intensive management attention, especially in upland sagebrush types.	
		Annual livestock grazing monitoring
	HIR1-5-SM: Complete the windmill removal and solar pump replacement projects in the Adobe Valley portion of the South Mono PMU.	
		Four Adobe Valley windmills removed and conversion to solar
	HIR1-6-SM: Maintain the Indian Spring protective fence in the Mono Basin portion of the South Mono PMU.	
		Fence removed after fire. Now riparian area is monitored and maintained.
	HIR2-1-SM: In drought years, work with the LADWP to prioritize irrigation for important brood meadows (e.g., Laurel meadows) in the Long Valley portion of the South Mono PMU.	
		CDFW works with LADWP to advise on best irrigation practices
		LADWP, CDFW, USFWS, Audubon met to discuss water allocation strategies in Long Valley that provide adequate habitat for bird and fish species while maintaining LADWP's mission to provide water to paying customers
		LADWP submitted a commitment letter to the USFWS stating willingnes to manage their land with best management practices for sage-grouse in mind
		LADWP developed and implemented and Adaptive Management Plan for watering in Long Valley
Research and Monitoring: Implement a coordinated interagency research and monitoring program to support the conservation and management of greater sage-grouse populations and habitats within the Bi-State Plan area.		
	RAM1-1: Coordinate annual lek monitoring efforts across state and federal jurisdictional boundaries.	
		Annual lek counts are carried out by a diversity of partners across the Bi-State
	RAM1-2: Increase the level of interagency support and effort for annual lek counts in the Pine Nut, Desert Creek-Fales, Mount Grant, and White Mountains PMUs. Implement "saturation counts" where logistically feasible.	
		Beginning in 2012 NDOW, Bishop BLM, Carson BLM, USGS, CDFW determine staff needs and coordinate lek surveys in Pine Nut, Desert Creek-Fales, Mt. Grant, and White Mountain PMUs
	RAM1-3: Maintain the current level of interagency support and effort required to conduct annual "saturation counts" in the Bodie and South Mono PMUs.	

		Annual coordinated saturation counts. BIFO/CDFW leads the coordination of these counts. LADWP, NRCS, USFS and volunteers are involved
	RAM1-4: Conduct a systematic aerial inventory of potential breeding habitats in the Bi-State area to identify new or previously undocumented leks.	
		Aerial lek inventory occurred in 2012
	RAM1-5: Focus aerial lek monitoring efforts on remote or otherwise inaccessible locations. Augment aerial surveys with ground counts when and where logistically feasible.	
		Aerial helicopter surveys are conducted most years in hard to access areas in the the Pine Nut, Desert Creek and Mount Grant PMUs
	RAM1-6: Increase the level of volunteer training and support for annual lek monitoring efforts in the Bi-State area.	
		Mono County Lek tour and training
		Annual Bi-State volunteer lek survey training
	RAM1-7: Incorporate lek habitat inventory and assessment protocols identified in the interagency Sage-Grouse Habitat Assessment Framework (Stiver et al. 2010) into lek inventory and monitoring efforts in the Bi-State area.	
		Sage-grouse HAF conducted on leks within Mount Grant PMU in FY19 included Baldwin Canyon, Nine Mile Flat, Nine Mile 2, and Mudspring leks. 4 more in Pine Nut PMU
	RAM1-8: Develop and implement a standardized lek location database for documented (active and historic) leks in the Bi-State area.	
		Development of the California Lek database
		Development of the integrated lek database (CA and NV)
	RAM2-1: Identify and map existing sagebrush habitats and important sage-grouse habitats within each PMU. Develop a draft interim habitat map for the Bi-State area by April 30, 2012. Complete a final interim habitat map for the Bi-State area by September 30, 2012.	
		Published map of BSSG habitat
	RAM2-2: Incorporate standardized vegetation and environmental characteristics data sampling into existing agency vegetation inventory and monitoring protocols to support the development and implementation of the Conservation Planning Tool (CPT).	
		Standardized vegetation sampling protocols for treatment efficacy
		Standardized vegetation sampling protocols for nest and brood sites
	RAM2-3: Incorporate multi-scale sage-grouse habitat inventory and assessment protocols identified in the interagency Sage-Grouse Habitat Assessment Framework (Stiver et al. 2010) into habitat inventory and monitoring efforts in the BiState area.	
		Annual vegetation monitoring and treatment efficiency monitoring
	RAM3-1: Continue and expand the on-going telemetry effort in the Pine Nut PMU. Incorporate additional capture locations into the study design based on lek inventory results.	

		Capture and monitoring efforts in the Pine Nut PMU (2012-2015)
	RAM3-2: Implement a new telemetry effort in the Mount Grant PMU to supplement and expand on previous efforts focused in the Bodie PMU. Focus initial capture efforts in the China Camp, Baldwin Canyon, Aurora and Lapon Meadows lek areas, as well as brood rearing habitat on Ninemile Ranch and Scierine Ranch. Incorporate additional capture locations into the study design based on lek inventory results.	
		Capture and monitoring efforts in the Mount Grant PMU (2012-2018 and 2021)
	RAM3-3: Implement a new telemetry effort in the Desert Creek portion of the Desert Creek-Fales PMU to supplement and expand on previous efforts. Focus initial capture efforts in the Desert Creek, Sweetwater and Wiley Ditch lek areas, as well as brood-rearing habitats on the Desert Creek Ranch, Sweetwater Ranch and Scierine Ranch. Incorporate additional capture locations into the study design based on lek inventory results.	
		Capture and monitoring efforts in the Desert Creek-Fales PMU (2012, 2015-2018)
	RAM3-4: Implement a new telemetry effort in the White Mountains PMU to supplement and expand on previous efforts. Incorporate the use of GPS technology to improve data collection capabilities in the White Mountains. Incorporate additional capture locations into the study design based on lek inventory results.	
		Capture and monitoring efforts in the White Mountain PMU (2013, 2016-2021)
	RAM3-5: Continue and supplement the on-going radio telemetry effort in the South Mono PMU. Focus new capture efforts in the Sagehen Summit, Sagehen Meadows, Gaspipe Spring and McLaughlin Spring areas. Incorporate additional capture locations into the study design based on lek inventory results.	
		Capture and monitoring efforts in the South Mono PMU (2014-2021)
	RAM3-6: Continue and supplement the on-going telemetry effort in the Fales Portion of the Desert Creek-Fales PMU. Focus additional capture efforts in the upper elevations of the Sweetwater Range and in the Huntoon Valley. Incorporate additional capture locations into the study design based on lek inventory results.	
		Incomplete
	RAM3-7: Continue and supplement the on-going radio telemetry effort in the Bodie PMU. Focus additional capture efforts in previously un-sampled lek areas and habitat restoration project areas. Incorporate additional capture locations into the study design based on lek inventory results.	
		Capture and monitoring efforts in the Bodie Hills PMU (2012-2021)
	RAM3-8: Collect vegetation and environmental characteristics data at telemetry relocation points and random points following standardized protocols to support the development and implementation of the Conservation Planning Tool (CPT).	
		Vegetation characteristics collected at telemetry locations

	RAM3-9: Incorporate the use of GPS technology into the study design for ongoing and planned telemetry efforts to collect data on intra-day and potential long-range and inter-PMU movements.	
		USGS deploys GPS collars to monitor sage-grouse movement
	RAM3-10: Collect feces in addition to environmental and vegetation characteristics data at winter relocations for diet quality analysis using gas chromatography	
		UC Davis diet and behaviorial study was completed
	RAM4-1A: Collect a blood sample from each captured bird and submit these samples to the University of Denver for genetic analyses.	
		Blood samples are collected
	RAM4-1B: Collect feathers from each captured bird and submit these samples to the University of Idaho and/or the US Forest Service Rocky Mountain Research Station (RMRS) genetics lab in Missoula, Montana for genetic analyses.	
		Feathers are collected
	RAM4-1C: Collect morphological measurements from each captured bird to calculate body condition index (BCI) by obtaining mass, flat wing, tarsus, and culmen measurements.	
		Morphological measurements are collected
	RAM4-2: Collect feathers from each monitored lek and submit these samples to the University of Idaho and/or the US Forest Service RMRS genetics lab in Missoula, Montana for genetic analyses.	
		Feathers are collected and genetic analyses are complete
	RAM5-1A: Develop and implement a standardized spatial database (ArcMap geodatabase) to collect and store all greater sage-grouse conservation related project work occurring in the Bi-State area. Coordinate geodatabase development with signatories to the Bi-State MOU and the Bi-State LAWG to ensure end user compatibility. Populate the geodatabase with conservation actions completed to date by September 30, 2012. Establish procedures for effective and efficient geodatabase maintenance and distribution.	
		Geodatabase to track BSSG projects was developed
	RAM5-1B: Develop and implement a standardized tabular database (Microsoft Access database) to collect and store all greater sage-grouse related conservation work occurring in the Bi-State area. Coordinate database development with signatories to the Bi-State MOU and the Bi-State LAWG to ensure end user compatibility. Populate the database with conservation actions completed to date by September 30, 2012. Establish procedures for effective and efficient database maintenance and distribution.	
		Tabular database was developed
	RAM5-2: Investigate options to develop and implement an Interagency BiState Sage-Grouse Conservation sharepoint site to facilitate collaborative projects and data sharing. If determined to be feasible, establish the sharepoint site and provide access to signatories of the Bi-State MOU.	
		Google Drive created

Maintaining Stakeholder Involvement: Develop active, well informed, local planning groups committed to the development and implementation of sage-grouse conservation actions within the Bi-State Plan area.		
	MSI1: Continue to support the stakeholder based Bi-State Local Area Working Group (LAWG) process to identify, develop, and implement PMU specific conservation actions for greater sage-grouse populations and habitats in the Bi-State area.	
		The Sage-Grouse Conservation Plan for Bi-State Area is updated through meetings held by the Technical Advisory Committe
	MSI1-2: Conduct PMU planning meetings on an as needed basis to address PMU specific issues and to identify, develop, and prioritize PMU specific conservation actions.	
		Minden NRCS SGI SWAT Workshop
		Long Valley Tribal Forum
		Adobe Field Tour
		Parker Meadow Field Tour
		Presentation on the BSSG to the LA Audubon in Bishop
		Aurora Canyon Road Hydrology Restoration Field Trip
		Pine Nut Project Field Tour with Assistant Secretary of Interior
		Pine Nut Project, Field tour with NCCS regional director
		Pine Nut Land Health Annual Meeting
		LAWG Field Tour of 9 Mile Ranch
		Nevada PMU Meeting
		Parker Meadow Disturbance Meeting
	MSI1-3: Conduct Bi-State LAWG planning meetings on a semi-annual basis to review the status of greater sage-grouse populations and habitats in the Bi-State area and to identify, prioritize, and coordinate implementation of annual conservation actions. Continue University of Nevada Cooperative Extension facilitation of the BiState LAWG meeting.	
		Annual Bi-State LAWG meetings held
	MSI2-1: Conduct workshops to provide information about programs available to assist ranchers and other private landowners that may be interested in the implementation of sage-grouse conservation projects and to explore opportunities for cooperative conservation of sage-grouse in the Bi-State area.	
		Bi-State landowner open house
		RCPP Grant meeting
		Deep Springs resource management team meeting
		Mono County meetings
	MSI2-2: Develop and publish a Bi-State LAWG sage-grouse conservation newsletter.	
		Mailchimp e-newsletter was created
	MSI2-3: Develop and implement a publically accessible Bi-State LAWG Sage-Grouse Conservation webpage to facilitate the sharing and distribution of information specific to greater sage-grouse conservation efforts in the Bi-State area.	
		Website was created and is mainainted to provide BSSG related information

State of California
Department of Fish and Wildlife

Signed Original on File
Received March 26, 2024

M e m o r a n d u m

Date: March 25, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Submission of Initial Statement of Reasons for the April 17-18, 2024, Fish and Game Commission Meeting to Amend Sections 2.30, 5.00, 7.50, 8.00, and 703 Title 14, California Code of Regulations, Re: Inland Sport Fishing Regulations Update

The Department of Fish and Wildlife (Department) requests the Fish and Game Commission (Commission) authorize publication of notice of its intent to amend sections 2.30, 5.00, 7.50, 8.00, and 703 for the upcoming sport fishing regulatory cycle. The proposed regulatory changes are needed to effectively manage California's sport fisheries and correct errors and inaccuracies in the existing regulations to reduce public confusion and improve regulatory enforcement. Authorization of this request will allow for possible adoption at the August 2024 Commission meeting.

The Department is submitting the attached Initial Statement of Reasons (ISOR) with proposals to reduce the daily bag limit for trout in Parker Lake and Willow Creek, reduce the minimum size limit for black bass in Lake Castaic, allow take of American Shad by spearfishing in the Valley District, simplify and streamline access to low-flow fishing information, amend the fishing boundary for Deep Creek, and update the Department's mailing address.

If you have any questions regarding this item, please contact Jay Rowan, Fisheries Branch Chief or Karen Mitchell, Senior Environmental Scientist, at Fisheries@wildlife.ca.gov.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Jay Rowan, Branch Chief
Fisheries Branch
Wildlife and Fisheries Division

Robert Pelzman, Captain
Law Enforcement Division

Anthony Cusato, Attorney
Office of General Counsel

Ari Cornman, Wildlife Advisor
Fish and Game Commission

David Thesell, Program Manager
Fish and Game Commission

David Haug, Analyst
Fish and Game Commission

Ona Alminas, Env. Program Manager
Regulations Unit
Wildlife and Fisheries Division

Chelle Temple-King, Sr. Regulatory Scientist
Regulations Unit
Wildlife and Fisheries Division

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Sections 2.30, 5.00, 7.50, 8.00, and 703
Title 14, California Code of Regulations
Re: Inland Sport Fishing Regulations Update

I. Date of Initial Statement of Reasons: January 24, 2024

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing

Date: April 18, 2024 Location: San Jose, CA

(b) Discussion Hearing

Date: June 20, 2024 Location: Mammoth Lakes, CA

(c) Adoption Hearing

Date: August 15, 2024 Location: Fortuna, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

This California Department of Fish and Wildlife (Department) proposal combines Department and public requests for changes to Title 14, sections 2.30, 5.00, 7.50, 8.00 and 703, for the 2024 sport fishing regulatory cycle. This proposal will reduce the daily bag limit for trout in Parker Lake and Willow Creek, reduce the minimum size limit for black bass in Lake Castaic, allow take of American Shad by spearfishing in the Valley District, simplify and streamline access to low-flow fishing information, amend the fishing boundary for Deep Creek, and update the Department's mailing address. These proposed regulatory changes are needed to effectively manage California's sport fisheries, and correct errors and inaccuracies in the existing regulations to reduce public confusion and improve regulatory enforcement.

(b) Proposed Regulations

The Department is proposing changes to the following regulations in Title 14, CCR:

- ***Section 2.30, Spearfishing***
  - The proposal would amend the freshwater sport fishing regulations to include American Shad as a species that may be taken by spearfishing in the Valley District, and clarification of the spearfishing boundaries (Section 2.30 Spearfishing, subsection (b)).
  - Currently several species of fish can be taken by speargun in the Valley District between May and September. Those species include Striped Bass, carp, goldfish,

Sacramento (Western Sucker), Sacramento Blackfish, Hardhead, Sacramento Pikeminnow, and lamprey. The regulations do not include American Shad as a species that can be taken by spearfishing. The Department would like to add spearfishing as a method of take for American Shad. The Department does not believe that adding this method of take will impact the American Shad population, or any other fish species. Additionally, this regulation change will increase angling opportunities for the angling community.

- The Department would also like to more clearly define spearfishing boundaries written in the regulations so that the need to look up Fish and Game Code Section 1505 is reduced. Additionally, the department would like to add language for anglers to check their local city and/or county ordinances for speargun (firearm) restrictions.

- ***Section 5.00, Black Bass, Subsection (b)(7), Castaic Lake (Los Angeles Co.)***
  - The proposal is to reduce the 15-inch total length minimum size limit at Castaic Lake to the statewide standard of 12-inch total length minimum size limit. The daily bag limit of five fish will remain unchanged.
  - The current regulation for black bass at Castaic Lake is inadequate and was enacted to protect a “trophy” black bass fishery that no longer exists. Castaic Lake has limiting factors that are not conducive to maintaining a large population of “trophy” black bass. Habitat for juvenile bass and sunfish is limited as shorelines are generally steep in both arms and contain few small coves. Aquatic vegetation, which is important for recruitment of black bass, is lacking due to water level fluctuations. There is also a large population of striped bass which are additional competitors of forage resources. Department electrofishing data from 2013-2022 show the black bass fishery has declined in condition and has stunted between 10-15 inches. The average Relative Weight (body condition) was 78 in 2022, where 100 is considered adequate health. Harvest is needed to reduce the population, warranting the regulation change. In addition to the black bass fisheries data, the Department has been contacted multiple times by local angling groups calling for the regulation change. Castaic Lake is the only water in the area with a special regulation, aligning it with the statewide black bass regulation would create regulation simplification and expand angler opportunity for resource utilization.
- ***Section 7.50, Subsection (b)(42), Deep Creek (San Bernardino Co.)***
  - This proposal would amend the fishing boundary for Deep Creek for clarity purposes. The current boundary reads “from headwaters at Little Green Valley to confluence of Willow Creek.” The proposed new boundary is “from below Green Valley Lake Dam to the confluence of Willow Creek. This change is necessary to ensure law enforcement officers are clear on which area the regulations apply. Current regulations mention Little Green Valley, which does not exist.
- ***Section 7.50, Parker Lake (Mono County)***
  - This proposal would amend the trout regulations for Parker Lake to year-round angling, two fish bag limit, 14-inch minimum size limit, and an artificial lures only gear restriction from the General Statewide Regulations for trout (i.e., Section 5.85) of all year, 5 fish

bag limit with 10 in possession. This will require adding Parker Lake to Section 7.50, Special Fishing Regulations for Trout.

- Parker Lake has been a designated Heritage Wild Trout water since 2011. Historically, Parker Lake was a fast action Brook Trout fishery that produced trophy size Brown Trout. Recent survey efforts by the Department in 2021 have shown a consistent decline in both species population numbers since surveys conducted in 2003 and 2011. The large decline in Brook Trout numbers in the lake indicates Parker Lake is no longer a fast action Brook Trout fishery, suggesting there is overharvest. Brown Trout have also decreased in size since 2003 and 2011 and are trending towards no longer reaching trophy sizes. Parker Lake has become more popular in recent years due to increasing interest and advertisement of the lake on various social media platforms, which most likely caused the increase in angling pressure. Since this water is not stocked, the current fishing methods and 5 fish bag limit with an additional 10 Brook Trout over 10 inches is most likely resulting in overfishing and a decline in both species.

- ***Section 7.50, Willow Creek (Alpine County)***
    - This public proposal seeks to amend the fishing regulations on Willow Creek upstream from the confluence with the West Fork Carson River to the main tributary of Willow Creek to protect the declining populations of trout in the creek. This proposal would reduce the daily bag limit for trout from five fish per day to catch and release fishing only, with a gear restriction of artificial lures and barbless hooks only. This change would require adding Willow Creek to Section 7.50, Special Fishing Regulations for Trout.
    - The Department has little data on the status of trout populations in Willow Creek, but given the small size of the watershed, and multiple exceptional droughts of the past decade, the Department supports actions to ensure this fishery continues to be viable. This aligns with the Department's mission to conserve and provide fishing opportunities for future generations.

- ***Section 8.00, Low Flow Fishing Restrictions***

Low-flow restrictions provide protection to listed and targeted game fish when stream flows are low. Low-flow restrictions affect fishing seasons for ten coastal counties: Del Norte, Humboldt, Mendocino, Sonoma, Marin, Napa, San Mateo, Santa Cruz, Santa Clara, and Monterey. Currently, the Department reports low-flow information via three different phone lines reflected in this section. Each phone line is associated with specific waters and each line is supported by one of the three Department regions (Northern Region 1, Bay Delta Region 3, and Central Region 4).

- The low-flow phone lines are problematic, and a continued source of concern for the Department. The phone line messages for all three low-flow phone lines are inefficient as it requires the public to navigate a phone line and potentially listen to information that is not relevant to their needs. Additionally, if the public is not engaged, they may miss the pertinent information requiring them to listen to the message again. Constituents have expressed concerns with the phone line and have requested a web-based message on public forums and with Department staff.

- In the event of inclement weather and/or power outages, the phone lines have been down and unable to communicate low-flow updates. The Department's Telecom Representative has identified multiple options to improve the phone lines, however these options will be expensive and time and labor intensive.
- With the proposed amendments to Section 8.00, the Department seeks to simplify and streamline access to low-flow information by transitioning the three low-flow phone lines to a Department webpage. A single source of information will be more efficient for the state and its constituents. An online system will be much more efficient for CDFW to operate. The proposed regulation changes show the phone number in existing regulation struck out and the Department website's regulations page (www.wildlife.ca.gov/regulations) added for Low-Flow Restrictions and information. This regulation will not impact where or when low-flow closures occur.

- ***Other Changes***

  The Department is proposing additional changes to correct errors in the regulations, including:

  1. Section 703(a)(3): The mailing address for the Department's Fisheries Branch in this section needs to be changed from 830 S Street, Sacramento, CA 95811 to 1010 Riverside Pkwy, West Sacramento, 95605.
  2. Section 7.50: Non-substantive renumbering of subsections (b)(106) through (b)(169) to account for the addition of Parker Lake and Willow Creek.

(c) Necessity of the Proposed Regulation Changes

The proposed changes are necessary to align California's inland sport fishery regulations with the Department's current fisheries management goals and objectives. Specifically, the changes are necessary to: (1) protect declining populations of trout in Parker Lake and Willow Creek; (2) increase fishing opportunity for black bass in Castaic Lake; (3) increase fishing opportunity for spearfishers in the Valley District; (4) make access to low-flow fishing information more efficient; and (5) make needed corrections to existing regulations to reduce public confusion and improve regulatory enforcement.

(d) Goals and Benefits of the Regulation

As stated in Fish and Game Code Section 1700, Conservation of Aquatic Resources, it is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use. Adoption of scientifically-based sport fish seasons, size limits, and bag and possession limits provides for the maintenance of sufficient populations sport fish to ensure their continued existence.

The benefits of the proposed regulations are consistent with the sustainable management of California's sport fisheries, general health and welfare of California residents, and promotion of businesses that rely on sport fishing throughout California.

(e) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 205, 255, 265, 270, 275, 315, and 399 Fish and Game Code.
Reference: Sections 200, 205, 255, 265, 270, and 275 Fish and Game Code.

(f) Specific Technology or Equipment Required by Regulatory Change

None.

(g) Identification of Reports or Documents Supporting Regulation Change

None.

(h) Public Discussions of Proposed Regulations Prior to Notice Publication

The Department presented the proposed amendments to the sport fishing regulations at the Commission's Wildlife Resources Committee meetings on September 19, 2023 and January 16, 2024.

On December 12, 2023, the Department released an online survey associated with the proposed low-flow regulation change to gauge the public's use of the current phone lines, preference to recorded phone line messages vs a web-based platform, and ability to access online low-flow information. The survey was completed on February 22, 2024 and results indicated overall support for a web-based provision of low flow information.

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified by or brought to the attention of Commission staff that would have the same desired regulatory effect.

(b) No Change Alternative

The no change alternative would leave the current regulations in place.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed changes provide clarification of existing regulations that are necessary for the continued preservation of the resource, while providing inland sport fishing opportunities and thus, the prevention of adverse economic impacts.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate adverse impacts on the creation or elimination of jobs within the state. The Commission does not anticipate adverse impacts on the creation of new business, the elimination of existing businesses or the expansion of businesses in California. The proposed changes are to provide clarification of existing regulations that are not anticipated to change the level of fishing activity and thus the demand for goods and services related to sportfishing that could impact the demand for labor, nor induce the creation of new businesses, the elimination, nor the expansion of businesses in California.

The Commission anticipates benefits to the environment by the sustainable management of fishery resources throughout the state. The Commission does not anticipate any benefits to the health and welfare of California residents or to worker safety.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None. No changes to costs or savings to state agencies or in federal funding are anticipated by the proposed clarification of existing regulations. The Department program implementation and enforcement are projected to remain the same with a stable volume of fishing activity.

(e) Nondiscretionary Costs/Savings to Local Agencies: None.

(f) Programs Mandated on Local Agencies or School Districts: None.

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None.

(h) Effect on Housing Costs: None.

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate adverse impacts on the creation or elimination of jobs within the state because the proposed amendments are not anticipated to impact the level of fishing activity and thus the demand for goods and services related to sportfishing that could impact the demand for labor.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate that any of the proposed amendments would induce impacts on the creation of new business or the elimination of existing businesses, because the economic impacts of the proposed clarifications of existing regulations are unlikely to be stimulate or lessen the demand for goods or services related to sport fishing, travel, or tourism to the affected areas.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate that any of the proposed clarification of existing regulations would induce impacts on the expansion of businesses currently doing business within the state. The proposed regulations are not anticipated to increase demand for services or products from the existing businesses that serve individuals who engage in inland sport fishing. The number of fishing trips and angler economic contributions are expected to remain within the range of historical averages.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

The Commission does not anticipate direct benefits to the health and welfare of California residents besides the furtherance of opportunities for sport fishing which is healthy outdoor recreation and form of relaxation for many. Sport fishing also provides opportunities for multi-generational family activities and promotes respect for California's environment by younger generations, the future stewards of California's natural resources.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate any benefits to worker safety from the proposed regulations because inland sport fishing does not impact working conditions.

(f) Benefits of the Regulation to the State's Environment

Under the proposed regulations, the Commission anticipates benefits to the environment in the sustainable management of inland fishery resources. It is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use.

(g) Other Benefits of the Regulation

Other benefits of the regulation include consistency with federal fishery management goals, and support for businesses that rely on inland sport fishing.

Informative Digest/Policy Statement Overview

This California Department of Fish and Wildlife (Department) proposal combines Department and public requests for changes to California Code of Regulations (CCR) Title 14, sections 2.30, 5.00, 7.50, 703, and 8.00, for the 2024 sport fishing regulatory cycle. This proposal will reduce the daily bag limit for trout in Parker Lake and Willow Creek, reduce the minimum size limit for black bass in Lake Castaic, allow take of American Shad by spearfishing in the Valley District, simplify and streamline access to low-flow fishing information, amend the fishing boundary for Deep Creek, and update the Department's mailing address. These proposed regulatory changes are needed to effectively manage California's sport fisheries, and correct errors and inaccuracies in the existing regulations to reduce public confusion and improve regulatory enforcement.

The Department is proposing changes to the following regulations in Title 14, CCR:

- ***Section 2.30, Spearfishing***
  - The proposal would amend the freshwater sport fishing regulations to include American Shad as a species that may be taken by spearfishing in the Valley District, and clarification of the spearfishing boundaries (Section 2.30 Spearfishing, subsections (b) and (c)).
- ***Section 5.00, Black Bass, Subsection (b)(7), Castaic Lake (Los Angeles Co.)***
  - The proposal is to reduce the 15-inch total length minimum size limit at Castaic Lake to the statewide standard of 12-inch total length minimum size limit. The daily bag limit of five fish will remain unchanged.
- ***Section 7.50, Subsection (b(42), Deep Creek (San Bernardino Co.)***
  - This proposal would amend the fishing boundary for Deep Creek for clarity purposes. The current boundary reads "from headwaters at Little Green Valley to confluence of Willow Creek." The proposed new boundary is "from below Green Valley Lake Dam to the confluence of Willow Creek." This change is necessary to ensure law enforcement officers are clear on which area the regulations apply. Current regulations mention Little Green Valley which does not exist.
- ***Section 7.50, Parker Lake (Mono Co.)***
  - This proposal would amend the trout regulations for Parker Lake to year-round angling, two fish bag limit, 14-inch minimum size limit, and an artificial lures only gear restriction from the General Statewide Regulations for trout (i.e., Section 5.85) of all year, 5 fish bag limit with 10 in possession. This will require adding Parker Lake to Section 7.50, Special Fishing Regulations for Trout.
- ***Section 7.50, Willow Creek (Alpine Co.)***
  - This public proposal seeks to amend the fishing regulations on Willow Creek upstream from the confluence with the West Fork Carson River to the main tributary of Willow Creek to protect the declining populations of trout in the creek. This proposal would reduce the daily bag limit for trout from five fish per day to catch and release fishing

only, with a gear restriction of artificial lures and barbless hooks only. This will require adding Willow Creek to Section 7.50, Special Fishing Regulations for Trout.

- ***Section 8.00, Low Flow Fishing Restrictions.***
  - This proposal seeks to simplify and streamline access to low-flow information by transitioning the three different phone lines in current regulations to a single-source CDFW webpage.

- ***Other Changes***

  The Department is proposing additional changes to correct errors in the regulations, including:

  1. Section 703(a)(3): The mailing address for the Department's Fisheries Branch in this section needs to be changed from 830 S Street, Sacramento, CA 95811 to 1010 Riverside Pkwy, West Sacramento, 95605.
  2. Section 7.50: Renumber subsections (b)(106) through (b)(169) to account for the addition of Parker Lake and Willow Creek.

Benefits of the Proposed Regulations

As stated in Fish and Game Code Section 1700, Conservation of Aquatic Resources, it is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use. Adoption of scientifically-based sport fish seasons, size limits, and bag and possession limits provides for the maintenance of sufficient populations sport fish to ensure their continued existence.

The benefits of the proposed regulations are consistent with the sustainable management of California's sport fisheries, general health and welfare of California residents, and promotion of businesses that rely on sport fishing throughout California.

Consistency and Compatibility with Existing Regulations

Article IV, Section 20 of the State Constitution specifies that the Legislature may delegate to the Fish and Game Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to regulate recreational fishing in waters of the state (Fish and Game Code sections 200, 205, 315, and 316.5). The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the California Code of Regulations and finds no other state agency regulations pertaining to trout sport fishing seasons, bag, and possession limits.

Proposed Regulatory Language

Subsection (b) of Section 2.30, Title 14, CCR, is amended to read:

§ 2.30. Spearfishing.

Spearfishing is permitted only in:

(a) The Colorado River District for carp, tilapia, goldfish and mullet, all year.

(b) The Valley District and Black Butte Lake (Tehama County) for <u>American Shad,</u> carp, tilapia, goldfish, striped bass, Sacramento (Western) Sucker, Sacramento blackfish, hardhead, Sacramento pikeminnow and lamprey, from May 1 through September 15, except that no spearfishing is permitted in:

(1) Shasta County (see Section 2.12).

(2) Tehama County except Black Butte Lake.

(3) Butte Creek (Butte Co.).

(4) Feather River below Oroville Dam (Butte Co.).

~~(5) Designated salmon spawning areas (See Fish and Game Code Section 1505).~~

<u>(5) Yuba River upstream of Simpson Lane Bridge (Yuba Co.).</u>

<u>(6) American River upstream of Howe Ave. Bridge (Sacramento Co.).</u>

<u>(7) Mokelumne River upstream of Elliot Road Bridge (San Joaquin Co.).</u>

<u>(8) San Joaquin River upstream of State Route 99 Bridge (Madera and Fresno Co.).</u>

<u>(9) Stanislaus River upstream of S. Santa Fe Road (J7) Bridge (Stanislaus Co.).</u>

<u>(10) Tuolumne River upstream of the Geer Road (J14) Bridge (Stanislaus Co.).</u>

<u>(11) Merced River upstream of N. Santa Fe Drive (J7) Bridge (Merced Co.).</u>

<u>(12) All designated salmon spawning areas (See Fish and Game Code Section 1505).</u>

<u>(13) Refer to all county, city, and/or local regulations and ordinances to confirm if use and/or possession of projectile weapons is prohibited.</u>

(c) The Kern River from the Kern-Tulare county line upstream to the Johnsondale Bridge for carp, goldfish, Sacramento (Western) Sucker, hardhead and Sacramento pikeminnow, from May 1 through September 15.

(d) See bullfrogs (Section 5.05).

Note: Authority cited: Sections 200, 205, 255 and 265, Fish and Game Code.
Reference: Sections 200, 205, 255 and 265, Fish and Game Code.

Proposed Regulatory Language

Subsection (b)(7) of Section 5.00, Title 14, CCR, is amended to read:

§ 5.00. Black Bass.

. . . No changes to subsections (a) and (b)(1) through (b)(6), just shown for background information. . .

It is unlawful to take or possess black bass except as provided in this section:

(Note: Some waters are closed to all fishing under Sections 7.40 and 7.50.)

(a) General Statewide Restrictions:

(1) Lakes/Reservoirs and the Sacramento-San Joaquin Delta: The following waters, except for those listed in subsection (b), are open to fishing all year, with a 12-inch total length minimum size limit and a five-fish daily bag limit: All lakes and reservoirs in the State, and the Sacramento-San Joaquin River Delta (see Section 1.71 for definition of the Delta).

(2) Rivers/Streams and Private Ponds: Rivers, streams, canals, and lakes or ponds entirely on private lands that are not listed in subsection (b) are open all year with no size limit and a five-fish daily bag limit.

(b) Special Regulations: Counties and individual waters listed below are those having regulations different from the General Statewide Restrictions in subsection (a).

DISTRICTS AND COUNTIES WITH SPECIAL REGULATIONS

Area or Body of Water	**Open Season**	**Size (total length)**	**Bag Limit**
(1) Colorado River District: All waters (Bag and size limits conform with Arizona regulations.).	All year.	13-inch minimum.	6
(2) Inyo Co.: All streams east of Highway 395 from the southern Inyo Co. line north to the junction of Highway 6 and east of Highway 6 to the Mono Co. line, except those streams listed by name in Section 7.50(b), Special Fishing Regulations.	All year.	12-inch minimum.	5
The remaining streams of Inyo Co., except those waters listed in Section 7.50(b), Special Fishing Regulations	Last Sat. in Apr. through Nov. 15. Closed to bass fishing from Nov. 16 through the Fri. preceding	12-inch minimum.	5

	the last Sat. in Apr.		
All Lakes, Big Pine Canal, Fish Spring Canal, and Millpond in Inyo Co.	All year.	12-inch minimum.	5
(3) Mono Co.: All streams except for Fish Slough (see subsection (b)(10)) and those waters listed by name in Section 7.50(b), Special Fishing Regulations	Last Sat. in Apr. through Nov. 15. Closed to bass fishing from Nov. 16 through the Fri. preceding the last Sat. in Apr.	No size limit.	5
(4) Plumas Co.: All waters.	All year.	No size limit.	5

INDIVIDUAL BODIES OF WATER WITH SPECIAL REGULATIONS

Area or Body of Water	**Open Season**	**Size (total length)**	**Bag Limit**
(5) Barrett Lake (San Diego Co.) (Also see Section 2.08.)	All year.	Catch and Release only.	0
(6) Casitas Lake (Ventura Co.)	All year.	12-inch minimum. No more than one over 22 inches.	5
(7) Castaic Lake (Los Angeles Co.).	All year.	~~15~~12-inch minimum.	5
(8) Cuyamaca Lake (San Diego Co.).	All year.	No size limit for Largemouth Bass. Catch and Release only for Smallmouth Bass.	5
(9) Fish Slough (Mono Co.), except the fenced portions of Fish Slough within the BLM Spring, which are closed to all fishing all year. See Section 7.50(b)(49), Special	All year.	No size limit.	5

Area or Body of Water	Open Season	Size (total length)	Bag Limit
Fishing Regulations.			
(10) Hodges Lake (San Diego Co.).	All year.	15-inch minimum.	5
(11) Lett's Lake (Colusa Co.).	All year.	No size limit.	5
(12) Plaskett Meadows lakes, upper and lower (Glenn Co.).	All year.	No size limit.	5
(13) Shaver Lake (Fresno Co.).	All year.	No size limit.	5
(14) Upper Otay Lake (San Diego Co.). (Also see Section 2.08.)	All year	Catch and Release only.	0

Note: Authority cited: Sections 200, 205, 265, 270 and 275, Fish and Game Code. Reference: Sections 200 and 205, Fish and Game Code.

Proposed Regulatory Language

Subsection (b) of Section 7.50, Title 14, CCR, is amended to read:

§ 7.50. Alphabetical List of Trout Waters with Special Fishing Regulations

[…No changes to subsection (a)…]

(b)

[…No changes to subsections (b)(1) through (b)(41)…]

§ 7.50. Alphabetical List of Trout Waters with Special Fishing Regulations.

(b)

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(42) Deep Creek (San Bernardino Co.) from ~~headwaters at Little Green Valley to confluence of Willow Creek.~~ below Green Valley Lake Dam to the confluence of Willow Creek.	All year. Only artificial lures may be used.	2 trout

[…No changes to subsections (b)(43) through (b)(104)…]

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(105) Parker Creek (Mono Co.) from Parker Lake to the confluence with Rush Creek.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(106) Parker Lake (Mono Co.)	All year. Only artificial lures may be used. 14-inch minimum size limit.	2 trout
(~~106~~107) Pine Creek (Goose Lake Tributary) and tributaries (Modoc Co.).	Sat. preceding Memorial Day through the last day in Feb.	5 trout
(~~107~~108) Pine Valley Creek (San Diego Co.) upstream of Barrett Lake and all its tributaries.	All year. Only artificial lures may be used.	2 trout
(~~108~~109) Piru Creek (Los Angeles and Ventura Cos.).		

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(A) Piru Creek and tributaries upstream of Pyramid Lake.	All year. Only artificial lures may be used.	2 trout
(B) From Pyramid Dam downstream to the bridge approximately 300 yards below Pyramid Lake.	Closed to all fishing all year.	
(C) From the bridge approximately 300 yards below Pyramid Lake downstream to the falls about 1/2 mile above the old Highway 99 bridge.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~109~~110) Pit River (Shasta and Modoc Cos.).		
(A) Pit River, South Fork (Modoc Co.) and tributaries upstream of the Highway 395 bridge in Likely.	Sat. preceding Memorial through the last day in Feb.	5 trout
(B) Pit River, North Fork (Modoc Co.) and tributaries from the confluence with the South Fork in Alturas upstream to and including Franklin Creek.	Sat. preceding Memorial Day through the last day in Feb. Only artificial lures may be used.	2 trout
(C) From Pit No. 3 (Britton Dam) downstream to the outlet of the Pit No. 3 Powerhouse.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(D) Pit River, from Pit No. 3 Powerhouse downstream to Shasta Lake.	All year.	2 trout. 4 trout in possession.
(~~110~~111) Pole Creek and tributaries (Placer Co.).	Closed to all fishing all year.	
(~~111~~112) Portuguese Creek, West Fork (Madera Co.) from headwaters downstream to confluence with the East Fork Portuguese Creek.	Sat. preceding Memorial Day through the last day in Feb. Only artificial lures with barbless hooks may be used.	0 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~112~~113) Prosser Creek from the Prosser Reservoir dam downstream to the confluence with the Truckee River (Nevada Co.).	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~113~~114) Purisima Creek (San Mateo Co.).	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(~~114~~115) Putah Creek (Solano and Yolo Cos.) from Solano Lake to Monticello Dam.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~115~~116) Redwood Creek and tributaries (Alameda Co.).	Closed to all fishing all year.	
(~~116~~117) Redwood Creek (Humboldt Co.) and tributaries above the mouth of Bond Creek.	Closed to all fishing all year.	
(~~117~~118) Robinson Creek (Mono Co.).		
(A) From the U.S. Forest Service boundary downstream to Upper Twin Lake.	Sat. preceding Memorial Day through Sep. 30.	5 trout
(B) Between Upper and Lower Twin Lakes.	Sat. preceding Memorial Day through Sep. 30.	5 trout
(~~118~~119) Rock Creek Diversion Channel (Mono Co.) from its source below Tom's Place to its confluence with Crooked Creek.	Closed to all fishing all year.	
(~~119~~120) Rock Creek Lake (Inyo Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~120~~121) Rock Creek in the Hat Creek Drainage (Shasta Co.) from Rock Creek spring (origin) downstream to Baum Lake.	Closed to all fishing all year.	

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~121~~122) Rock Creek (Shasta Co.) from its confluence with Pit River to Rock Creek Falls (about one mile upstream).	Closed to all fishing all year.	
(~~122~~123) Roosevelt Lake (Mono Co.).	All year. Only artificial lures may be used.	2 trout
(12~~3~~124) Rush Creek (Mono Co.).		
(A) Rush Creek from Grant Lake Dam downstream to Mono Lake.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(B) Rush Creek (Mono.Co.) between Silver Lake and Grant Lake.	Sat. preceding Memorial Day through Sep. 30.	5 trout
(~~124~~125) Sabrina Lake (Lake Sabrina, Inyo Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~125~~126) Sacramento River and tributaries above Keswick Dam (Shasta and Siskiyou Cos.).		
(A) Sacramento River and tributaries from Box Canyon Dam downstream to the Scarlett Way bridge in Dunsmuir.	All Year. Only artificial lures with barbless hooks may be used.	0 trout
(B) Sacramento River and tributaries from Scarlett Way bridge downstream to the county bridge at Sweetbriar.	Sat. preceding Memorial Day through Sep. 30. Oct. 1 through the Fri. preceding Memorial Day. Only artificial lures may be used.	5 trout 2 trout
(C) Sacramento River and tributaries from the county bridge at Sweetbriar downstream to Shasta Lake.	All year. Only artificial lures may be used.	2 trout
(~~126~~127) Sagehen Creek (Nevada Co.).		

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(A) From the stream gauging station (located about 1/8 mile below Sagehen Creek Station Headquarters) upstream to about 1/8 mile above the station headquarters at a point where the stream splits into two sections.	Closed to all fishing all year.	
(B) From the Highway 89 bridge upstream to the gauging station at the east boundary of the Sagehen Creek Station.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~127~~128) Salmon Creek and tributaries above Highway 1 (Monterey Co.).	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(~~128~~129) San Gabriel River, West Fork and tributaries (Los Angeles Co.).		
(A) Upstream of Cogswell Dam (including Cogswell reservoir and its tributaries).	All year. Only artificial lures may be used.	2 trout
(B) From Cogswell Dam downstream to the second bridge upstream from the Highway 39 bridge.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~129~~130) San Luis Rey River West Fork (San Diego Co.).	All year. Only artificial lures may be used.	2 trout
(~~130~~131) Santa Ana River and tributaries upstream above Seven Oaks Dam (San Bernardino Co.). This does not include Bear Creek. See subsection (b)(8), Bear Creek (San Bernardino Co.) for additional info.	All year.	5 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~131~~132) Santa Ynez River and tributaries upstream of Gibraltar Dam (Santa Barbara Co.).	All year.	2 trout. 4 trout in possession.
(~~132~~133) Sausal Creek and tributaries (Alameda Co.).	Closed to all fishing all year.	
(~~133~~134) Sespe Creek and tributaries above Alder Creek confluence (Ventura Co.).	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~134~~135) Silver Creek (Mono Co.), tributary to West Walker River, and tributaries upstream from Silver Falls.	Closed to all fishing all year.	
(~~135~~136) Silver Creek and all other tributaries to Sworinger Lake (Modoc and Lassen Cos.).	Sat. preceding Memorial Day through the last day in Feb. Only artificial lures may be used.	2 trout
(~~136~~137) Silver King Creek and tributaries (Alpine Co.) upstream of the confluence with Snodgrass Creek.	Closed to all fishing all year.	
(~~137~~138) Silver Lake (Mono. Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~138~~139) Slinkard Creek and tributaries (Mono Co.) upstream from a department of Fish and Wildlife rock gabbion barrier (38.606976°N, 119.567687°W). The barrier is located approximately 5–6 miles upstream from the Hwy 89 and Hwy 395 junction.	All year. Only artificial flies with barbless hooks may be used.	0 trout
(~~139~~140) Solano Lake (Solano Co.).	All year. Only artificial lures and barbless hooks may be used.	0 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~140~~141) Sonoma Creek and tributaries (Sonoma Co.) above the Sonoma Creek seasonal waterfall in Sugarloaf Ridge State Park (located 0.2 miles upstream of the west end of the Canyon Trail).	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(~~141~~142) Sonoma Lake (Sonoma Co.).	All year.	2 trout. 4 trout in possession.
(~~142~~143) Sonoma Lake tributaries (Sonoma Co.).	Sat. preceding Memorial Day through Sep. 30. Only artificial lures may be use.	2 trout
(~~143~~144) Soulajoule Lake tributaries (Marin Co.).	Sat. preceding Memorial Day through Sep. 30.	2 trout. 4 trout in possession.
(~~144~~145) South Lake (Inyo Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~145~~146) Squaw Valley Creek and tributaries (Shasta Co.).	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~146~~147) Stanislaus River, Middle Fork (Tuolumne Co.).		
(A) From Beardsley Dam downstream to the U. S. Forest Service footbridge at Spring Gap (including the Beardsley Afterbay).	All year. Only artificial lures may be used.	2 trout
(B) From the U.S. Forest Service footbridge at Spring Gap to New Melones Reservoir.	All year.	2 trout. 4 trout in possession.
(~~147~~148) Stevens Creek and all tributaries upstream of Stevens Creek Reservoir (Santa Clara Co.).	All year. Only artificial lures with barbless hooks may be used.	0 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~148~~149) Stony Creek, and tributaries (including the North, South, and Middle forks) from the headwaters downstream to the diversion dam west of Stonyford in the center of Section 35, T18N, R7W (Colusa, Glenn and Lake Cos.).	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~149~~150) Susan River (Lassen Co.)	Sat. preceding Memorial Day through the last day in Feb.	5 trout
(~~150~~151) Sweetwater River and tributaries upstream of Sweetwater Reservoir (San Diego Co.).	All year. Only artificial lures may be used.	2 trout.
(~~151~~152) Tahoe Lake and tributaries (Placer and El Dorado Cos.).		
(A) Tahoe Lake tributaries upstream to the first lake.	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(B) Tahoe Lake within 300 feet of the mouth of its tributaries.	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(~~152~~153) Trinity River, above Trinity Lake (Trinity Co.) from the confluence with Tangle Blue Creek (Hwy. 3), downstream (south) to the mouth of Trinity Lake, approximately 13.8 miles.	Sat. preceding Memorial Day through Sep. 30. Oct. 1 through the Fri. preceding Memorial Day. Only artificial lures with barbless hooks may be used.	5 trout
(~~153~~154) Truckee River (Nevada, Placer, and Sierra Cos.).		
(A) Truckee River for 1,000 feet below the Lake Tahoe outlet dam.	Closed to all fishing all year.	

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(B) Truckee River from the confluence of Trout Creek downstream to the mouth of Prosser Creek.	All year. Only artificial flies with barbless hooks may be used.	0 trout
(C) Truckee River from the mouth of Prosser Creek downstream to the Nevada State Line.	Last Saturday in Apr. through Nov. 15. Only artificial lures may be used. Nov. 16 through the Friday preceding the last Saturday in Apr. Only artificial lures with barbless hooks may be used.	2 trout 0 trout
(~~154~~155) Tule River and tributaries (Tulare Co.).		
Tule River, North Fork (Tulare Co.), only in the North Fork Tule River and all its forks and tributaries above the confluence with Pine Creek (about 50 yards upstream from the Blue Ridge road bridge, about 12 1/4 miles north of Springville).	All year. Only artificial lures may be used.	2 trout
(~~155~~156) Tuolumne River (Stanislaus and Tuolumne Cos.) from O'Shaughnessy Dam (Hetch Hetchy Reservoir downstream to Clavey River Falls.	All year. Only artificial lures may be used.	2 trout
(~~156~~157) Twelvemile Creek (Modoc Co.).	Sat. preceding Memorial Day through the last day in Feb. Only artificial lures with barbless hooks may be used.	0 trout
(~~157~~158) Twin Lakes (Mammoth, Mono Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~158~~159) Twin Lakes, Upper and Lower (Bridgeport, Mono Co.).	Last Sat. in Apr. through Nov. 15.	5 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~159~~160) Upper Otay Lake (San Diego Co.).	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~160~~161) Upper Truckee River and tributaries upstream from confluence with Showers Creek (Alpine and El Dorado Cos.).	Sat. preceding Memorial Day through Sep. 30. Only artificial lures with barbless hooks may be used.	0 trout
(~~161~~162) Virginia Lakes, Upper and Lower (Mono Co.).	Last Sat. in Apr. through Nov. 15.	5 trout
(~~162~~163) Walker Creek (Mono Co.) from the private property line (fence) to the confluence Rush Creek.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~163~~164) Walker River, East Fork (Mono Co.) from Bridgeport Dam to Nevada State Line.	Last Sat. in Apr. through Nov. 15. Only artificial lures may be used. Minimum size limit: 18 inches total length. NOTE: BOW AND ARROW FISHING FOR CARP ONLY IS PERMITTED.	2 trout
(~~164~~165) Whiskey Creek (Mono Co.) downstream from Crowley Lake Drive (old Highway 395).	Sat. preceding Memorial Day through Sep. 30.	5 trout
(166) Willow Creek (Alpine Co.) upstream from the confluence with the West Fork Carson River to the main tributary of Willow Creek.	All year. Only artificial lures with barbless hooks may be used.	0 trout
(~~165~~167) Wolf Creek and tributaries (tributary to West Walker River) (Mono Co.).	All year. Only artificial flies with barbless hooks may be used.	0 trout

Body of Water	*Open Season and Special Restrictions*	*Daily Bag and Possession Limit*
(~~166~~168) Wolf Creek Lake (at the headwaters of Wolf Creek, tributary to the West Walker River) (Mono Co.).	Closed to all fishing all year.	
(~~167~~169) Yellow Creek (Plumas Co.) from Big Springs downstream to the marker at the lower end of Humbug Meadow.	Sat. preceding Memorial Day through the last day in Feb. Only artificial lures with barbless hooks may be used.	0 trout
(~~168~~170) Yuba River, Middle Fork (Nevada and Sierra Cos.) from Jackson Meadows Dam downstream to Milton Lake.	See Milton Lake (b)(97).	
(~~169~~171) Yuba River, North Fork (Sierra and Yuba Cos.) from the western boundary of Sierra City to the confluence with Ladies Canyon Creek.	All year. Only artificial lures may be used.	2 trout

NOTE: Authority cited: Sections 200, 205, 265, 270, 315 and 399, Fish and Game Code. Reference: Sections 200, 205, 265 and 270, Fish and Game Code.

Proposed Regulatory Language

Section 8.00, Title 14, CCR, is amended to read:

§ 8.00. Low-Flow Restrictions.

(a) Eel River, Mad River, Mattole River, Redwood Creek, Smith River and Van Duzen River. Stream closures: Special Low Flow Conditions.

(1) From September 1 through April 30:

(A) Any of the stream reaches listed in subsections (a)(2) through (8) below shall be closed to all angling on Tuesday and Wednesday when the department determines that the flow on the previous Monday at any of the designated gauging stations is less than the minimum flows set forth in subsections (a)(2) through (8).

(B) Any of the stream reaches listed in subsections (a)(2) through (8) below shall be closed to all angling on Thursday and Friday when the department determines that the flow on the previous Wednesday at any of the designated gauging stations is less than the minimum flows set forth in subsections (a)(2) through (8).

(C) Any of the stream reaches listed in subsections (a)(2) through (8) below shall be closed to all angling from Saturday through Monday when the department determines that the flow on the previous Friday at any of the designated gauging stations is less than the minimum flows set forth in subsections (a)(2) through (8).Note: Authority cited: Sections 200, 205, 265 and 270, Fish and Game Code. Reference: Sections 200, 205 and 265, Fish and Game Code.

(D) Notwithstanding subsections (a)(1)(A) through (C), the department may close or keep a stream reach closed to fishing when the minimum flow is exceeded on the scheduled flow determination day if the department is reasonably assured that the stream flow is likely to decrease below the minimum flow as specified in subsections (a)(2) through (8) before or on the next flow-determination date.

(E) The department may reopen a stream at any time during a closed period if the minimum flow as specified in subsections (a)(2) through (8) is exceeded and the department is reasonably assured that it will remain above the minimum flow until the next scheduled Monday, Wednesday, or Friday flow determination. The department shall make information available to the public by a ~~telephone recorded message~~webpage updated, as necessary, no later than 1:00 p.m. each Monday, Wednesday, and Friday as to whether any stream will be open or closed to fishing. It shall be the responsibility of the angler to use the ~~telephone number~~webpage designated in the sport fishing regulations booklet to obtain information on the status of any stream.

(2) Eel River

(A) From the mouth to Fulmor Road, at its paved junction with the south bank of Eel River. Closed to angling, except:

1. Legal fishing methods other than angling are permitted.

2. From the mouth to Cock Robin Island Bridge, angling from shore for non-salmonids is permitted.

Minimum Flow: 350 cfs at the gauging station near Scotia.

(B) The main stem Eel River from the paved junction of Fulmor Road with the Eel River to the South Fork Eel River. Minimum Flow: 350 cfs at the gauging station near Scotia.

(3) The South Fork of the Eel River downstream from Rattlesnake Creek and the Middle Fork Eel River downstream from the Bar Creek. Minimum Flow: 340 cfs at the gauging station at Miranda.

(4) Van Duzen River: The main stem Van Duzen River from its junction with the Eel River to the end of Golden Gate Drive near Bridgeville (approximately 4,000 feet upstream from the Little Golden Gate Bridge).

Minimum Flow: 150 cfs at the gauging station near Grizzly Creek Redwoods State Park.

(5) Mad River: The main stem Mad River from the Hammond Trail Railroad Trestle to Cowan Creek.

Minimum Flow: 200 cfs at the gauging station at the Highway 299 bridge.

(6) Mattole River: The main stem of the Mattole River from the mouth to Honeydew Creek.

Minimum Flow: 320 cfs at the gauging station at Petrolia.

(7) Redwood Creek: The main stem of Redwood Creek from the mouth to its confluence with Bond Creek.

Minimum Flow: 300 cfs at the gauging station near the Highway 101 bridge.

(8) Smith River: The main stem Smith River from the mouth of Rowdy Creek to the mouth of Patrick Creek (tributary of the Middle Fork Smith River); the South Fork Smith River from the mouth upstream approximately 1000 feet to the County Road (George Tyron-) bridge and Craigs Creek to its confluence with Jones Creek; and the North Fork Smith River from the mouth to its confluence with Stony Creek.

Minimum Flow: 600 cfs at the Jedediah Smith Redwoods State Park gauging station.

~~THE NUMBER TO CALL FOR INFORMATION IS (707) 822–3164.~~Check the Department's regulations page at www.wildlife.ca.gov/regulations for Low-Flow Restrictions and Information.

(b) Mendocino, Sonoma, and Marin County coastal streams: Stream Closures: Special Low Flow Conditions.

(1) From September 1 through April 30:

(A) Any of the stream reaches listed in subsections (b)(2) through (5) below shall be closed to all angling on Tuesday and Wednesday when the department determines that the flow on the previous Monday at the applicable designated gauging stations is less than the minimum flows set forth in subsections (b)(2) through (5).

(B) Any of the stream reaches listed in subsections (b)(2) through (5) below shall be closed to all angling on Thursday and Friday when the department determines that the flow on the previous Wednesday at the applicable designated gauging stations is less than the minimum flows set forth in subsections (b)(2) through (5).

(C) Any of the stream reaches listed in subsections (b)(2) through (5) below shall be closed to all angling from Saturday through Monday when the department determines that the flow on the previous Friday at the applicable designated gauging stations is less than the minimum flows set forth in subsections (b)(2) through (5).

(D) Notwithstanding subsections (b)(1)(A) through (C), the department may close or keep a stream reach closed to fishing when the minimum flow is exceeded on the scheduled flow determination day if the department is reasonably assured that the stream flow is likely to decrease below the minimum flow as specified in subsections (b)(2) through (5) before or on the next flow-determination date.

(E) The department may reopen a stream at any time during a closed period if the minimum flow as specified in subsections (b)(2) through (5) is exceeded and the department is reasonably assured that it will remain above the minimum flow until the next scheduled Monday, Wednesday, or Friday flow determination.

(F) The department shall make information available to the public by a ~~telephone recorded message~~webpage updated, as necessary, no later than 1:00 p.m. each Monday, Wednesday, and Friday as to whether any stream will be open or closed to fishing. It shall be the responsibility of the angler to use the ~~telephone number~~webpage designated in the sport fishing regulations booklet to obtain information on the status of any stream.

~~THE NUMBER TO CALL FOR INFORMATION IS (707) 822–3164 for Mendocino County and (707) 944–5533 for Sonoma, Marin, and Napa Counties.~~Check the Department's regulations page at www.wildlife.ca.gov/regulations for Low-Flow Restrictions and information.

(2) All rivers, creeks, and streams that flow directly into the Pacific Ocean (and its bays) in Mendocino County, except for the Russian and Gualala rivers. This excludes sections and reaches above fish migration barriers, dams, and natural features that prevent upstream anadromous migration.

Minimum Flow: 200 cfs at the USGS gauging station on the main stem Navarro River near Navarro, CA.

(3) All rivers, creeks, and streams that flow directly into the Pacific Ocean (and its bays) in Sonoma and Marin Counties, except for the Russian River. This excludes sections and reaches above fish migration barriers.

Minimum Flow: 150 cfs at the gauging station on the South Fork Gualala River near Sea Ranch (Sonoma County).

(4) Russian River main stem below the confluence of the East Branch Russian River (Mendocino and Sonoma Counties), Laguna de Santa Rosa, and Santa Rosa Creek.

Minimum Flow: 300 cfs at the gauging station located on the main stem Russian River near Guerneville (Sonoma County).

(5) The Napa River (Napa County) between Trancas Avenue in Napa and Oakville Cross Bridge near Yountville.

Minimum Flow: 15 cfs at the gauging station at the Oak Knoll Bridge on the main stem Napa River.

(c) South Central Coast Streams — Special Low Flow Closures: During December 1 through March 7, the following streams (subsections (c)(1) through (5)) will be closed to fishing when the department determines that stream flows are inadequate to provide fish passage for migrating steelhead trout and salmon. Closed streams will be reopened when the department determines flows are adequate for fish passage.

(1) Pescadero Creek and all anadromous reaches of San Mateo Co. coastal streams normally open for fishing, from Elliot Creek through Milagro Creek, shall be closed to all fishing when the department determines that the Pescadero Creek flows are impeding fish passage. (U. S. G. S. gauging station is on Pescadero Creek.)

(2) Aptos and Soquel Creeks (Santa Cruz Co.) shall be closed to all fishing when the department determines that the Soquel Creek flows are impeding fish passage. (U. S. G. S. gauging station on Soquel Creek.)

(3) The Pajaro River and Uvas, Llagas, and Corralitos Creeks (Santa Cruz, Monterey, & Santa Clara Cos.) shall be closed to all fishing when the department determines that the Pajaro River flows are impeding fish passage. (U. S. G. S. gauging station on the lower Pajaro River.)

(4) The main stem of the Salinas River (Monterey Co.), below its confluence with the Arroyo Seco River, shall be closed to all fishing when the department determines that the flows are impeding fish passage (U. S. G. S. Spreckels gauging station on the Salinas River.)

(5) The Arroyo Seco River (Monterey Co.) shall be closed to all fishing when the department determines that the flows are impeding fish passage. (Flows to be evaluated at U. S. G. S. Spreckels gauging station on the Salinas River and the U. S. G. S. gauging station near Geenfield on the Arroyo Seco River.)

(6) The San Lorenzo River and all its tributaries, as well as all anadromous reaches of coastal streams normally open for fishing in Santa Cruz Co. from the San Lorenzo River north through Waddell Creek, shall be closed to all fishing when the department determines that the flow at the U.S.G.S. gauging station (#11160500) in the San Lorenzo River at Big Trees is less than 40 cfs.

(7) The Carmel River main stem, and the adjacent waters of San Jose, Gibson, Malpaso, and Soberanes Creeks that are west of Highway 1 (Monterey Co.), shall be closed to all fishing when the department determines that the flow at the U. S. G. S. gauging station near Carmel is less than 80 cfs.

(8) The Big Sur River main stem west of the Highway 1 bridge, all of Limekiln Creek and its tributaries, and the anadromous portions of all other Big Sur Coast streams west of Highway 1 in Monterey Co., from Granite Creek south to Salmon Creek, shall be closed to all fishing when the department determines that the flow at the U. S. G. S. gauging station on the Big Sur River is less than 40 cfs.

(9) The stream flow gauges referred to above in subsections (c)(6) through (8) will be checked on Tuesday and Friday of each week. The decision as to whether these rivers will be open or closed to fishing will take place only on Tuesday and Friday of each week. In the event that river flow differs later in the week, the fishing status for each specific river will not change until the day following the next scheduled reading.

(10) It shall be the responsibility of the angler to use the ~~telephone number~~ webpage designated in the sport fishing regulations booklet to obtain information on the status of any of the rivers or creeks listed above in subsections (c)(1) through (8).

~~THE NUMBER TO CALL FOR INFORMATION IS (831) 649–2886.~~Check the Department's regulations page at www.wildlife.ca.gov/regulations for Low-Flow Restrictions and information.

NOTE: Authority cited: Sections 200, 205, 265 and 270, Fish and Game Code. Reference: Sections 200, 205 and 265, Fish and Game Code.

Proposed Regulatory Language

Subsection (a) of Section 703, Title 14, CCR is amended to read:

§ 703. Miscellaneous Applications, Tags, Seals, Licenses, Permits, and Fees.

(a) Applications, Forms and Fees for January 1 through December 31 (Calendar Year).

… No changes to subsections (1) through (2)…

(3) Determination that a Transgenic Aquatic Animal is not Detrimental

(A) The applicant shall apply in the form of a letter, on letterhead if an entity, for a department determination that a transgenic aquatic animal is not detrimental in accordance with Section 1.92 and shall include all of the following:

1. The name, mailing address, telephone number(s), and e-mail address of the person seeking to import, possess, distribute, and sell the transgenic aquatic animal or of the principal contact person if an entity seeks to import, possess, distribute, and sell the transgenic aquatic animal.

2. A detailed analysis based on credible science containing:

a. The common and scientific names of the species for which an exemption is sought.

b. A description of the life history of the species.

c. A description of the method(s) by which the genome of the species has been deliberately altered, modified, or engineered.

d. The known or anticipated effects of the genetic alteration, modification or engineering of the species.

e. An analysis of the potential risk to native fish, wildlife, or plants posed by the presence of the transgenic aquatic animal within California.

f. A description of the applicant's proposed importation, possession, distribution, and sale of the transgenic aquatic animal within California.

3. Certification in the following language: I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject the application to rejection, or the department determination to revocation, and to civil and criminal penalties under the laws of the State of California.

a. The original signature of the person, or principal contact person if an entity, seeking the determination.

4. The applicant shall submit a separate application and nonrefundable fee of $4,790 per species of transgenic aquatic animal.

5. The applicant shall submit one paper copy, and an electronic copy (via email or other device as directed by department staff) containing all application materials, and the application fee, to the Fisheries Branch Chief at ~~830 S Street, Sacramento, CA 95811~~1010 Riverside Pkwy, West Sacramento, CA, 95605.

(B) Contents of the Department Determination

1. The department shall issue a determination in writing, based on the information provided by the applicant, and any other relevant credible scientific information in the possession of the department or submitted to the department.

2. The determination shall state whether:

a. The presence of the transgenic aquatic animal within California is detrimental and subject to regulation under Section 671 and subsection 671.1(a)(8); or,

b. The presence of the transgenic aquatic animal within California is not detrimental and poses no reasonably foreseeable risk to native fish, wildlife, or plants and is not subject to regulation under Section 671 and subsection 671.1(a)(8).

c. In making its determination, the department may impose reasonable conditions to ensure the proposed importation, possession, distribution, and sale of the transgenic aquatic animal within California is not detrimental to native fish, wildlife, or plants.

d. The department may revoke or change its determination at any time upon newly-obtained information or circumstances involving said animal's detrimental impacts.

3. If the department identifies deficiencies in the application, requiring additional time or further review, the department shall reject the application and provide written notification of the identified deficiencies in the application to the applicant. No additional fee is required if the application, with required information, is resubmitted within one year of receipt of the original application.

(C) Effect of Department Determination

1. Once it receives a determination from the department that the transgenic aquatic animal poses no reasonably foreseeable risk to native fish, wildlife, or plants, the applicant or its authorized agent may import, possess, distribute, and sell the animal within the state provided that both the applicant and its authorized agent possess and provide within three business days, upon request by the department, a copy of the department's determination.

2. Any wholesaler or retailer purchasing a transgenic aquatic animal from the applicant or its authorized agent may import, possess, distribute, and sell the animal provided that the wholesaler or retailer possesses and provides within three business days, upon request by the department, both a copy of the department's

determination and written documentation to demonstrate that the animal that the wholesaler or retailer purchased originated from the applicant or its authorized agent.

3. Individuals purchasing a transgenic aquatic animal that originated from the applicant, its authorized agent, or wholesalers or retailers as authorized by this section may possess the animal, without a copy of the department's determination or any other documentation, provided that the animal is maintained in a closed system and not placed in the waters of the state.

NOTE: Authority cited: Sections 713, 1002, 1002.5, 1050, 1055, 2118, 2120, 2122, 2150, 2150.2, 2157 and 5060, Fish and Game Code.

Reference: Sections 395, 396, 398, 713, 1002, 1002.5, 1050, 2116, 2116.5, 2117, 2118, 2120, 2125, 2150, 2150.2, 2150.4, 2151, 2157, 2190, 2193, 2271, 3005.5, 3007, 3503, 3503.5, 3511, 3513, 3950, 5060, 5061, 10500, 12000 and 12002, Fish and Game Code; and Title 50, Code of Federal Regulations, Parts 21.29 and 21.30.

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT (REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

DRAFT DOCUMENT

ECONOMIC IMPACT STATEMENT

DEPARTMENT NAME	CONTACT PERSON	EMAIL ADDRESS	TELEPHONE NUMBER
Fish and Gam Commission	David Thesell	fgc@fgc.ca.gov	916 902-9291
DESCRIPTIVE TITLE FROM NOTICE REGISTER OR FORM 400			NOTICE FILE NUMBER
Amend Sections 2.30, 5.00, 7.50, 703, and 8.00 Title.14, CCR, Re: Inland Sport Fishing Regulations Update			Z

A. ESTIMATED PRIVATE SECTOR COST IMPACTS *Include calculations and assumptions in the rulemaking record.*

1. Check the appropriate box(es) below to indicate whether this regulation:

- ☐ a. Impacts business and/or employees
- ☐ b. Impacts small businesses
- ☐ c. Impacts jobs or occupations
- ☐ d. Impacts California competitiveness
- ☐ e. Imposes reporting requirements
- ☐ f. Imposes prescriptive instead of performance
- ☐ g. Impacts individuals
- ☒ h. None of the above (Explain below):

No new private sector costs are necessarily incurred.

If any box in Items 1 a through g is checked, complete this Economic Impact Statement.
If box in Item 1.h. is checked, complete the Fiscal Impact Statement as appropriate.

2. The ______________________ estimates that the economic impact of this regulation (which includes the fiscal impact) is:
(Agency/Department)

- ☐ Below $10 million
- ☐ Between $10 and $25 million
- ☐ Between $25 and $50 million
- ☐ Over $50 million *[If the economic impact is over $50 million, agencies are required to submit a Standardized Regulatory Impact Assessment as specified in Government Code Section 11346.3(c)]*

3. Enter the total number of businesses impacted: ______________

Describe the types of businesses (Include nonprofits): ______________

Enter the number or percentage of total businesses impacted that are small businesses: ______________

4. Enter the number of businesses that will be created: ______________ eliminated: ______________

Explain: ______________

5. Indicate the geographic extent of impacts: ☐ Statewide

☐ Local or regional (List areas): ______________

6. Enter the number of jobs created: ______________ and eliminated: ______________

Describe the types of jobs or occupations impacted: ______________

7. Will the regulation affect the ability of California businesses to compete with other states by making it more costly to produce goods or services here? ☐ YES ☐ NO

If YES, explain briefly: ______________

DRAFT DOCUMENT

ECONOMIC IMPACT STATEMENT (CONTINUED)

B. ESTIMATED COSTS *Include calculations and assumptions in the rulemaking record.*

1. What are the total statewide dollar costs that businesses and individuals may incur to comply with this regulation over its lifetime? $ ____________

   a. Initial costs for a small business: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   b. Initial costs for a typical business: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   c. Initial costs for an individual: $ ____________ Annual ongoing costs: $ ____________ Years: ________

   d. Describe other economic costs that may occur: ____________

2. If multiple industries are impacted, enter the share of total costs for each industry: ____________

3. If the regulation imposes reporting requirements, enter the annual costs a typical business may incur to comply with these requirements. *Include the dollar costs to do programming, record keeping, reporting, and other paperwork, whether or not the paperwork must be submitted.* $ ____________

4. Will this regulation directly impact housing costs? ☐ YES ☐ NO

   If YES, enter the annual dollar cost per housing unit: $ ____________

   Number of units: ____________

5. Are there comparable Federal regulations? ☐ YES ☐ NO

   Explain the need for State regulation given the existence or absence of Federal regulations: ____________

   Enter any additional costs to businesses and/or individuals that may be due to State - Federal differences: $ ____________

C. ESTIMATED BENEFITS *Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. Briefly summarize the benefits of the regulation, which may include among others, the health and welfare of California residents, worker safety and the State's environment: ____________

2. Are the benefits the result of: ☐ specific statutory requirements, or ☐ goals developed by the agency based on broad statutory authority?

   Explain: ____________

3. What are the total statewide benefits from this regulation over its lifetime? $ ____________

4. Briefly describe any expansion of businesses currently doing business within the State of California that would result from this regulation: ____________

D. ALTERNATIVES TO THE REGULATION *Include calculations and assumptions in the rulemaking record. Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. List alternatives considered and describe them below. If no alternatives were considered, explain why not: ____________

ECONOMIC IMPACT STATEMENT (CONTINUED)

2. Summarize the total statewide costs and benefits from this regulation and each alternative considered:

Regulation: Benefit: $ ______ Cost: $ ______

Alternative 1: Benefit: $ ______ Cost: $ ______

Alternative 2: Benefit: $ ______ Cost: $ ______

3. Briefly discuss any quantification issues that are relevant to a comparison of estimated costs and benefits for this regulation or alternatives: ______

4. Rulemaking law requires agencies to consider performance standards as an alternative, if a regulation mandates the use of specific technologies or equipment, or prescribes specific actions or procedures. Were performance standards considered to lower compliance costs? ☐ YES ☐ NO

Explain: ______

E. MAJOR REGULATIONS *Include calculations and assumptions in the rulemaking record.*

California Environmental Protection Agency (Cal/EPA) boards, offices and departments are required to submit the following (per Health and Safety Code section 57005). Otherwise, skip to E4.

1. Will the estimated costs of this regulation to California business enterprises **exceed $10 million**? ☐ YES ☐ NO

If YES, complete E2. and E3
If NO, skip to E4

2. Briefly describe each alternative, or combination of alternatives, for which a cost-effectiveness analysis was performed:

Alternative 1: ______

Alternative 2: ______

(Attach additional pages for other alternatives)

3. For the regulation, and each alternative just described, enter the estimated total cost and overall cost-effectiveness ratio:

Regulation: Total Cost $ ______ Cost-effectiveness ratio: $ ______

Alternative 1: Total Cost $ ______ Cost-effectiveness ratio: $ ______

Alternative 2: Total Cost $ ______ Cost-effectiveness ratio: $ ______

4. Will the regulation subject to OAL review have an estimated economic impact to business enterprises and individuals located in or doing business in California exceeding $50 million in any 12-month period between the date the major regulation is estimated to be filed with the Secretary of State through12 months after the major regulation is estimated to be fully implemented?

☐ YES ☒ NO

If YES, agencies are required to submit a Standardized Regulatory Impact Assessment (SRIA) as specified in Government Code Section 11346.3(c) and to include the SRIA in the Initial Statement of Reasons.

5. Briefly describe the following:

The increase or decrease of investment in the State: ______

The incentive for innovation in products, materials or processes: ______

The benefits of the regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, and the state's environment and quality of life, among any other benefits identified by the agency: ______

DRAFT DOCUMENT

FISCAL IMPACT STATEMENT

A. FISCAL EFFECT ON LOCAL GOVERNMENT *Indicate appropriate boxes 1 through 6 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year which are reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________

☐ a. Funding provided in ______________

Budget Act of ______________ or Chapter ______________ , Statutes of ______________

☐ b. Funding will be requested in the Governor's Budget Act of ______________

Fiscal Year: ______________

☐ 2. Additional expenditures in the current State Fiscal Year which are NOT reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________

Check reason(s) this regulation is not reimbursable and provide the appropriate information:

☐ a. Implements the Federal mandate contained in ______________

☐ b. Implements the court mandate set forth by the ______________ Court.

Case of: ______________ vs. ______________

☐ c. Implements a mandate of the people of this State expressed in their approval of Proposition No. ______________

Date of Election: ______________

☐ d. Issued only in response to a specific request from affected local entity(s).

Local entity(s) affected: ______________

☐ e. Will be fully financed from the fees, revenue, etc. from: ______________

Authorized by Section: ______________ of the ______________ Code;

☐ f. Provides for savings to each affected unit of local government which will, at a minimum, offset any additional costs to each;

☐ g. Creates, eliminates, or changes the penalty for a new crime or infraction contained in ______________

☐ 3. Annual Savings. (approximate)

$ ______________

☐ 4. No additional costs or savings. This regulation makes only technical, non-substantive or clarifying changes to current law regulations.

☒ 5. No fiscal impact exists. This regulation does not affect any local entity or program.

☐ 6. Other. Explain ______________

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT (REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

DRAFT DOCUMENT

FISCAL IMPACT STATEMENT (CONTINUED)

B. FISCAL EFFECT ON STATE GOVERNMENT *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ____________________

It is anticipated that State agencies will:

☐ a. Absorb these additional costs within their existing budgets and resources.

☐ b. Increase the currently authorized budget level for the ____________ Fiscal Year

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ____________________

☒ 3. No fiscal impact exists. This regulation does not affect any State agency or program.

☐ 4. Other. Explain ____________________

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ____________________

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ____________________

☒ 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.

☐ 4. Other. Explain ____________________

FISCAL OFFICER SIGNATURE	DATE

The signature attests that the agency has completed the STD. 399 according to the instructions in SAM sections 6601-6616, and understands the impacts of the proposed rulemaking. State boards, offices, or departments not under an Agency Secretary must have the form signed by the highest ranking official in the organization.

AGENCY SECRETARY	DATE

Finance approval and signature is required when SAM sections 6601-6616 require completion of Fiscal Impact Statement in the STD. 399.

DEPARTMENT OF FINANCE PROGRAM BUDGET MANAGER	DATE

ADDENDUM TO FORM STD. 399

Amend Sections 2.30, 5.00, 7.50, 8.00, and 703
Title 14, California Code of Regulations
Re: Inland Sport Fishing Regulations Update

This California Department of Fish and Wildlife (Department) proposal combines Department and public requests for changes to Title 14, sections 2.30, 5.00, 7.50, 8.00, and 703 for the 2024 sport fishing regulatory cycle. This proposal will reduce the daily bag limit for trout in Parker Lake and Willow Creek, reduce the minimum size limit for black bass in Lake Castaic, allow take of American Shad by spearfishing in the Valley District, simplify and streamline access to low-flow fishing information, amend the fishing boundary for Deep Creek, and update the Department's mailing address in Section 703. These proposed changes are needed to effectively manage California's sport fisheries, increase fishing opportunities, improve access to fishing information, reduce public confusion and improve regulatory enforcement.

Economic Impact Statement

A. Estimated Private Sector Costs Impacts

Answer 1: h. None of the above (Explain below):

The Commission is not aware of any private sector cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

Fiscal Impact Statement

A. Fiscal Effect on Local Government

Answer 5. No fiscal impact exists. This regulation does not affect any local entity or program. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution.

B. Fiscal Effect on State Government

Answer 3. No fiscal impact exists. This regulation does not affect any State agency or program. The Department program implementation and enforcement are projected to remain the same with a stable volume of fishing activity.

B. Fiscal Effect on Federal Funding of State Programs

Answer 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.

Photo Credit: CDFW

INLAND SPORT FISHING REGULATIONS

Updates for 2025

PRESENTATION TO THE FISH AND GAME COMMISSION

April 18, 2024 | Karen Mitchell

Fisheries Branch

Overview – Proposed Regulation Changes

1. Castaic Lake (Los Angeles County): Reduce Black Bass size limit from 15 inches to statewide standard of 12 inches
2. Parker Lake (Mono County): Change 5 fish bag limit to 2 fish bag limit, 14-inch minimum size limit, artificial lures
3. Deep Creek (San Bernardino County): Amend fishing boundary description for clarity
4. Spearfishing (Valley District): Include American Shad as a species that may be taken by spearfishing
5. Low-flow Fishing Restrictions: Information platform change from phone lines to web based (multiple counties)
6. Willow Creek (Alpine County): Petition for Regulation Change

Castaic Lake – Los Angeles County

- Reduce the 15-inch total length minimum size limit to the statewide standard of 12-inches
  - "Trophy" black bass fishery no longer exists
    - inadequate habitat and food competition
    - the black bass fishery has declined in condition and has stunted between 10-15 inches
  - Harvest is needed to reduce the population
  - Local angling groups have called for the regulation change
  - Reverting to the statewide regulation would create regulation simplification and expand angler opportunity

Parker Lake – Mono County

- Historically fast action Brook Trout fishery with trophy-sized Brown Trout
    - Brook Trout densities 10% of normal; Brown Trout size declined 50%
    - Current declines due in part to increased angler usage
- Reducing harvest of smaller fish will allow Brook Trout to repopulate and protect mid-sized Brown Trout
- Continue to allow anglers to harvest fish
    - Original proposal: open all year, catch and release, artificial lures with barbless hooks
    - Amended proposal: open all year, 2 fish bag limit, 14-inch minimum size limit, artificial lures

Deep Creek – San Bernardino County

- Amend the fishing boundary description for clarity purposes
  - Current: from headwaters at Little Green Valley to confluence of Willow Creek
    - Problem: Little Green Valley does not exist
  - Proposed: from below Green Valley Lake Dam to the confluence of Willow Creek
  - Necessity: to ensure anglers are clear on which area the regulations apply

Spearfishing – Valley District

- Allow spearfishing as a method of take for American Shad in the Valley District
- Clarify spearfishing boundaries in the Valley District
- Add language directing anglers to check their local city and/or county ordinances for speargun (firearm) restrictions

Low-Flow Information Platform Change

- Remove the low-flow closure phone lines and include instream closure information on the CDFW website
- 10 counties affected: Del Norte, Humboldt, Mendocino, Sonoma, Marin, Napa, San Mateo, Santa Cruz, Santa Clara, and Monterey

Platform Change Justification

- A single source of information will be more efficient for anglers
  - Regulations which state the streams, seasons, and relevant phone numbers are online
  - The phone line messages require the public to navigate a phone line and potentially listen to information that is not relevant to their needs
- Constituents have requested a web-based message

Willow Creek – Alpine County

- Proposal addresses Fish and Game Commission Petition No. 2022-13, received on August 5, 2022
- Area: upstream from the confluence with the West Fork Carson River to the main tributary of Willow Creek
- Current regulation: open all year, 5 trout bag limit, no gear restrictions
- Public proposal: open all year, 0 trout bag limit, artificial flies with barbless hooks only
- Purpose is to protect all species of trout in Willow Creek including Lahontan Cutthroat Trout

Willow Creek – CDFW Proposal and Justification

- **CDFW proposal: open all year, 0 trout bag limit, artificial lures with barbless hooks only**
  - Artificial flies are not inclusive to all angling groups
  - Small watershed and multiple exceptional droughts of past decade
  - Department supports action to ensure the fishery continues to be viable
  - Aligns with CDFW's mission to conserve and provide fishing opportunities for future generations

Timeline

- April 18, 2024 Commission Meeting – Request to go Notice
- June 20, 2024 Commission Meeting – Discussion hearing
- August 15, 2024 Commission Meeting – Adoption hearing
- January 1, 2025 – If approved, new regulations go into effect

Questions/Contact

Photo Credit: CDFW

Karen Mitchell

Senior Environmental Scientist (Specialist)

Fisheries Branch

Fisheries@wildlife.ca.gov

STAFF SUMMARY FOR OCTOBER 11-12, 2023

For background purposes only

9. WHITE STURGEON EMERGENCY REGULATION

Today's Item **Information ☐** **Action ☒**

Discuss and consider adopting emergency regulations concerning recreational take of white sturgeon to support recovery of sturgeon populations and to track fishing pressure and success.

Summary of Previous/Future Actions

- Wildlife Resources Committee (WRC) discussion and recommendation — September 19, 2023; WRC
- **Today's adoption hearing — October 11-12, 2023**

Background

White sturgeon is an anadromous fish species that resides primarily in the San Francisco Bay-Delta and migrates as adults into the major rivers of the Central Valley to spawn. White sturgeon are long lived, potentially in excess of 100 years, with most individuals reaching maturity by approximately 14 to 15 years. Mature white sturgeon spawn every 2 to 5 years. Successful recruitment to the adult population is uncommon, occurring approximately every s6to 7 years, and is highly correlated with above normal water years as measured by high mean daily Sacramento–San Joaquin River Delta outflow. The abundance of legal-sized white sturgeon in California has declined considerably since the 1980s, when abundance was estimated to be approximately 175,000 fish. In 2015, the Department estimated abundance in California at about 48,000 fish, and the Department's 2023 estimate was about 33,000 fish.

At present, recreational anglers can keep one white sturgeon per day, with a combined total of three per year, between 40 and 60 inches (fork length). The season is open year-round, with some limited regional and/or seasonal closures. Fishing pressure for white sturgeon, as measured by the number of fish harvested by anglers, has remained relatively stable; however, the number of fish caught and released has declined precipitously, indicating that fewer fish overall are being caught. The exploitation rate (i.e., the age-specific proportion of the population or biomass that is removed each year) of white sturgeon is estimated to be very high, ranging from 8 to 29.6% between 2007 and 2015. It has been suggested that the highest exploitation rate that a white sturgeon population can sustain is approximately 5 to 10%.

During July and August 2022, the San Francisco Bay region experienced a major harmful algal bloom (HAB) of *Heterosigma akashiwo* that resulted in significant mortality of fishes, including sturgeon. The resulting mortality has exacerbated what the Department believes to be an already unsustainable level of fishery exploitation of white sturgeon into a crisis situation.

Synopsis of Events

The Commission was first informed about the existence of an emergency through WRC. At the January 2023 WRC meeting at the request of the chair, the Department responded to an op-ed written by various sturgeon researchers in the academic field, calling on the Department to close the recreational white sturgeon fishery. The Department's response included a brief discussion of white sturgeon population declines, and the status of white sturgeon data being processed from various sources, including ongoing evaluation of impacts caused to the species by the summer of 2022 HAB, the possibility of future regulatory actions, data collection and modelling, and future stakeholder input. At the January meeting, the Department indicated that, based on the information available at the time, emergency action was not warranted, but that data was still being analyzed.

During the May 2023 WRC meeting, the Department outlined its previous and future plans for stakeholder engagement on the subject of potential white sturgeon regulation changes, stating its intent to develop a proposed regular rulemaking for Commission consideration that would change white sturgeon regulations for the 2025 calendar year, and that the Department was continuing to analyze data to determine the status of white sturgeon and appropriate management measures, including options for changes to sport fishing.

At the September 2023 WRC meeting, the Department presented new evidence on the white sturgeon population, the effects of the HAB, current and historical rates of sturgeon exploitation, and other information, all of which led the Department to conclude that an emergency situation exists. To protect the surviving population of white sturgeon and maintain a recreational fishery into the future, the Department stated that immediate steps are necessary to (1) stop angler-associated harvest of adult white sturgeon and (2) minimize harassment and handling on the spawning grounds so that adults can successfully spawn, and new individuals can recruit to the population.

Given this new information, WRC decided to recommend to the full Commission that it consider an emergency regulation at its next scheduled meeting, in October 2023. As a result of that WRC decision, Commission staff requested the Commission president add an agenda item to the October meeting to allow the Commission to consider emergency action.

Proposed Emergency Regulations

This proposed regulatory action amends sections 5.79, 5.80, 27.90 and 29.72, which describe report card and tagging requirements, seasons, and associated bag limits for white sturgeon recreational fishing in inland waters.

- Section 5.79: Removes language regarding white sturgeon harvest tags, as no harvest would be allowed under the proposed emergency regulations. Adds a requirement for anglers to report the length of any fish caught, to provide the Department with additional data for future management options. Adds language to instruct anglers to report additional sturgeon caught and released to provide data on fishing pressure and success.
- Section 5.80: Specifies white sturgeon fishing seasons from the west Carquinez Bridge east to the Highway 50 bridge on the Sacramento River, and above the Highway 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River; changes the fishing to catch-and-release only; and changes the daily bag limit to 0.
- Section 27.90: Specifies white sturgeon fishing seasons for the Carquinez Bridge area, which falls under the jurisdiction of marine fisheries; changes the fishing to catch-and-release only; and changes the daily bag limit to 0.
- Section 27.92: Updates language to a bag limit of 0 and specifies that white sturgeon is catch-and-release only in ocean waters.

Further details on the proposed changes are available in the emergency statement and proposed regulatory language (exhibits 4 and 5).

Significant Public Comments

1. An owner of a bait shop writes in opposition to the proposed emergency regulations, stating that the closure is not necessary and will have a dire effect on small businesses and the fishing industry (Exhibit 6).
2. A member of the public expresses concern that the urgency for the rulemaking is exaggerated. They state that the information provided is only from the last 4 years and that historical information from the past 80 years should also be considered. Lastly, they indicate that they are unaware of any successful catch-and-release fisheries on the West Coast, and are skeptical of the survey results that inquired if people would continue to fish without the option of harvest (Exhibit 7).

Recommendation

Commission staff: Adopt the emergency regulations amending sections 5.79, 5.80, 27.90, and 27.92 related to white sturgeon catch and release as recommended by the Department.

Committee: The Wildlife Resources Committee recommends the Commission adopt an emergency regulation regarding recreational take of white sturgeon.

Department: Adopt the emergency regulations as presented in the emergency statement in Exhibit 4 to pause all harvest of white sturgeon within the recreational fishery until new regulations can be developed that will limit exploitation to sustainable rates based on monitoring data.

Exhibits

1. Department presentation
2. Supplementary material from the Department, received October 4, 2023
3. Department memo, received September 22, 2023
4. Draft emergency statement and informative digest
5. Draft proposed regulatory language
6. Email from Leonard Butcher, received September 18, 2023
7. Email from Jacob Linard, received September 25, 2023

Motion

The Commission determines, pursuant to Section 399 of the California Fish and Game Code, that adopting these regulations is necessary for the immediate conservation, preservation, and protection of birds, mammals, fish, amphibians, or reptiles, including, but not limited to, their nests or eggs.

The Commission further determines, pursuant to Section 11346.1 of the California Government Code, that an emergency situation exists and finds the proposed regulations are necessary to address the emergency.

STAFF SUMMARY FOR OCTOBER 11-12, 2023
For background purposes only

Moved by ___________ and seconded by ___________ that the Commission adopts the emergency regulations amending sections 5.79, 5.80, 27.90 and 27.92 related to white sturgeon catch and release fishing regulations.

State of California
Department of Fish and Wildlife

M e m o r a n d u m

Original on File
Recevied April 8, 2024

Date: March 14, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Submission of Initial Statement of Reasons/Certificate of Compliance for the April 17-18, 2024 Fish and Game Commission meeting to Amend Sections 5.79, 5.80, 27.90 and 27.92, Title 14, California Code of Regulations, Re: White Sturgeon

Please find attached the Initial Statement of Reasons (for a Certificate of Compliance) to amend sections 5.79, 5.80, 27.90 and 27.92, Title 14, California Code of Regulations. The proposed changes to the White Sturgeon sport fishing regulations aim to continue the existing one fish annual bag limit, reduced size limit, per-day vessel limit, and fishing closures established by emergency regulatory action on October 13, 2023. The existing regulations are set to expire in November 2024, following two planned readoptions of the emergency regulations in April and August. It is anticipated that a standard rulemaking with long-term changes to the White Sturgeon fishery will be received by the Commission this summer. It is expected that the new long-term regulations would become effective January 2025. The proposed Certificate of Compliance action is necessary to protect the White Sturgeon population until a long-term regulation can be implemented.

If you have any questions or need additional information, please contact Jay Rowan, Chief, Fisheries Branch at fisheries@wildlife.ca.gov. The Department point of contact for this regulation should identify Statewide Sturgeon Coordinator, John Kelly. He can be reached at sturgeon@wildlife.ca.gov.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Jay Rowan, Branch Chief
Fisheries Branch
Wildlife and Fisheries Division
Department of Fish and Wildlife

Ona Alminas, Env. Program Manager
Regulations Unit
Wildlife and Fisheries Division
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David Thesell, Program Manager
Fish and Game Commission

Dan Kratville
Senior Environmental Scientist (Supervisor)
Fisheries Branch
Wildlife and Fisheries Division
Department of Fish and Wildlife

Robert Pelzman, Captain
Law Enforcement Division
Department of Fish and Wildlife

Anthony Cusato, Attorney
Office of General Counsel
Department of Fish and Wildlife

Chelle Temple-King, Regulatory Scientist
Regulations Unit
Wildlife and Fisheries Division
Department of Fish and Wildlife

John Kelly, Statewide Sturgeon Coordinator
Fisheries Branch
Wildlife and Fisheries Division
Department of Fish and Wildlife

Jenn Bacon, Analyst
Fish and Game Commission

Draft Document

State of California
Fish and Game Commission

Initial Statement of Reasons for Regulatory Action
Certificate of Compliance

Amend Sections 5.79, 5.80, 27.90, and 29.72,
Title 14, California Code of Regulations
Re: White Sturgeon Fishing

I. Date of Initial Statement of Reasons:

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: April 18, 2024 Location: San Jose

(b) Discussion Hearing:

Date: June 20, 2024 Location: Mammoth Lakes

(c) Adoption Hearing:

Date: August 15, 2024 Location: Fortuna

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR). Commission refers to the California Fish and Game Commission unless otherwise specified. Department and CDFW both refer to the California Department of Fish and Wildlife unless otherwise specified.

The proposed changes to the White Sturgeon (*Acipenser transmontanus*) sport fishing regulations aim to continue the one fish annual bag limit, reduced size limit, per-day vessel limit, and fishing closures established by emergency regulatory action on October 13, 2023 (Office of Administrative Law file #2023-1106-01E). The existing emergency regulations are set to expire in November 2024, following planned readoptions of the emergency regulations in April and August. It is anticipated that a standard rulemaking with long-term changes to the White Sturgeon fishery will be received by the Commission in summer 2024. The proposed amendments in this current rulemaking are necessary to protect the White Sturgeon population until the long-term regulation can be implemented.

Background

White Sturgeon Sport Fishing

White Sturgeon are an anadromous species of fish that reside primarily in the San Francisco Bay Delta (SF Bay) and migrate as adults into the major rivers of the Central Valley to spawn. Most spawning occurs in the Sacramento River approximately between

Verona and Colusa (Schaffter 1997), with a lesser amount of spawning on the lower San Joaquin River (Jackson et al. 2015). Some additional spawning may occur in tributaries such as the Feather, Bear, and Yuba rivers. White Surgeon are long lived, potentially in excess of 100 years, with most reaching maturity by approximately 19 years, spawning every two to five years once mature (Chapman et al. 1996; Hildebrand et al. 2016). Successful recruitment to the adult population is uncommon, occurring approximately every six to seven years, highly correlated with above normal water years as measured by high mean daily Delta outflow (CDFW 2023; Fish 2010). The abundance of legal-sized White Sturgeon has declined considerably since the 1980s, when abundance was estimated to be approximately 175,000 fish (CDFW 2023; Danos et al. 2019). In 2015, the Department estimated abundance at about 48,000 fish (Danos et al. 2019), and the most recent estimate was about 33,000 fish (CDFW 2023).

Until the start of the emergency action on November 16, 2023, recreational anglers were permitted to keep one White Sturgeon per day, and a combined total of three per year, between 40 and 60 in. fork length (FL), meaning the measurement of the fish from the front of its head to the fork in its tail. The season was open year-round, with some limited regional and/or seasonal closures. As of November 16, 2023, the emergency action a) reduced the annual bag limit for White Sturgeon from three to one fish, b) reduced the legal-sized slot limit from 40-60" FL to 42-48" FL, c) placed a limit of two fish per day per boat, and d) closed White Sturgeon fishing in the migrating and spawning reaches of the Sacramento and San Joaquin rivers from January 1 through May 31.

Fishing pressure for White Sturgeon has remained stable at roughly 40,000 to 45,000 anglers per year since 2013 when fees were first charged for the Sturgeon Fishing Report Card (Card). Based on Card returns, the number of fish harvested by anglers has remained relatively stable. However, the number of fish caught and released has declined precipitously, indicating that fewer fish overall are being caught. According to Card data, in 2021, anglers kept 46% of landed fish (Hause et al. 2021). The majority of anglers that harvest fish keep only one per year (75%), with only about 5% of anglers that harvest (1% of Card-holders) keeping the full three-fish limit. Exploitation rate of White Sturgeon is estimated to be very high, ranging from 8 to 29.6% between 2007 and 2015 (Blackburn et al. 2019) and averaging 8.1% in the years since then (CDFW 2023). It is suggested that the highest exploitation rate that a sturgeon population can sustain is approximately 5 to 10% (Beamesderfer and Farr 1997) and that does not account for other anthropogenic sources of mortality such as habitat loss, altered hydrology, or contaminants. For comparison, Washington and Oregon use 3.8% as a target for management in areas that permit harvest.

During July and August 2022, the San Francisco Bay region experienced a major Harmful Algal Bloom (HAB) of *Heterosigma akashiwo* that resulted in significant mortality of fishes, including sturgeon. The Department recorded over 850 sturgeon carcasses, the majority legal-sized or larger and within the age range of the core spawning population (CDFW 2023). The number of carcasses observed during the HAB was 62% of the number harvested by anglers in 2022. Based on carcass studies and fish kills of other species of sturgeon, it is thought that only a small percentage of the fish killed floated long enough to be detected (Fox et al. 2020). While the absolute magnitude of the HAB’s impact on the

White Sturgeon population is unknown, it is thought to be quite significant. In addition, in July and August of 2023, a HAB of the same species was detected in San Francisco Bay and at least 15 white sturgeon carcasses were reported, though the total impacts are unknown.

The fish kill resulting from the HAB exacerbated what the Department believed to be an already unsustainable level of fishery exploitation of White Sturgeon into a crisis situation. In order to protect the surviving population of White Sturgeon and maintain a recreational fishery into the future, immediate steps were necessary to reduce angler associated harvest of adult White Sturgeon and to minimize harassment and handling on the spawning grounds so that these adults can spawn successfully and new individuals can recruit to the population. The Department recommended that all harvest of White Sturgeon within the recreational fishery be paused starting January 2024, until new regulations could be developed to limit exploitation to sustainable rates based on monitoring, which was opposed by the recreational sturgeon fishing industry. At its October 11, 2023 meeting, the Commission voted in support of an emergency action that limited harvest via reductions in the bag and legal slot limits, and institution of per-day vessel limits and seasonal and geographic closures of migrating and spawning habitat. This was intended to protect the existing population in the short term while allowing time for the Department to develop new long-term management measures for the future population.

Proposed Regulations

This proposed regulatory action seeks to continue amendments to sections 5.79, 5.80, 27.90, and 27.92, Title 14, CCR, which describe report card and tagging requirements, and seasons and bag limits for White Sturgeon sport fishing in inland and ocean waters. The proposed changes aim to continue the existing one fish annual bag limit, reduced size limit, per-day vessel limit, and fishing closures established by emergency regulatory action on October 13, 2023.

Subsection 5.79, White Sturgeon Report Card and Tagging Requirements for Inland Waters

The proposed regulations amend White Sturgeon report card and tagging requirements for inland waters in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (b): Edit text to reflect that report cards will come with only one tag rather than three. Add subsections (7) and (8) to clarify when anglers can continue to fish catch and release after harvesting a fish. Anglers will not be permitted to fish catch and release the same day they harvest a fish in order to prevent 1) take over the daily possession limit and 2) “high grading” (holding a fish in captivity while continuing to fish in the hopes of catching a larger individual).
- Subsection (c)(1): Add a requirement for anglers to report length of fish caught and released. This is necessary to provide more data availability on the nature of size to inform future management options related to age.

- Subsection (c)(2): Remove the current language that tells anglers if all lines on the card are filled, any additional sturgeon caught and released do not need to be recorded, and replace with language specifying that anglers may report additional sturgeon caught and released on the back of the card. This is necessary in order to track fishing pressure and success. It is valuable to track all fish caught by anglers and this should not be restricted simply by the size of the printed card. This type of data allows the Department to form a better understanding of the fishery as it plans long-term regulations for the fishery.

Section 5.80, White Sturgeon

The proposed regulations amend the White Sturgeon open season and daily and annual bag limit in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (a): From the west Carquinez Bridge east to the Highway 50 bridge on the Sacramento River and the Interstate 5 bridge on the San Joaquin River, the fishing season will remain open all year. Above the Highway 50 bridge on the Sacramento River and the Interstate 5 bridge on the San Joaquin River, including all tributaries of both rivers, fishing will be allowed from June 1 through December 31 and all fishing for sturgeon will be unlawful from January 1 to May 31. This is necessary to maintain recreational fishing, which has economic and cultural benefits, while preventing additional mortality of the impacted White Sturgeon population and minimizing harassment and handling of migrating and spawning individuals. White Sturgeon are known to handle catch and release fishing with minimal adverse impacts except during migration and spawning season when additional stress of catch can cause fish to abort spawning activities.
- Subsection (b), now (b) and (c): Divide this subsection so there are individual subsections for daily and annual limits. Proposed subsection (b) specifies the daily limit and provides unambiguous clarification of when catch and release angling is permitted. Proposed subsection (c) changes the annual bag limit of “three fish per year statewide” to “one fish per calendar year statewide”. This is necessary to reduce harvest of White Sturgeon in inland waters to ensure protection of the population impacted by the HAB-induced fish kill and provide protection during migration and spawning.
- Add subsection (d): Add a daily vessel maximum limit of two fish per day per vessel, regardless of how many anglers are on board. This will help reduce the daily amount of harvest associated with multi-angler vessels, both private and professional, and should contribute to less overall harvest of the adult population.
- Subsection (c), now (e): Change the minimum legal size from 40 to 42 in. fork length and the maximum size from 60 to 48 in. fork length. Reducing the slot limit to target a lower size range of adults is expected to reduce overall harvest and provide more protection of the larger, most reproductively valuable fish in the population.

- Subsections (d) through (j) will need to be re-lettered as subsections (f) through (l) to account for the splitting of subsection (b) and the addition of subsection (d) daily vessel maximum harvest.

Section 27.90, White Sturgeon

These regulations refer to areas west of the Carquinez Bridge, which fall under the jurisdiction of marine fisheries. The proposed regulations amend the White Sturgeon open season and daily and annual bag limit in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (a): West of the Carquinez Bridge, angling will be allowed all year, except as described in Section 27.95. This note has been added to explicitly draw attention the existing seasonal closure in San Francisco Bay.
- Subsection (b), now (b) and (c): Divide this subsection so there are individual subsections for daily and annual limits. Proposed subsection (b) specifies the daily limit and provides unambiguous clarification of when catch and release angling is permitted. Proposed subsection (c) changes the annual bag limit of “three fish per year statewide” to “one fish per calendar year statewide.” This is necessary to reduce harvest of White Sturgeon in marine waters to ensure protection of the population impacted by the HAB-induced fish kill and provide protection during migration and spawning.
- Add subsection (d): Add a daily vessel maximum limit of two fish per day per vessel, regardless of how many anglersl a are on board. This will help reduce the daily amount of harvest associated with multi-angler vessels, both private and professional, and should contribute to less overall harvest of the adult population.
- Subsection (c), now (e): Change the minimum legal size from 40 to 42 in. fork length and the maximum size from 60 to 48 in. fork length. Reducing the slot limit to target a lower size range of adults is expected to reduce overall harvest and provide more protection of the larger, most reproductively valuable fish in the population.
- Subsections (d) through (h) will need to be re-lettered as subsections (f) through (j) to account for the splitting of subsection (b) and the addition of subsection (d) daily vessel maximum harvest.

Subsection 27.92, White Sturgeon Report Card and Tagging Requirements for Ocean Waters

The proposed regulations amend White Sturgeon report card and tagging requirements for ocean waters in the following subsections:

- All subsections: White Sturgeon has been capitalized for consistency throughout the regulation.
- Subsection (b): Edit text to reflect that report cards will come with only one tag rather than three. Add subsections (7) and (8) to clarify when anglers can continue to fish catch and release after harvesting a fish. Anglers will not be permitted to fish catch and release the same day they harvest a fish in order to prevent 1) take over the

daily possession limit and 2) “high grading” (holding a fish in captivity while continuing to fish in the hopes of catching a larger individual).

- Subsection (c)(1): Add a requirement for anglers to report length of caught fish to provide more data availability to inform future management options.
- Subsection (c)(2): Remove the current language that tells anglers if all lines on the card are filled any additional sturgeon caught and released do not need to be recorded and replace with language specifying that anglers may report additional sturgeon caught and released on the back of the card. This is necessary in order to track fishing pressure and success. It is valuable to track all fish caught by anglers and this should not be restricted simply by the size of the printed card. This type of data allows the Department to form a better understanding of the fishery as we plan long-term regulations for the fishery.

(b) Goals and Benefits of the Regulation

These harvest restrictions will protect the remaining population while new long-term regulations are developed, providing opportunity for surviving fish to spawn unmolested.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Section 5.79

Authority cited: Sections 200, 205, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

Section 5.80

Authority cited: Sections 200, 205, 265, 270, 275, 315 and 399, Fish and Game Code.
Reference: Sections 110, 200 and 205, Fish and Game Code.

(note: Sections 270 and 315 were added to the authority with this action to allow for Commission consideration for actions needed to manage the White Sturgeon fishery.)

Section 27.90

Authority cited: Sections 200, 205, 265, 275 and 399, Fish and Game Code.
Reference: Sections 110, 200, and 205, Fish and Game Code.

Section 27.92

Authority cited: Sections 200, 205, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

(d) Specific Technology or Equipment Required by Regulatory Change: None

(e) Identification of Reports or Documents Supporting Regulation Change

California Department of Fish and Wildlife (CDFW). 2023. White Sturgeon 2023 Emergency Regulation Change: Supporting Material. California Department of Fish and Wildlife, Fisheries Branch, West Sacramento, California.

Danos, A., J. DuBois, R. Baxter, J. T. Kelly, and M. L. Gingras. 2019. White Sturgeon, Acipenser transmontanus, Enhanced Status Report. California Department of Fish and Wildlife. https://marinespecies.wildlife.ca.gov/white-sturgeon/

Hause, C. L., C. Parker, D. Kratville, D. Stompe, J. A. Hobbs, and J. T. Kelly. 2023. Sturgeon Fishing Report Card: 2022 Summary Data Report. California Department of Fish and Wildlife, West Sacramento, California. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213586

Hause, C. L., C. Parker, D. Kratville, D. Stompe, J. A. Hobbs, and J. T. Kelly. 2022. Sturgeon Fishing Report Card: 2021 Summary Data Report. California Department of Fish and Wildlife, West Sacramento, California. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=202750

(f) Documents Providing Background Information

Beamesderfer, R. C. P., and R. A. Farr. 1997. Alternatives for the protection and restoration of sturgeons and their habitat. Environmental Biology of Fishes 48:407–417.

Blackburn, S. E., M. L. Gingras, J. DuBois, Z. J. Jackson, and M. C. Quist. 2019. Population Dynamics and Evaluation of Management Scenarios for White Sturgeon in the Sacramento–San Joaquin River Basin. North American Journal of Fisheries Management 39(5):896–912.

Chapman, F. A., J. P. Van Eenennaam, and S. I. Doroshov. 1996. The reproductive condition of white sturgeon, Acipenser transmontanus, in San Francisco Bay, California. Fishery Bulletin 94:628–634.

Fish, M. A. 2010. White Sturgeon Year-Class Index for the San Francisco Estuary and its Relation to Delta Outflow. IEP Newsletter 23(2):80–84.

Fox, D. A., E. A. Hale, and J. A. Sweka. 2020. Examination of Atlantic Sturgeon Vessel Strikes in the Delaware River Estuary: Final Report. NOAA-NMFS Award No. NA16NMF4720357.

Halvorson, L. J., B. J. Cady, K. M. Kappenman, B. W. James, and M. A. H. Webb. 2018. Observations of handling trauma of Columbia River adult white sturgeon, Acipenser transmontanus Richardson, 1836, to assess spawning sanctuary success. Journal of Applied Ichthyology 34(2):390–397.

Hildebrand, L. R., A. Drauch Schreier, K. Lepla, S. O. McAdam, J. McLellan, M. J. Parsley, V. L. Paragamian, and S. P. Young. 2016. Status of White Sturgeon (Acipenser transmontanus Richardson, 1863) throughout the species range, threats to survival, and prognosis for the future. Journal of Applied Ichthyology 32:261–312.

Jackson, Z. J., J. J. Gruber, and J. P. Van Eenennaam. 2015. White Sturgeon Spawning in the San Joaquin River, California, and Effects of Water Management. Journal of Fish and Wildlife Management 7(1):171–180.

Lamansky, J. A., K. A. Meyer, J. M. DuPont, B. J. Bowersox, B. Bentz, and K. B. Lepla. 2018. Deep hooking, landing success and gear loss using inline and offset circle and J hooks when bait fishing for white sturgeon. Fisheries Management and Ecology 25(2):100–106.

Schaffter, R. G. 1997. White sturgeon spawning migrations and location of spawning habitat in the Sacramento River, California. California Fish and Game 83(1):1–20.

(g) Public Discussions of Proposed Regulations Prior to Notice Publication

Wildlife Resources Committee meeting, September 19, 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives to a regulatory change were identified by or brought to the attention of Commission staff that would have the same desired effect. At the October 11, 2023 Commission meeting, the Department recommended that all harvest of White Sturgeon within the recreational fishery be paused until new regulations could be developed to limit exploitation to sustainable rates based on monitoring, which was opposed by the recreational sturgeon fishing industry. Following a discussion between Department staff and sturgeon fishing industry representatives, the Commission voted in support of an emergency action that limited harvest via reductions in the bag and legal slot limits and instituted per-day vessel limits and seasonal and geographic closures of migrating and spawning habitat.

(b) No Change Alternative

A delay in prompt action to amend the regulations for White Sturgeon puts the species at risk. Under current environmental and management conditions, the White Sturgeon population cannot handle the current rate of exploitation and is not sustainable. The fish kill resulting from the 2022 HAB exacerbated what the Department believes to be an already unsustainable level of fishery exploitation of White Sturgeon. In order to protect the surviving population of White Sturgeon and maintain a recreational fishery into the future, it is necessary to reduce angler associated harvest of adult White Sturgeon and to minimize harassment and handling on the spawning grounds so that these adults can spawn successfully, and new individuals can recruit to the population.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. A bag limit maintains the existing economic climate because the reduction is not significant enough to alter fishing behavior beyond reducing daily harvest.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate any impacts on the creation or elimination of jobs, the creation of new business, the elimination of existing businesses or the expansion of businesses in California. This proposed action should allow for ongoing fishing activity similar to current and historical levels which would not affect the demand for jobs or the demand for goods and services.The Commission does not anticipate any benefits to the health and welfare of California residents, or worker safety. The Commission anticipates benefits to the State's environment by sustainably managing California's sportfishing resources.

(c) Cost Impacts on a Representative Private Person or Business

The Department is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. No change in fees, nor gear or equipment requirements are introduced for the recreational White Sturgeon fishery.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State:

No costs or savings to state agencies or costs/savings in federal funding to the state are anticipated. The Department's existing level of monitoring and enforcement activities is expected to be unchanged by the proposed regulation. However, the Department anticipates a continuation of the reduction in White Sturgeon Report Cards sales revenue since the emergency had been implemented. Card sales revenue losses are estimated to be about $20,000 in the 2024 license year.

(e) Nondiscretionary Costs/Savings to Local Agencies: None

(f) Programs Mandated on Local Agencies or School Districts: None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None

(h) Effect on Housing Costs: None

VII. Economic Impact Assessment

The proposed rulemaking would make the emergency White Sturgeon fishing regulations permanent. This is necessary to maintain current and future recreational fishing's economic and cultural benefits, while preventing additional mortality of the impacted White Sturgeon population and minimizing harassment of spawning individuals.

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate any impacts on the creation or elimination of jobs within the state because this proposed action should allow for ongoing fishing activity similar to current and historical levels which would not affect the demand for jobs.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate any impacts on the creation of new business or the elimination of existing businesses within the state because this proposed action should allow for ongoing fishing activity similar to current and historical levels which would not affect the demand for goods and services related to White Sturgeon fishing within the state.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate any impacts on the expansion of businesses in California because this action will not affect the demand for goods and services related to White Sturgeon fishing within the state.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

The Commission does not anticipate impacts on the health and welfare of California residents.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate any impacts to worker safety because the proposed regulation does not impact working conditions.

(f) Benefits of the Regulation to the State's Environment

The Commission anticipates benefits to the state's environment through this regulatory action to make near-term changes directed at reducing exploitation rate and protecting reproduction of the species until more updated management actions for the fishery are enacted that will adequately protect the remaining White Sturgeon population in the long-term. Based on fishery data, the White Sturgeon population was already overexploited under current regulations, and updated regulations were needed and are being considered.

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

White Sturgeon are an anadromous species of fish that reside primarily in the San Francisco Bay Delta (SF Bay) and migrate as adults into the major rivers of the Central Valley to spawn. Most spawning occurs in the Sacramento River approximately between Verona and Colusa (Schaffter 1997), with a lesser amount of spawning on the lower San Joaquin River (Jackson et al. 2015). Some additional spawning may occur in tributaries such as the Feather, Bear, and Yuba rivers. White Surgeon are long lived, potentially in excess of 100 years, with most reaching maturity by approximately 19 years, spawning every two to five years once mature (Chapman et al. 1996; Hildebrand et al. 2016). Successful recruitment to the adult population is uncommon, occurring approximately every six to seven years, highly correlated with above normal water years as measured by high mean daily Delta outflow (CDFW 2023; Fish 2010). The abundance of legal-sized White Sturgeon has declined considerably since the 1980s, when abundance was estimated to be approximately 175,000 fish (CDFW 2023; Danos et al. 2019). In 2015, the Department estimated abundance at about 48,000 fish (Danos et al. 2019), and the most recent estimate was about 33,000 fish (CDFW 2023).

Until the start of the emergency action on November 16, 2023, recreational anglers were permitted to keep one White Sturgeon per day, and a combined total of three per year, between 40 and 60 in. fork length (FL), meaning the measurement of the fish from the front of its head to the fork in its tail. The season was open year-round, with some limited regional and/or seasonal closures. As of November 16, 2023, the emergency action a) reduced the annual bag limit for White Sturgeon from three to one fish, b) reduced the legal-sized slot limit from 40-60" FL to 42-48" FL, c) placed a limit of two fish per day per boat, and d) closed White Sturgeon fishing in the migrating and spawning reaches of the Sacramento and San Joaquin rivers from January 1 through May 31.

Fishing pressure for White Sturgeon has remained stable at roughly 40,000 to 45,000 anglers per year since 2013 when fees were first charged for the Sturgeon Fishing Report Card (Card). Based on Card returns, the number of fish harvested by anglers has remained relatively stable. However, the number of fish caught and released has declined precipitously, indicating that fewer fish overall are being caught. According to Card data, in 2021, anglers kept 46% of landed fish (Hause et al. 2021). The majority of anglers that harvest fish keep only one a year (75%), with only about 5% of anglers that harvest (1% of Card-holders) keeping the full three-fish limit. Exploitation rate of White Sturgeon is estimated to be very high, ranging from 8 to 29.6% between 2007 and 2015 (Blackburn et al. 2019) and averaging 8.1% in the years since then (CDFW 2023). It is suggested that the highest exploitation rate that a sturgeon population can sustain is approximately 5 to 10% (Beamesderfer and Farr 1997) and that does not account for other anthropogenic sources of mortality such as habitat loss, altered hydrology, or contaminants. For comparison, Washington and Oregon use 3.8% as a target for management in areas that permit harvest.

During July and August 2022, the San Francisco Bay region experienced a major Harmful Algal Bloom (HAB) of *Heterosigma akashiwo* that resulted in significant mortality of fishes, including sturgeon. The Department recorded over 850 sturgeon carcasses, the majority legal-sized or larger and within the age range of the core spawning population (CDFW 2023). The number of carcasses observed during the HAB was 62% of the number harvested by anglers in 2022. Based on carcass studies and fish kills of other species of sturgeon, it is thought that only a small percentage of the fish killed floated long enough to be detected (Fox et al. 2020). While the absolute magnitude of the HAB's impact on the White Sturgeon population is unknown, it is thought to be quite significant. In addition, in July and August of 2023, a HAB of the same species was detected in San Francisco Bay and at least 15 white sturgeon carcasses were reported, though the total impacts are unknown.

The fish kill resulting from the HAB exacerbated what the Department believed to be an already unsustainable level of fishery exploitation of White Sturgeon into a crisis situation. In order to protect the surviving population of White Sturgeon and maintain a recreational fishery into the future, immediate steps were necessary to reduce angler associated harvest of adult White Sturgeon and to minimize harassment and handling on the spawning grounds so that these adults can spawn successfully and new individuals can recruit to the population. The Department recommended that all harvest of White Sturgeon within the recreational fishery be paused starting January 2024, until new regulations could be developed to limit exploitation to sustainable rates based on monitoring, which was opposed by the recreational sturgeon fishing industry.

At its October 11, 2023 meeting, the Commission voted in support of an emergency action that limited harvest via reductions in the bag and legal slot limits, and institution of per-day vessel limits and seasonal and geographic closures of migrating and spawning habitat. This was intended to protect the existing population in the short term while allowing time for the Department to develop new long-term management measures for the future population. The proposed subject standard rulemaking would continue the existing one fish annual bag limit, reduced size limit, per-day vessel limit, and fishing closures established by emergency regulatory action on October 13, 2023.

Benefit of the Regulations:

The Commission anticipates benefits to the state's environment through this regulatory action to make near-term the emergency action directed at reducing exploitation rate and protecting reproduction of the species is necessary until more updated management actions for the fishery are enacted that will adequately protect the remaining White Sturgeon population in the long-term. Based on fishery data, the White Sturgeon population was already overexploited under current regulations, and updated regulations were needed and are being considered.

Consistency and Compatibility with Existing Regulations:

Article IV, Section 20 of the State Constitution specifies that the Legislature may delegate to Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to regulate sport fishing in waters of the state (Fish and Game Code sections 200, 205, and 315). The Commission has reviewed its own regulations and finds that the proposed regulations are consistent with other recreational fishing regulations in Title 14, CCR, and therefore finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the California Code of Regulations and finds no other state agency regulations pertaining to temporarily prohibiting harvest of White Sturgeon due to population decline.

Proposed Regulatory Language

Sections 5.79, Title 14, CCR, is amended to read as follows:

§ 5.79. White Sturgeon Report Card and Tagging Requirements for Inland Waters(FG 683, See Section 701).

(a) Sturgeon Fishing Report Card Required. All anglers must have a valid Sturgeon Fishing Report Card in their possession while fishing for or taking W~~w~~hite S~~s~~turgeon. Cardholders must complete and return the card pursuant to regulations in this Section and in Section 1.74.

(b) Tagging and Recording Requirements for Retained Fish. A Sturgeon Fishing Report Card includes a detachable ~~tags~~tag that shall be used to tag any W~~w~~hite S~~s~~turgeon that is taken and retained in the sport fishery. Any W~~w~~hite S~~s~~turgeon possessed by any person shall be tagged.

(1) Upon taking and retaining a W~~w~~hite S~~s~~turgeon, the cardholder shall immediately record the following information:

(A) The fishing location, time of catch and length of the fish shall be recorded legibly and permanently in the appropriate spaces on the tag. The cardholder shall immediately and completely punch out the date of catch (month and day) on the sturgeon tag. ~~Tags shall be used in sequential order.~~

(B) The month, day, fishing location and length of the fish shall be recorded in the appropriate space~~s~~ on the Sturgeon Fishing Report Card ~~which corresponds to the number on the tag~~.

(2) Immediately after recording the information above, the cardholder shall remove and completely detach the tag from the card and affix it to the W~~w~~hite S~~s~~turgeon. Cardholders shall not wait until completion of fishing activity to tag any W~~w~~hite S~~s~~turgeon in possession.

(3) The tag shall be securely fastened to the fish. To affix the tag, a "zip tie", string, line or other suitable material shall be passed through the tag at the location specified on the sturgeon tag and attached to the fish.

(4) ~~Tags~~The tag shall not be removed from the report card until immediately prior to affixing to a W~~w~~hite S~~s~~turgeon. Any tag~~s~~ detached from the report card and not affixed to a W~~w~~hite S~~s~~turgeon shall be considered used and therefore invalid. No person shall possess any used or otherwise invalid sturgeon tags.

(5) Records of Prior Activity. The tag ~~All tags~~ must be accounted for at all times by entry of a record on the Sturgeon Fishing Report Card ~~corresponding to all tags that are not in the cardholder's possession~~. Any tag that was lost or destroyed shall be recorded as such on the corresponding line on the Sturgeon Fishing Report Card.

(6) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(7) After retaining and tagging a White Sturgeon, a cardholder shall not continue to fish catch and release for White Sturgeon on the same day.

(8) Cardholders that have retained and tagged a White Sturgeon are permitted to catch and release White Sturgeon starting on the day after the tag was used.

(c) Reporting Requirements for Released Fish.

(1) Whenever the cardholder catches and releases a sturgeon, the cardholder shall immediately record the month, day, location code, length, and species of sturgeon.

(2) If all lines in the "sturgeon released" field of the report card are filled, any additional sturgeon caught and released ~~need not be recorded on the card~~may be recorded on the back of the card.

(3) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(d) Sturgeon tags must be left affixed to the fish in place, including while stored at a residence or non-transient location, until the fish is processed for immediate consumption.

(e) The annual fee for the Sturgeon Fishing Report Card is specified in Section 701(c).

NOTE: Authority cited: Sections 200, 205~~ and 265~~, 265 and 399, Fish and Game Code.
Reference: Sections 200, 205 and 265, Fish and Game Code.

Proposed Regulatory Language

Section 5.80, Title 14, CCR, is amended to read as follows:

§ 5.80. White Sturgeon.

(a) Open season: ~~All year, except for closures listed under special regulations.~~

(1) All year: from the west Carquinez Bridge east to the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River.

(2) From June 1 through December 31: above the Hwy 50 bridge on the Sacramento River and the I-5 bridge on the San Joaquin River, including all tributaries of both rivers. From January 1 through May 31: it is unlawful to take White Sturgeon.

~~(b) Daily and annual bag limit: One fish per day. Three fish per year statewide.~~

(b) Daily limit: One fish per day. After harvesting a White Sturgeon, anglers shall not continue to catch and release White Sturgeon on the same day. Anglers that have retained and tagged a fish are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.

(c) Annual bag limit: One fish per calendar year statewide.

(d) Daily vessel maximum harvest: All persons aboard a vessel may be cited for violation of a daily vessel maximum harvest limit. No more than two White Sturgeon may be harvested per day on a vessel, regardless of the number of anglers on board. Anglers must have in their possession a report card with a valid tag in order to retain a White Sturgeon. When the daily vessel maximum harvest is reached, only anglers that have not tagged a White Sturgeon that day may continue to fish catch and release for White Sturgeon.

(~~c~~e) Size limit: No fish less than ~~40~~42 inches fork length or greater than ~~60~~48 inchesfork length may be taken or possessed.

(~~d~~f) Methods of take: Only one single point, single shank, barbless hook may be used on a line when taking sturgeon. The sturgeon must voluntarily take the bait or lure inside its mouth. No sturgeon may be taken by trolling, snagging or by the use of firearms. Sturgeon may not be gaffed, nor shall any person use any type of firearm or snare to take any sturgeon. For the purposes of this section, a snare is a flexible loop made from any material that can be tightened like a noose around any part of the fish.

(~~e~~g) Removal from water. Any sturgeon greater than 68 inches fork length may not be removed from the water and shall be released immediately.

(~~f~~h) Report card required: Any person fishing for or taking sturgeon shall have in their possession a nontransferable Sturgeon Fishing Report Card issued by the department and shall adhere to all reporting and tagging requirements for sturgeon defined in Sections 1.74 and 5.79, Title 14, CCR.

(~~g~~i) Special North Coast District Sturgeon Closure (Humboldt, Del Norte, Trinity and Siskiyou cos.). It is unlawful to take any sturgeon in the North Coast District at anytime.

(~~h~~j) For regulations on take and possession of sturgeon in ocean waters as defined in Section 27.00, see Sections 27.90, 27.91, and 27.95.

(~~i~~k) Special Sierra and Valley District Sturgeon Closure from January 1 to December 31 (Shasta, Tehama, Butte and Glenn cos.).

(1) Sacramento River from Keswick Dam to the Highway 162 Bridge.

(A) It is unlawful to take any sturgeon.

(B) It is unlawful to use wire leaders.

(C) It is unlawful to use lamprey or any type of shrimp as bait.

(~~j~~l) Special Yolo Bypass Flood Control System Sturgeon Closure. It is unlawful to takeany sturgeon in the Yolo Bypass, Toe Drain Canal, and Tule Canal upstream of Lisbon Weir at any time.

NOTE: Authority cited: Sections 200, 205, 265~~ and 275~~, 270, 275, 315 and 399, Fish and Game Code.
Reference: Sections 110, 200 and 205, Fish and Game Code.

Proposed Regulatory Language

Section 27.90, Title 14, CCR, is amended to read as follows:

§ 27.90. White Sturgeon.

(a) Open season: All year except as described in Section 27.95 of these regulations.

~~(b) Daily and annual bag limit: One fish per day. Three fish per year statewide.~~

(b) Daily limit: One fish per day. After harvesting a White Sturgeon, anglers shall not continue to catch and release White Sturgeon on the same day. Anglers that have retained and tagged a fish are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.

(c) Annual bag limit: One fish per calendar year statewide.

(d) Daily vessel maximum harvest: All persons aboard a vessel may be cited for violation of a daily vessel maximum harvest limit. No more than two White Sturgeon may be harvested per day on a vessel, regardless of the number of anglers on board. Anglers must have in their possession a report card with a valid tag in order to retain a White Sturgeon. When the daily vessel maximum harvest is reached, only anglers that have not tagged a White Sturgeon that day may continue to fish catch and release for White Sturgeon.

(~~c~~e) Size limit: No fish less than ~~40~~42 inches fork length or greater than ~~60~~48 inches fork length may be taken or possessed.

(~~d~~f) Methods of take: Only one single point, single shank, barbless hook may be used on a line when taking sturgeon. The sturgeon must voluntarily take the bait or lure in its mouth. No sturgeon may be taken by trolling, snagging or by the use of firearms. Sturgeon may not be gaffed, nor shall any person use any type of firearm or snare to take any sturgeon. For the purposes of this section, a snare is a flexible loop made from any material that can be tightened like a noose around any part of the fish.

(~~e~~g) Removal from water. Any sturgeon greater than 68 inches fork length may not be removed from the water and shall be released immediately.

(~~f~~h) Report card required: Any person fishing for or taking sturgeon shall have in their possession a nontransferable Sturgeon Fishing Report Card issued by the department and shall adhere to all reporting and tagging requirements for sturgeon defined in Sections 1.74 and 27.92, Title 14, CCR.

(~~g~~i) For regulations on take and possession of sturgeon in inland waters as defined in Section 1.53, see Section 5.80 and Section 5.81.

(~~h~~j) Boat limits, as defined in Subsection 27.60(c) and Section 195, are not authorized for sturgeon fishing and shall not apply to the take, possession or retention of W~~w~~hite S~~s~~turgeon.

NOTE: Authority cited: Sections 200, ~~202,~~ 205~~ and 220~~, 265, 275, and 399, Fish and Game Code.
Reference: Sections 110, 200, and 205, ~~and 206,~~ Fish and Game Code.

Proposed Regulatory Language

Section 27.92, Title 14, CCR, is amended to read as follows:

§ 27.92. White Sturgeon Report Card and Tagging Requirements for OceanWaters (FG 683, See Section 701).

(a) Sturgeon Fishing Report Card Required. All anglers must have a valid Sturgeon Fishing Report Card in their possession while fishing for or taking W~~w~~hite S~~s~~turgeon.Cardholders must complete and return the card pursuant to regulations in this Section and in Section 1.74.

(b) Tagging and Recording Requirements for Retained Fish. A Sturgeon Fishing Report Card includes a detachable tag~~s~~ that shall be used to tag any W~~w~~hite S~~s~~turgeon thatis taken and retained in the sport fishery. Any W~~w~~hite S~~s~~turgeon possessed by any person shall be tagged.

(1) Upon taking and retaining a W~~w~~hite S~~s~~turgeon, the cardholder shall immediately record the following information:

(A) The fishing location, time of catch and length of the fish shall be recorded legibly and permanently in the appropriate spaces on the tag. The cardholder shall immediately and completely punch out the date of catch (month and day) on the sturgeon tag.~~ Tags shall be used in sequential order.~~

(B) The month, day, fishing location and length of the fish shall be recorded in the appropriate space~~s~~ on the Sturgeon Fishing Report Card~~ which corresponds to the number on the tag~~.

(2) Immediately after recording the information above, the cardholder shall remove and completely detach the tag from the card and affix it to the W~~w~~hite S~~s~~turgeon.Cardholders shall not wait until completion of fishing activity to tag any W~~w~~hite S~~s~~turgeon in possession.

(3) The tag shall be securely fastened to the fish. To affix the tag, a “zip tie”, string, line or other suitable material shall be passed through the tag at the location specified on the sturgeon tag and attached to the fish.

(4) The ~~Tags~~tag shall not be removed from the report card until immediately prior to affixing to a W~~w~~hite S~~s~~turgeon. Any tag~~s~~ detached from the report card and not affixed to a W~~w~~hite S~~s~~turgeon shall be considered used and therefore invalid. Noperson shall possess any used or otherwise invalid sturgeon tags.

(5) Records of Prior Activity. The tag~~ All tags~~ must be accounted for at all times by entry of a record on the Sturgeon Fishing Report Card ~~corresponding to all tags that are not in the cardholder’s possession~~. Any tag that was lost or destroyed shall be recorded as such on the corresponding line on the Sturgeon Fishing Report Card.

(6) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(7) After retaining and tagging a White Sturgeon, cardholders shall not continue to catch and release White Sturgeon on the same day.

(8) Cardholders that have retained and tagged a White Sturgeon are permitted to fish catch and release for White Sturgeon starting on the day after the tag was used.

(c) Reporting Requirements for Released Fish.

(1) Whenever the cardholder catches and releases a sturgeon, the cardholder shall immediately record the month, day, location code, length, and species of sturgeon.

(2) If all lines in the "sturgeon released" field of the report card are filled, any additional sturgeon caught and released ~~need not be recorded on the card~~may be recorded on the back of the card.

(3) If the sturgeon has a department reward disk attached, write the reward disk number in the space provided on the report card.

(d) Sturgeon tags must be left affixed to the fish in place, including while stored at a residence or non-transient location, until the fish is processed for immediate consumption.

(e) The annual fee for the Sturgeon Fishing Report Card is specified in Section 701, Title 14, CCR.

NOTE: Authority cited: Sections 200, 205~~ and 265~~, 265 and 399, Fish and Game Code. Reference: Sections 200, 205 and 265, Fish and Game Code.

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

DRAFT DOCUMENT

ECONOMIC AND FISCAL IMPACT STATEMENT
(REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

ECONOMIC IMPACT STATEMENT

DEPARTMENT NAME	CONTACT PERSON	EMAIL ADDRESS	TELEPHONE NUMBER
Fish and Game Commission	David Thesell	fgc@fgc.ca.gov	916 902-9291
DESCRIPTIVE TITLE FROM NOTICE REGISTER OR FORM 400			NOTICE FILE NUMBER
Amend Section 5.79, Title 14, CCR, Re: White Sturgeon Fishing			Z

A. ESTIMATED PRIVATE SECTOR COST IMPACTS *Include calculations and assumptions in the rulemaking record.*

1. Check the appropriate box(es) below to indicate whether this regulation:

- [ ] a. Impacts business and/or employees
- [x] b. Impacts small businesses
- [ ] c. Impacts jobs or occupations
- [ ] d. Impacts California competitiveness
- [ ] e. Imposes reporting requirements
- [ ] f. Imposes prescriptive instead of performance
- [x] g. Impacts individuals
- [ ] h. None of the above (Explain below):

Note: no new compliance costs necessarily incurred with reduced bag limit.

If any box in Items 1 a through g is checked, complete this Economic Impact Statement.
If box in Item 1.h. is checked, complete the Fiscal Impact Statement as appropriate.

2. The Fish and Game Commission (Agency/Department) estimates that the economic impact of this regulation (which includes the fiscal impact) is:

- [x] Below $10 million
- [ ] Between $10 and $25 million
- [ ] Between $25 and $50 million
- [ ] Over $50 million *[If the economic impact is over $50 million, agencies are required to submit a Standardized Regulatory Impact Assessment as specified in Government Code Section 11346.3(c)]*

3. Enter the total number of businesses impacted: ~35 only indirect

Describe the types of businesses (Include nonprofits): Fishing boat owners, tackle stores, guides, food, fuel, and lodging.

Enter the number or percentage of total businesses impacted that are small businesses: 90 %

4. Enter the number of businesses that will be created: 0 eliminated: 0

Explain: Changes in fishing for one species will not greatly change market demand so as to induce business loss or creation.

5. Indicate the geographic extent of impacts:
- [x] Statewide
- [ ] Local or regional (List areas): Sacramento-San Joaquin Delta Sturgeon habitat

6. Enter the number of jobs created: 0 and eliminated: 0

Describe the types of jobs or occupations impacted: Fishing Guides may experience reduced demand for guided fishing trips for White Sturgeon.

7. Will the regulation affect the ability of California businesses to compete with other states by making it more costly to produce goods or services here? [ ] YES [x] NO

If YES, explain briefly:

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ECONOMIC IMPACT STATEMENT (CONTINUED)

B. ESTIMATED COSTS *Include calculations and assumptions in the rulemaking record.*

1. What are the total statewide dollar costs that businesses and individuals may incur to comply with this regulation over its lifetime? $ 0

   a. Initial costs for a small business: $0 Annual ongoing costs: $ 0 Years:

   b. Initial costs for a typical business: $0 Annual ongoing costs: $ 0 Years:

   c. Initial costs for an individual: $0 Annual ongoing costs: $ 0 Years:

   d. Describe other economic costs that may occur: No direct costs to comply with proposed regulations. Possible decline (or not) in fishing trips may affect bait and tackle shop, CPFV, and sturgeon guide revenue.

2. If multiple industries are impacted, enter the share of total costs for each industry: No new costs; possible revenue declines for Guides 50%; CPFVs 30%; bait and tackle shops 10%.

3. If the regulation imposes reporting requirements, enter the annual costs a typical business may incur to comply with these requirements. *Include the dollar costs to do programming, record keeping, reporting, and other paperwork, whether or not the paperwork must be submitted.* $N/A

4. Will this regulation directly impact housing costs? ☐ YES ☒ NO

   If YES, enter the annual dollar cost per housing unit: $

   Number of units:

5. Are there comparable Federal regulations? ☐ YES ☒ NO

   Explain the need for State regulation given the existence or absence of Federal regulations: Inland water species under Fish and Game Commission authority (Fish and Game Code (FGC) sections 200 and 205).

   Enter any additional costs to businesses and/or individuals that may be due to State - Federal differences: $ N/A

C. ESTIMATED BENEFITS *Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. Briefly summarize the benefits of the regulation, which may include among others, the health and welfare of California residents, worker safety and the State's environment: This action is intended to support the continued sustainability of White Sturgeon sport fisheries that benefit sport anglers, the health and welfare of California residents, the State's environment and businesses that support sport fishing activities.

2. Are the benefits the result of: ☐ specific statutory requirements, or ☒ goals developed by the agency based on broad statutory authority?

   Explain: Statute provides Fish & Game Commission the authority to establish sport fishing regulations (FGC sec. 200, 205).

3. What are the total statewide benefits from this regulation over its lifetime? $ Sturgeon preservation

4. Briefly describe any expansion of businesses currently doing business within the State of California that would result from this regulation: N/A

D. ALTERNATIVES TO THE REGULATION *Include calculations and assumptions in the rulemaking record. Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. List alternatives considered and describe them below. If no alternatives were considered, explain why not: No Alternatives were identified that would have the same desired regulatory effect (See ISOR).

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ECONOMIC IMPACT STATEMENT (CONTINUED)

2. Summarize the total statewide costs and benefits from this regulation and each alternative considered:

Regulation: Benefit: $ White Sturgeon Cost: $ No direct costs

Alternative 1: Benefit: $ N/A Cost: $ N/A

Alternative 2: Benefit: $ N/A Cost: $ N/A

3. Briefly discuss any quantification issues that are relevant to a comparison of estimated costs and benefits for this regulation or alternatives: Difficult-to-monetize benefit of Sturgeon preservation is at stake. Costs are the temporary reduction in White Sturgeon take to avoid long-run over-fishing costs.

4. Rulemaking law requires agencies to consider performance standards as an alternative, if a regulation mandates the use of specific technologies or equipment, or prescribes specific actions or procedures. Were performance standards considered to lower compliance costs? ☐ YES ☒ NO

Explain: Fisheries management regulations traditionally involve setting harvest quotas, seasons, bag and possession limits.

E. MAJOR REGULATIONS *Include calculations and assumptions in the rulemaking record.*

California Environmental Protection Agency (Cal/EPA) boards, offices and departments are required to submit the following (per Health and Safety Code section 57005). Otherwise, skip to E4.

1. Will the estimated costs of this regulation to California business enterprises **exceed $10 million**? ☐ YES ☐ NO

If YES, complete E2. and E3
If NO, skip to E4

2. Briefly describe each alternative, or combination of alternatives, for which a cost-effectiveness analysis was performed:

Alternative 1: ____________________

Alternative 2: ____________________

(Attach additional pages for other alternatives)

3. For the regulation, and each alternative just described, enter the estimated total cost and overall cost-effectiveness ratio:

Regulation: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

Alternative 1: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

Alternative 2: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

4. Will the regulation subject to OAL review have an estimated economic impact to business enterprises and individuals located in or doing business in California exceeding $50 million in any 12-month period between the date the major regulation is estimated to be filed with the Secretary of State through12 months after the major regulation is estimated to be fully implemented?

☐ YES ☒ NO

If YES, agencies are required to submit a Standardized Regulatory Impact Assessment (SRIA) as specified in Government Code Section 11346.3(c) and to include the SRIA in the Initial Statement of Reasons.

5. Briefly describe the following:

The increase or decrease of investment in the State: No effect on level of investment in the State.

The incentive for innovation in products, materials or processes: No effect on the incentive for innovation in products, materials, or processes.

The benefits of the regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, and the state's environment and quality of life, among any other benefits identified by the agency: Benefits to the state's environment and quality of life, recreational angling, and the businesses that support fishing.

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT
(REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

DRAFT DOCUMENT

FISCAL IMPACT STATEMENT

A. FISCAL EFFECT ON LOCAL GOVERNMENT *Indicate appropriate boxes 1 through 6 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year which are reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ____________________

☐ a. Funding provided in ____________________

Budget Act of ____________ or Chapter ____________ , Statutes of ____________

☐ b. Funding will be requested in the Governor's Budget Act of ____________________

Fiscal Year: ____________

☐ 2. Additional expenditures in the current State Fiscal Year which are NOT reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ____________________

Check reason(s) this regulation is not reimbursable and provide the appropriate information:

☐ a. Implements the Federal mandate contained in ____________________

☐ b. Implements the court mandate set forth by the ____________________ Court.

Case of: ____________________ vs. ____________________

☐ c. Implements a mandate of the people of this State expressed in their approval of Proposition No. ____________

Date of Election: ____________________

☐ d. Issued only in response to a specific request from affected local entity(s).

Local entity(s) affected: ____________________

☐ e. Will be fully financed from the fees, revenue, etc. from: ____________________

Authorized by Section: ____________ of the ____________ Code;

☐ f. Provides for savings to each affected unit of local government which will, at a minimum, offset any additional costs to each;

☐ g. Creates, eliminates, or changes the penalty for a new crime or infraction contained in ____________________

☐ 3. Annual Savings. (approximate)

$ ____________________

☐ 4. No additional costs or savings. This regulation makes only technical, non-substantive or clarifying changes to current law regulations.

☒ 5. No fiscal impact exists. This regulation does not affect any local entity or program.

☐ 6. Other. Explain ____________________

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FISCAL IMPACT STATEMENT (CONTINUED)

B. FISCAL EFFECT ON STATE GOVERNMENT *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________

It is anticipated that State agencies will:

☐ a. Absorb these additional costs within their existing budgets and resources.

☐ b. Increase the currently authorized budget level for the ______________ Fiscal Year

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________

☐ 3. No fiscal impact exists. This regulation does not affect any State agency or program.

☒ 4. Other. Explain White Sturgeon Report Card sales are anticipated to continue to be reduced since the Emergency period resulting in approx. $20,000 decline in CDFW revenue for the 2024 license year.

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________

☒ 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.

☐ 4. Other. Explain ______________

FISCAL OFFICER SIGNATURE	DATE

The signature attests that the agency has completed the STD. 399 according to the instructions in SAM sections 6601-6616, and understands the impacts of the proposed rulemaking. State boards, offices, or departments not under an Agency Secretary must have the form signed by the highest ranking official in the organization.

AGENCY SECRETARY	DATE

Finance approval and signature is required when SAM sections 6601-6616 require completion of Fiscal Impact Statement in the STD. 399.

DEPARTMENT OF FINANCE PROGRAM BUDGET MANAGER	DATE

STD399 ADDENDUM

Economic and Fiscal Impact Statement

Certificate of Compliance

Amend Sections 5.79, 5.80, 27.90, and 29.72,
Title 14, California Code of Regulations
Re: White Sturgeon Fishing

Economic Impact Statement

The proposed rulemaking would make the emergency White Sturgeon fishing regulations permanent. This is necessary to maintain current and future recreational fishing's economic and cultural benefits, while preventing additional mortality of the impacted White Sturgeon population and minimizing harassment of spawning individuals. The proposed regulations aim to continue the existing one fish annual bag limit, reduced size limit, per-day vessel limit, and fishing closures in migrating and spawning habitat established by emergency regulatory action on October 13, 2023. The existing emergency regulations are set to expire in November 2024, following readoption of the emergency regulations in April and August. It is anticipated that a standard rulemaking with long-term changes to the White Sturgeon fishery will be received by the Commission at its April 17-18, 2024 meeting. It is expected that the new long-term regulations would become effective January 2025. The proposed amendments are necessary to protect the White Sturgeon population until the long-term regulation can be implemented.

Although the fishery has been historically open year-round, the majority of White Sturgeon catches are in winter and spring, with a notable decrease in fishing success in the summer months. During the summer months, catch rates for Striped Bass, Chinook Salmon, and other common recreational targets are higher so fishermen switch to those species. Unfortunately, the winter period also coincides with the White Sturgeon spawning migration, and fishing during this time may have a greater impact on the long-term population health.

The primary region targeted by the recreational White Sturgeon fishery is the San Francisco Estuary, including central San Francisco Bay, San Pablo Bay, Suisun Bay and the Sacramento-San Joaquin Delta; however, fishing also occurs in the Sacramento, San Joaquin and Feather rivers. White Sturgeon are successfully harvested throughout the estuary in various depths, salinities, and locations. Commercial fishing for White Sturgeon in California has been banned since 1917.

A. ESTIMATED PRIVATE SECTOR COST IMPACTS

1. Answer: b Impacts small businesses and g. Impacts individuals

No new private sector costs are necessarily incurred by a representative private person or business in reasonable compliance with the proposed regulations. No change in fees, nor gear or equipment requirements are introduced for the recreational White Sturgeon fishery. However, the proposed regulations limit harvest opportunities for individuals and may result in fewer White Sturgeon sportfishing trips. Fewer sportfishing trips would have the potential to reduce revenues for chartered boats, boat rentals, or fishing guide services, as well as for other retail businesses that serve sport fishers.

Recreational fishing for White Sturgeon is often conducted via chartered boats, with many fishing guides in San Francisco and the Bay-Delta area offering sturgeon fishing trips. Advertised rates for chartered fishing trips to catch White Sturgeon are somewhat variable by season and guide, but can range from $200 to $450 per person per day. Information from CPFVs and Sturgeon report cards provide data for estimating total number of White Sturgeon caught in the fishery. Other studies have estimated that 1,200 anglers participated in guided trips in 2018, showing that the recreational White Sturgeon fishery is a relatively small contributor to California's $2.9 billion annual recreational fishing industry[1].

Fiscal Impact Statement

A. FISCAL EFFECT ON LOCAL GOVERNMENT

Answer: 5. No fiscal impact.

The proposed amendment to Section 5.79, 5.80, 27.90, and 29.72, Title 14, CCR will not have the potential for a fiscal effect on local governments.

B. FISCAL EFFECT ON STATE GOVERNMENT

Answer: 4. Other.

The Fish and Game Commission (Commission) anticipates that the proposed certificate of compliance after the recent emergency action will not introduce new costs or savings for any state agency or program. The Department of Fish and Wildlife's (Department) existing level of monitoring and enforcement activities is expected to be unchanged. However, the Department anticipates that the continued reduced take limits may result in a continued drop in White Sturgeon Report Cards sales revenue estimated to be about $20,000 during that later part of fiscal year 2023-2024.

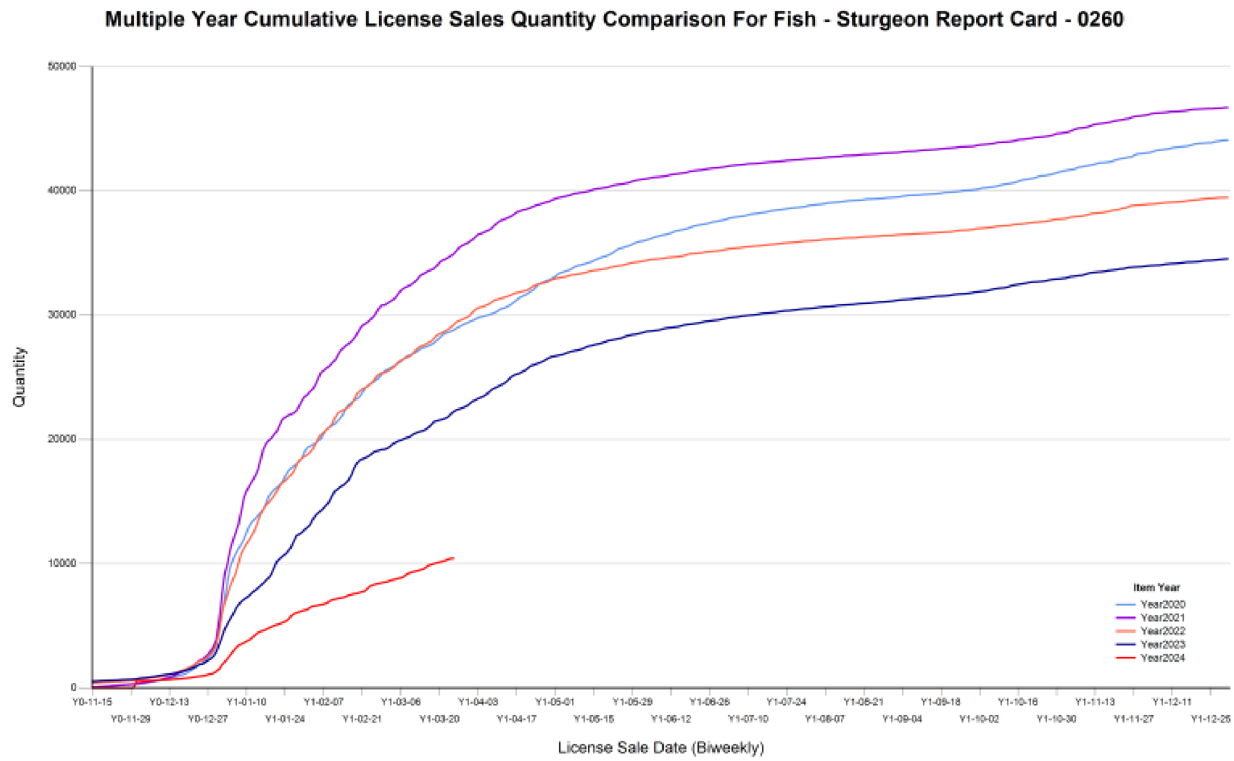
Pandemic and 365-day License Impacts

Sales of Sturgeon report cards are plotted in Figure 1, showing purchases throughout the year. Most cards are sold in the first months of the year, with a small bump in sales in the later months of the year. Sales in years 2020 and 2021 may have been elevated due to the Covid-19 pandemic surge in outdoor recreation. For the early part of this fiscal year, and through to March 2024, Sturgeon card sales have reached about 11,000, which is about 6% less than the amount sold in 2022 over the same period, and 19% less than 2019, which are more historically-typical years with no pandemic affects. While difficult to discern with certainty, the lower 2023-2024 numbers to date may be

[1] **American** Sportfishing Association, (ASA) 2019.

primarily driven by the new 365-day sportfish license and also the closures of Salmon fishing in various parts of the state. Many other states with 365-day licenses experienced absolute declines in license sales and for some sport fishers, no Salmon opportunity induces them to forego all fishing trips for any other fish. Thus, acknowledging the probable influence of those factors, 2023-24 fiscal year total sales were already projected to be less than the 40,844 average sold during a typical pre-pandemic and pre 365-day license year.

Figure 1. Cumulative license sales quantity 2020-2024 for sturgeon report card



Source: Department License and Revenue Branch sales statistics, 2024.

Proposed Regulation Impacts

A Department survey of White Sturgeon fishery participants reveals that while over 67 percent report the main reason to fish for White Sturgeon is recreation and 70 percent state that their goal is only or mostly catch and release; approximately 27 percent state their goal is to fish for food and 43 percent answer that they would not participate in a catch and release only fishery. These sentiments have been recognized in the proposed emergency action in efforts to balance resource protection with recreational fishery opportunity.

Recent spatial and temporal take patterns suggest that the proposed January to May upper spanning ground closure is the one component that may induce a small decline in report card sales during. The evidence that six percent of the seasonal catch has occurred in the area of the proposed January to May spanning ground closure, may induce those individual fishers to not purchase a Sturgeon Report Card, if that is the only time and area that they fish. Many may pursue Sturgeon in other areas at different times as well as the spawning grounds. But for some, that may be the only area and time for Sturgeon fishing, so it is reasonable to project a continued six percent drop in card sales revenue in 2024. This amounts to an estimated 2,000 fewer cards sold in 2024. The projected revenue loss to the Department for reduced White Sturgeon report card sales ($10.70 per item) is about $20,000 throughout the 2024 calendar year.

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS

Answer: 3. No fiscal impact.

The proposed action will not have the potential for a fiscal effect on the federal funding of state programs.

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action
Amend Subsections (b)(4), (b)(43), (b)(66), and (b)(80) of Section 7.40
Title 14, California Code of Regulations
Re: Central Valley Sport Fishing Regulations

I. Date of Initial Statement of Reasons: January 9, 2024

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing

Date: February 15, 2024 Location: Sacramento

(b) Discussion Hearing

Date: April 18, 2024 Location: San Jose

(c) Adoption Hearing

Date: May 15, 2024 Location: Webinar/Teleconference

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

Current regulations in subsections (b)(4), (b)(43), (b)(66), and (b)(80) of Section 7.40 prescribe the 2023 season dates and daily bag and possession limits for Sacramento River fall-run Chinook Salmon (*Oncorhynchus tshawytscha*; SRFC) sport fishing in the American, Feather, Mokelumne, and Sacramento rivers, respectively. Collectively, these four rivers constitute the "Central Valley fishery" for SRFC for purposes of this document (Figure 1). Each year, the Department of Fish and Wildlife (Department) recommends new Chinook Salmon daily bag and possession limits for consideration by the Fish and Game Commission (Commission) to align with up-to-date management goals, as set forth below.

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of recreational and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service (NMFS).

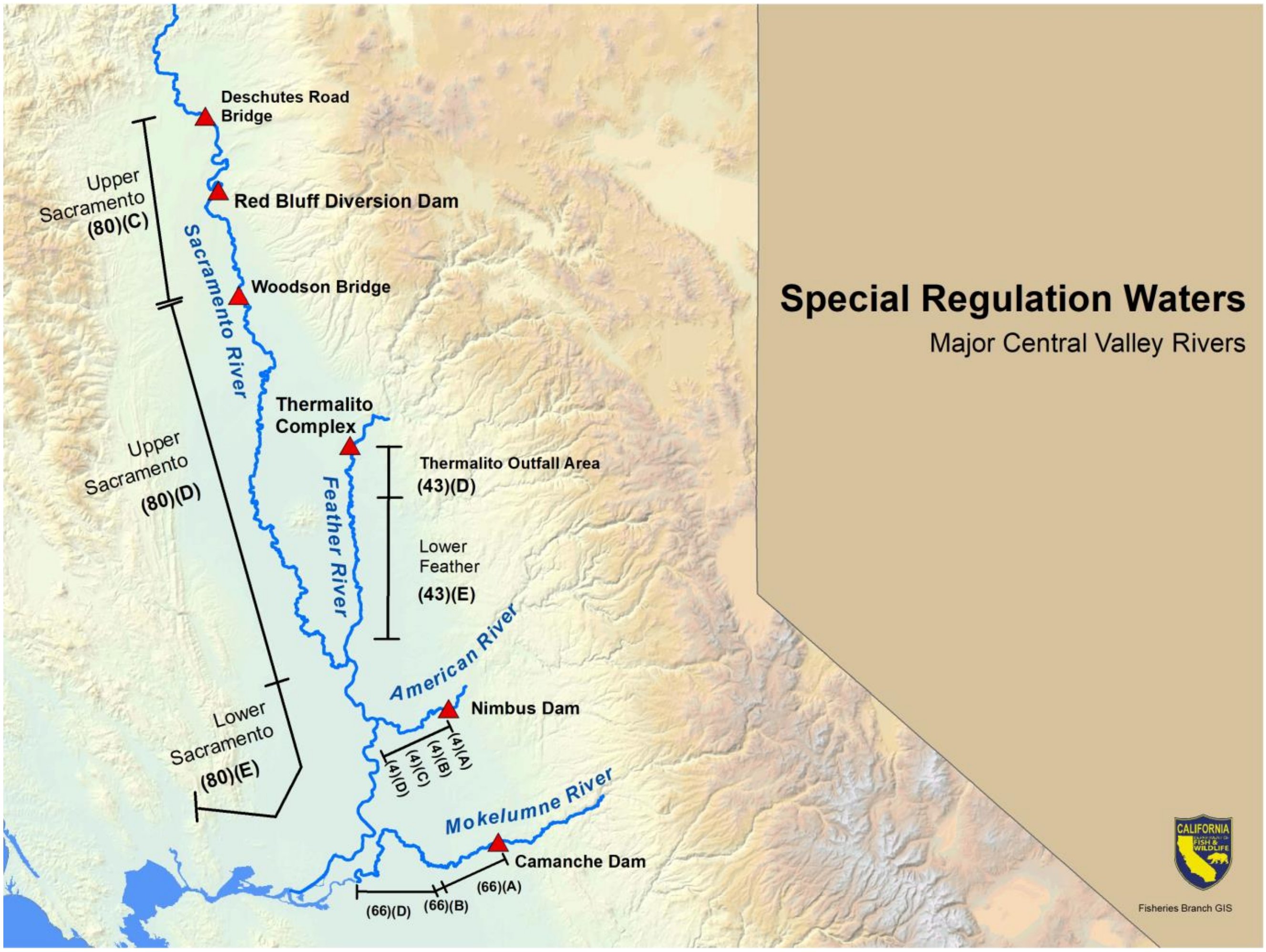


Figure 1. Map of the 2024 "Central Valley fishery" for Sacramento River fall-run Chinook Salmon, encompassing the following rivers and their respective subsections of Section 7.40: American (b)(4), Feather (b)(43), Mokelumne (b)(66), and Sacramento (b)(80).

The PFMC will develop the annual Pacific coast ocean salmon fisheries regulatory options for public review at its March 2024 meeting and will adopt its final regulatory recommendations at its April 2024 meeting based on the PFMC salmon abundance estimates and recommendations for ocean harvest for the coming season. Based on the April 2024 recommendation by PFMC, the Department will recommend specific bag and possession limit regulations for the Central Valley fishery to the Commission at its April 18, 2024 meeting. The Commission will then consider adoption of the Central Valley sport fishing regulations at its May 15, 2024, meeting.

(b) Proposed Regulations

CHINOOK SALMON BAG AND POSSESSION LIMITS

The Department recognizes the uncertainty of SRFC in-river harvest projections. Therefore, for the 2024 Central Valley fishery, the Department is presenting four regulatory options for the Commission's consideration to tailor 2024 Central Valley fishery management to target 2024 in-river fisheries harvest projections. The Commission may adopt these options for each river section independently, or in combination to meet PFMC SRFC management objectives and determine the recreational salmon fishing opportunities in the Central Valley.

- Option 1 is the most liberal of the options, and allows take of any size Chinook Salmon up to the daily bag and possession limits.
- Option 2 allows for take of a limited number of adult Chinook Salmon, with grilse Chinook Salmon (two-year old salmon) making up the remainder of the daily bag and possession limits.
- Option 3 is a more conservative option, and allows for a grilse-only Chinook Salmon fishery.
- Option 4 is the most conservative option, and prohibits the take and possession of Chinook Salmon in all anadromous areas of and tributaries to the American, Feather, Mokelumne, and Sacramento rivers.

Key to Proposed Regulatory Changes:

Because the PFMC recommendations are not known at this time, a range shown in [brackets] in the text below of bag and possession limits is indicated where it is desirable to continue Chinook Salmon fishing in the American, Feather, Mokelumne, and Sacramento rivers.

The following options are provided for Commission consideration:

Option 1 – Any Size Chinook Salmon Fishery

This option would allow anglers to take up to [0-4] Chinook Salmon of any size per day and have [0-12] Chinook Salmon in possession. This option is the Department's preferred option if the 2024 SRFC stock abundance forecast is sufficiently high to avoid the need to constrain in-river SRFC harvest.

American River, subsection 7.40(b)(4):

(B) From the United States Geological Survey (USGS) gauging station cable crossing about 300 yards downstream from the Nimbus Hatchery fish rack site to the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park.

July 16 through October 31 with a bag limit of [0-4] Chinook Salmon.

Possession limit - [0-12] Chinook Salmon.

(C) From the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park downstream to the Jibboom Street bridge.

July 16 through December 31 with a bag limit of [0-4] Chinook Salmon.

Possession limit - [0-12] Chinook Salmon.

(D) From the Jibboom Street bridge to the mouth.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon.

Possession limit - [0-12] Chinook Salmon.

Feather River, subsection 7.40(b)(43):

(D) From the unimproved boat ramp above the Thermalito Afterbay Outfall to 200 yards above the Live Oak boat ramp.

July 16 through October 31 with a daily bag limit of [0-4] Chinook Salmon.

Possession limit - [0-12] Chinook Salmon.

(E) From 200 yards above the Live Oak boat ramp to the mouth. For purposes of this subsection, the lower boundary is defined as a straight line drawn from the peninsula point on the west bank to the Verona Marine boat ramp.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

Mokelumne River, subsection 7.40(b)(66):

(A) From Camanche Dam to Elliott Road.

July 16 through October 15 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

(B) From Elliott Road to the Woodbridge Irrigation District Dam and including Lodi Lake.

From July 16 through December 31 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

(D) From the Lower Sacramento Road bridge to the mouth. For purposes of this subsection, this river segment is defined as Mokelumne River and its tributary sloughs downstream of the Lower Sacramento Road bridge and east of Highway 160 and north of Highway 12.

From July 16 through December 16 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

Sacramento River and tributaries below Keswick Dam, subsection 7.40(b)(80):

(C) Sacramento River from the Deschutes Road bridge to Woodson Bridge.

August 1 through October 31, and November 1 through December 31, with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

(D) Sacramento River from Woodson Bridge to the Highway 113 bridge near Knights Landing.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

(E) Sacramento River from the Highway 113 bridge near Knights Landing to the Carquinez Bridge (includes Suisun Bay, Grizzly Bay and all tributary sloughs west of Highway 160).

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon.

Possession limit – [0-12] Chinook Salmon.

Option 2 – Limited Adult and Grilse Salmon Fishery

This option would allow the take of a limited number of adult Chinook Salmon, with grilse Chinook Salmon (two-year old salmon) making up the remainder of the daily bag and possession limits. This option would allow anglers to take up to [0-4] Chinook Salmon per day, with no more than [0-4] of those salmon over 27 inches total length, and have [0-12] Chinook Salmon in possession, of which no more than [0-12] salmon may be over 27 inches total length. Should a reduction in the adult component of the stock be indicated by PFMC harvest projections, the Department is recommending specifying angling opportunities on the smaller, and possibly more numerous grilse salmon to increase angling harvest opportunities. Grilse returns from the previous season are included in pre-season stock abundance forecasts, but are not included in the current season adult returns used for evaluating conservation targets for SRFC. Due to their smaller size, grilse are typically outcompeted by larger adults, and contribute significantly less to the spawning population, and so they would be available for harvest with minimal impact to juvenile recruitment for the current season. Take of adult salmon would be limited under regulation, and the subsequent juvenile production would help rebuild the depressed stock size at a time when there is the need to restrict harvest of adult salmon.

The Department recommends a grilse salmon size limit of less than or equal to 27 inches total length based on an analysis of grilse data conducted by Department staff in 2018 (refer to Section III(g) below). A 27-inch total length grilse salmon cutoff is the best balance between angling harvest opportunity of possibly abundant smaller, two-year old male salmon and preserving the limited number of females available to spawn.

American River, subsection 7.40(b)(4):

(B) From the U.S. Geological Survey gauging station cable crossing about 300 yards downstream from the Nimbus Hatchery fish rack site to the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park.

July 16 through October 31 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit - [0-12] Chinook Salmon of which no more than [0–12] fish may be over 27 inches total length.

(C) From the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park downstream to the Jibboom Street bridge

July 16 through December 31 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit - [0-12] Chinook Salmon of which no more than [0–12] fish may be over 27 inches total length.

(D) From the Jibboom Street bridge to the mouth.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit - [0-12] Chinook Salmon of which no more than [0–12] fish may be over 27 inches total length.

Feather River, subsection 7.40(b)(43):

(D) From the unimproved boat ramp above the Thermalito Afterbay Outfall to 200 yards above the Live Oak boat ramp.

July 16 through October 31 with a daily bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit - [0-12] Chinook Salmon of which no more than [0–12] fish may be over 27 inches total length.

(E) From 200 yards above Live Oak boat ramp to the mouth. For purposes of this subsection, the lower boundary is defined as a straight line drawn from the peninsula point on the west bank to the Verona Marine boat ramp.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

Mokelumne River, subsection 7.40(b)(66)

(A) From Camanche Dam to Elliott Road.

July 16 through October 15 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

(B) From Elliott Road to the Woodbridge Irrigation District Dam and including Lodi Lake.

From July 16 through December 31 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

(D) From the Lower Sacramento Road bridge to the mouth. For purposes of this subsection, this river segment is defined as Mokelumne River and its tributary sloughs downstream of the Lower Sacramento Road bridge and east of Highway 160 and north of Highway 12.

From July 16 through December 16 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

Sacramento River and tributaries below Keswick Dam, subsection 7.40(b)(80):

(C) Sacramento River from the Deschutes Road bridge to Woodson Bridge.

August 1 through October 31, and November 1 through December 31, with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

(D) Sacramento River from Woodson Bridge to the Highway 113 bridge near Knights Landing.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

(E) Sacramento River from the Highway 113 bridge near Knights Landing to the Carquinez Bridge (includes Suisun Bay, Grizzly Bay and all tributary sloughs west of Highway 160).

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit – [0-12] Chinook Salmon of which no more than [0-12] fish may be over 27 inches total length.

Option 3 – Grilse-only Salmon Fishery

This option would allow for a grilse-only salmon fishery. This option would allow anglers to take [0-4] Chinook Salmon with a maximum size of 27 inches total length and have [0-12] Chinook Salmon in possession, with a maximum size of 27 inches total length. Should a reduction in the adult component of the stock be indicated by PFMC harvest projections, the Department is recommending specifying angling opportunities on the smaller, and possibly more numerous grilse salmon to increase angling harvest opportunities. Grilse returns from the previous season are included in pre-season stock abundance forecasts, but are not included in the current season adult returns used for evaluating conservation targets for SRFC. Due to their smaller size, grilse are typically outcompeted by larger adults, and contribute significantly less to the spawning population, and so they would be available for harvest with minimal impact to juvenile recruitment for the current season. Take of adult salmon would be prohibited under regulation, and the subsequent juvenile production would help rebuild the depressed stock size at a time when there is the need to restrict harvest of adult salmon.

The Department recommends a grilse salmon size limit of less than or equal to 27 inches total length based on an analysis of grilse data conducted by Department staff in 2018 (refer to Section III(g) below). A 27-inch total length grilse salmon cutoff is the best balance between angling harvest opportunity of possibly abundant smaller, two-year old male salmon and preserving the limited number of female salmon available to spawn.

American River, subsection 7.40(b)(4):

(B) From the U.S. Geological Survey gauging station cable crossing about 300 yards downstream from the Nimbus Hatchery fish rack site to the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park.

July 16 through October 31 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(C) From the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park downstream to the Jibboom Street bridge.

July 16 through December 31 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(D) From the Jibboom Street bridge to the mouth.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

Feather River, subsection 7.40(b)(43):

(D) From the unimproved boat ramp above the Thermalito Afterbay Outfall to 200 yards above the Live Oak boat ramp.

July 16 through October 31 with a daily bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(E) From 200 yards above Live Oak boat ramp to the mouth. For purposes of this subsection, the lower boundary is defined as a straight line drawn from the peninsula point on the west bank to the Verona Marine boat ramp.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

Mokelumne River, subsection 7.40(b)(66):

(A) From Camanche Dam to Elliott Road.

July 16 through October 15 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(B) From Elliott Road to the Woodbridge Irrigation District Dam and including lake Lodi.

From July 16 through December 31 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(D) From the Lower Sacramento Road bridge to the mouth. For purposes of this subsection, this river segment is defined as Mokelumne River and its tributary sloughs downstream of the Lower Sacramento Road bridge and east of Highway 160 and north of Highway 12.

From July 16 through December 16 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

Sacramento River and tributaries below Keswick Dam, subsection 7.40(b)(80):

(C) Sacramento River from the Deschutes Road bridge to Woodson Bridge.

August 1 through October 31, and November 1 through December 31, with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(D) Sacramento River from Woodson Bridge to the Highway 113 bridge near Knights Landing.

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

(E) Sacramento River from the Highway 113 bridge near Knights Landing to the Carquinez Bridge (includes Suisun Bay, Grizzly Bay and all tributary sloughs west of Highway 160).

July 16 through December 16 with a bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

Option 4 – No Salmon Fishing in all Central Valley Rivers, Streams, and Tributaries

This option would close salmon fishing in the American, Feather, Mokelumne, and/or Sacramento rivers, and all associated tributaries, or specific areas/bodies of water, as specified by river reach(es) in subsection 7.40(b) to provide protection to SRFC should a reduction in the stock be indicated by PFMC abundance projections. In any year, should the PFMC recommend a complete or near complete closure to ocean recreational salmon fishing, this option will give the Department flexibility to respond to and support any federal action in the ocean. This option prohibits all methods of targeting salmon including catch and release fishing. Unless otherwise noted, this option would still allow take of other species in specific areas/bodies of water, as specified by river reach(es) in subsection 7.40(b) (See Section VII below).

American River, subsection 7.40(b)(4):

(B) From the U.S. Geological Survey gauging station cable crossing about 300 yards downstream from the Nimbus Hatchery fish rack site to the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park.

July 16 through October 31. No take or possession of Chinook Salmon.

(C) From the SMUD power line crossing at the southwest boundary of Ancil Hoffman Park downstream to the Jibboom Street bridge.

July 16 through December 31. No take or possession of Chinook Salmon.

(D) From the Jibboom Street bridge to the mouth.

July 16 through December 16. No take or possession of Chinook Salmon.

Feather River, subsection 7.40(b)(43):

(D) From the unimproved boat ramp above the Thermalito Afterbay Outfall to 200 yards above the Live Oak boat ramp.

July 16 through October 31. No take or possession of Chinook Salmon.

(E) From 200 yards above Live Oak boat ramp to the mouth. For purposes of this subsection, the lower boundary is defined as a straight line drawn from the peninsula point on the west bank to the Verona Marine boat ramp.

July 16 through December 16. No take or possession of Chinook Salmon.

Mokelumne River, subsection 7.40(b)(66):

(A) From Camanche Dam to Elliott Road.

July 16 through October 15. No take or possession of Chinook Salmon.

(B) From Elliott Road to the Woodbridge Irrigation District Dam and including Lodi Lake.

From July 16 through December 31. No take or possession of Chinook Salmon.

(D) From the Lower Sacramento Road bridge to the mouth. For purposes of this subsection, this river segment is defined as Mokelumne River and its tributary sloughs downstream of the Lower Sacramento Road bridge and east of Highway 160 and north of Highway 12.

From July 16 through December 16. No take or possession of Chinook Salmon.

Sacramento River and tributaries below Keswick Dam, subsection 7.40(b)(80):

(C) Sacramento River from the Deschutes Road bridge to Woodson Bridge.

August 1 through October 31, and November 1 through December 31. No take or possession of Chinook Salmon.

(D) Sacramento River from Woodson Bridge to the Highway 113 bridge near Knights Landing.

July 16 through December 16. No take or possession of Chinook Salmon.

(E) Sacramento River from the Highway 113 bridge near Knights Landing to the Carquinez Bridge (includes Suisun Bay, Grizzly Bay and all tributary sloughs west of Highway 160).

July 16 through December 16. No take or possession of Chinook Salmon.

(c) Necessity of the Proposed Regulation Changes

The proposed regulations are necessary to adjust Chinook Salmon bag and possession limits, size limits, and open seasons for the American, Feather, Mokelumne, and Sacramento rivers for consistency with PFMC salmon abundance estimates and recommendations for ocean harvest for the coming season.

(d) Goals and Benefits of the Regulation

As stated in Fish and Game Code Section 1700, Conservation of Aquatic Resources: It is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use.

Adoption of science-based SRFC bag and possession limits provides for the maintenance of sufficient populations of Chinook Salmon to ensure their continued existence.

The benefits of the proposed regulations are consistency with federal fishery management goals, sustainable management of the SRFC fishery, and general health and welfare of California residents.

(e) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 205, 265, 270, 315, 316.5, 399 and 2084, Fish and Game Code.

Reference: Sections 200, 205, 265, 270, 316.5 and 2084, Fish and Game Code.

(f) Specific Technology or Equipment Required by Regulatory Change

None.

(g) Identification of Reports or Documents Supporting Regulation Change

NOAA’s National Marine Fisheries Service, West Coast Region, 2016. *5-Year Review: Summary and Evaluation of Central Valley Spring-run Chinook Salmon Evolutionarily Significant Unit. Available from: https://repository.library.noaa.gov/view/noaa/17018*

Pacific Fishery Management Council, 2023. *Review of 2022 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan*. Available from: https://www.pcouncil.org/documents/2023/02/review-of-2022-ocean-salmon-fisheries.pdf/

Pahlke, K, 1988. *Length Conversion Equations for Sockeye, Chinook, and Coho salmon in southeast Alaska. Regional Information Report No. Ij88-03.* Alaska Department of Fish and Game Division of Commercial Fisheries, Southeast Region. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=164436&inline

U.S. Fish and Wildlife Service, *2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, available from* https://www.census.gov/content/dam/Census/library/publications/2018/demo/fhw16-nat.pdf

(h) Public Discussions of Proposed Regulations Prior to Notice Publication

The Department presented the proposed amendments to the SRFC bag and possession limits at the Commission's Wildlife Resources Committee meeting on September 19, 2023.

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified by or brought to the attention of Commission staff that would have the same desired regulatory effect.

(b) No Change Alternative

SRFC Adult Stocks

The no change alternative would leave existing 2023 regulations in place. The no change alternative would not allow for appropriate harvest rates, while the proposed regulations will allow the state to harmonize its bag and possession limits with NMFS' regulations.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed changes are necessary for the continued preservation of the resource, while providing inland sport fishing opportunities and thus, the prevention of adverse economic impacts.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate significant adverse economic impacts but acknowledges the potential for short-term negative impacts on the creation or elimination of jobs within the state. The Commission anticipates no adverse impacts on the creation of new business, the elimination of existing businesses or the expansion of businesses in California. The management of an ongoing Chinook Salmon sport fishery with annual variations in the bag and possession limits and/or the implementation of a size limit is not anticipated to significantly impact the volume of business activity.

The loss of up to 22 jobs with Option 2, 43 jobs for Option 3, and 108 jobs for Option 4 is not expected to eliminate businesses because projected reduction in fishing days is expected to be partially offset by opportunities to fish for grilse Chinook Salmon and other species for Option 2 and 3 and continued opportunities for other non-salmonid species for Option 4.

The Commission anticipates benefits to the health and welfare of California residents. Providing opportunities for a Chinook Salmon sport fishery encourages consumption of a nutritious food. The Commission anticipates benefits to the environment by the sustainable management of Chinook Salmon resources in the Central Valley.

The Commission does not anticipate any benefits to worker safety.

Other benefits of the proposed regulations are concurrence with federal fishery management goals and promotion of businesses that rely on Central Valley sport fishing.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None.

(e) Nondiscretionary Costs/Savings to Local Agencies: None.

(f) Programs Mandated on Local Agencies or School Districts: None.

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None.

(h) Effect on Housing Costs: None.

VII. Economic Impact Assessment

This action is expected to sustain fishery activity within the range of historically typical seasons. Lower PFMC harvest forecasts can result in a smaller bag and possession limit, (more conservative), whereas larger PFMC harvest forecasts can result in a higher bag and possession limit (more liberal), both of which can skew the average fishing activity over seasons. The potential difference in total economic impact between a typical season and the options under consideration range from $0 to -$13.2 M as shown in Table 1 below. However, the anticipated total economic impacts may vary a bit more or less than the estimates of any one single option, as the proposed options may be adopted as a combination of bag and possession limits by body of water so as to minimize adverse impacts to fishing opportunity and economic activity.

A five-year average over the 2017-2021 seasons (the 2023 salmon closure year is excluded in the baseline) for the Central Valley fishery experiences about 174,192 sport salmon angler days in which anglers spend an average of $108 per day contributing a total of $18.8 M (2022$) in direct expenditures to California businesses. This expenditure is received by area businesses that spend a share on inputs and payroll. As employees receive income, their household spending again circulates in the local economy and statewide. These multiplier effects have historically resulted in an estimated total economic impact of $26.4 M (2022$), that supports up to 216 jobs throughout the state.

The regional and statewide economic impacts factor into the effort to balance the maintenance of the recreational fishery with resource preservation, while complying with PFMC allocations. The potential economic impacts that may result from each in-river harvest projection as specified in Option 1, Option 2, Option 3, and Option 4 are evaluated in terms of each scenario's probable impact on the number of Chinook Salmon and other species' angler days, and thus angler expenditures that circulate within the area and throughout the state.

Table 1. Central Valley Fishery Projected Economic Impacts 2024

Regulation	Angler Days	Angler Expenditures	Total Econ Impact	Jobs
Option 1	174,192[1]	$ 18,812,736	$ 26,453,598	216
Option 2	156,773	$ 16,931,462	$ 23,808,238	194
Option 3	139,354	$ 15,050,189	$ 21,162,878	173
Option 4	87,096	$ 9,406,368	$ 13,226,799	108

Difference	Angler Day Loss	Expenditure Loss	Total Impact Loss	Job Loss
Option 1	0	$ -	$ -	0
Option 2	-17,419	- $1,881,274	- $ 2,645,360	(22)
Option 3	-34,838	- $3,762,547	- $ 5,290,720	(43)
Option 4	-87,096[2]	-$9,406,368	-$13,226,799	(108)

[1]The base year for angler days is the five-year average of 2017–2021 derived from Department creel survey data. The 2017-2021 time period is more historically typical with no emergency actions that reduced fishing opportunity. [2]Projected angler days with a salmon closure assumes that 50% of effort will persist as anglers shift or continue to pursue opportunities for other fish species. Sources: California Department of Fish and Wildlife, Fisheries Branch economic analysis; U.S. Fish and Wildlife Service, 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation; expenditure figures are in (2022$), adjusted for inflation with Implicit Price Deflator for Personal Consumption Expenditures, Bureau of Economic Analysis.

Historical correlations between catch limits and fishery participation levels suggest that Option 1 could enable a historically typical (5-year average) number of angler days for the 2024 Chinook Salmon season on the American, Feather, Mokelumne, and Sacramento rivers. Option 2 may result in declines in angler days of 17,419 below a typical year. Option 3 may result in larger declines, or an estimated 34,838 fewer angler days. Option 4 may result in an estimated 50 percent reduction or 87,096 fewer angler days throughout the Central Valley fishery.

A share (approximately 50% for Option 4) of anglers are assumed to continue to pursue other in-river sport fish aside from Chinook Salmon, such as steelhead (*Oncorhynchus mykiss*), Striped Bass (*Morone saxatilis*), Largemouth Bass (*Micropterus salmoides*), White Sturgeon (*Acipenser transmontanus*) and catfish (*Ictalurus spp.*), that may mitigate any adverse impacts from any reductions in salmon fishing. In sum, the options presented to the Commission were conceived with the goal of enabling levels of recreational SRFC fishing in the range of historical averages, and thus should not be a source of significant adverse economic impacts.

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate that any of the proposed options would induce substantial impacts on the creation or elimination of jobs. For Option 1, no change in job creation or elimination is anticipated. Option 2, Option 3, and Option 4 have the potential to result in fewer angler visits, and absent substitution toward other sportfish and/or activities in the affected areas, the reduction in angler spending could reduce the support for 0-108 jobs statewide.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate that any of the proposed options would induce substantial impacts on the creation of new business or the elimination of existing businesses, because the proposed economic impacts of the regulations are unlikely to be substantial enough to stimulate the creation of new businesses or cause the elimination of existing businesses.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate that any of the proposed options would induce substantial impacts on the expansion of businesses currently doing business within the state. The proposed regulations are not anticipated to increase demand for services or products from the existing businesses that serve inland sport fishermen. The number of fishing trips and angler economic contributions are expected to remain within the range of historical averages.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

The Commission anticipates benefits to the health and welfare of California residents. Chinook Salmon is a nutritious food source and providing inland sport fishery opportunities encourages consumption of this nutritious food. Sport fishing also contributes to increased mental health of its practitioners, as fishing is a hobby and form of relaxation for many. Sport fishing also provides opportunities for multi-generational family activities and promotes respect for California’s environment by younger generations, the future stewards of California’s natural resources.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate any benefits to worker safety from the proposed regulations because inland sport fishing does not impact working conditions.

(f) Benefits of the Regulation to the State’s Environment

Under all options the Commission anticipates benefits to the environment in the sustainable management of SRFC. It is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use.

In accordance with this policy, adoption of science-based inland Chinook Salmon bag and possession limits provides for the maintenance of sufficient populations of salmon to ensure their continued existence and thus continued economic stimulus.

(g) Other Benefits of the Regulation

Other benefits of the regulation include consistency with federal fishery management goals.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations.

Current regulations in subsections (b)(4), (b)(43), (b)(66), and (b)(80) of Section 7.40 prescribe the 2023 seasons and daily bag and possession limits for Sacramento River fall-run Chinook Salmon (*Oncorhynchus tshawytscha*; SRFC) sport fishing in the American, Feather, Mokelumne, and Sacramento rivers, respectively. Collectively, these four rivers constitute the "Central Valley fishery" for SRFC for purposes of this document. In considering the current 2023 regulations the Fish and Game Commission (Commission) accepted the Department of Fish and Wildlife's (Department) recommendation for the most conservative option that prohibited fishing for Chinook Salmon in the Central Valley.

Each year, the Department recommends new Chinook Salmon bag and possession limits for consideration by the Commission to align the fishing limits with up-to-date management goals, as set forth below.

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of recreational and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service (NMFS).

The PFMC will develop the annual Pacific coast ocean salmon fisheries regulatory options for public review at its March 2024 meeting and will adopt its final regulatory recommendations at its April 2024 meeting based on the PFMC salmon abundance estimates and recommendations for ocean harvest for the coming season. Based on the April 2024 recommendation by PFMC, the Department will recommend specific bag and possession limit regulations to the Commission at its April 18, 2024, meeting. The Commission will then consider adoption of the Central Valley sport fishing regulations at its May 15, 2024, meeting.

Proposed Regulations

Chinook Salmon Bag and Possession Limits

The Department recognizes the uncertainty of SRFC in-river harvest projections. Therefore, for the 2024 Central Valley fishery, the Department is presenting four regulatory options for the Commission's consideration to tailor 2024 Central Valley fishery management to target 2024 in-river fisheries harvest projections. The Commission may adopt these options for each river section independently, or in combination to meet PFMC SRFC management objectives.

- American River, subsections 7.40(b)(4)(B), (C) and (D).
- Feather River, subsection 7.40(b)(43)(D) and (E).
- Mokelumne River, subsection 7.40(b)(66)(A), (B) and (D).
- Sacramento River below Keswick Dam, subsection 7.40(b)(80)(C), (D) and (E).

The following options are provided for Commission consideration:

Option 1 – Any Size Chinook Salmon Fishery

This option is the Department's preferred option if the 2024 SRFC stock abundance forecast is sufficiently high to avoid the need to constrain in-river SRFC harvest.

Bag limit of [0-4] Chinook Salmon.

Possession limit - [0-12] Chinook Salmon.

Option 2 – Limited Adult and Grilse Salmon Fishery

Bag limit of [0-4] Chinook Salmon of which no more than [0-4] fish over 27 inches total length may be retained.

Possession limit - [0-12] Chinook Salmon of which no more than [0–12] fish may be over 27 inches total length.

Option 3 – Grilse Salmon Fishery Only

Bag limit of [0-4] Chinook Salmon less than or equal to 27 inches total length.

Possession limit - [0-12] Chinook Salmon less than or equal to 27 inches total length.

Option 4– No Salmon Fishing in all Central Valley Rivers, Streams, and Tributaries

No take or possession of Chinook Salmon.

Benefits of the Proposed Regulations

The Commission anticipates benefits to the environment in the sustainable management of Central Valley Chinook Salmon resources. Other benefits of the proposed regulations are consistency with federal fishery management goals, and health and welfare of California residents.

Consistency and Compatibility with Existing Regulations

Article IV, Section 20 of the State Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to regulate sport fishing in waters of the state (Fish and Game Code sections 200, 205, 315 and 316.5). The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the California Code of Regulations and finds no other state agency regulations pertaining to Chinook Salmon sport fishing seasons, bag, and possession limits for Central Valley sport fishing.

State of California
Department of Fish and Wildlife

Memorandum

Original on file;
Received April 8, 2024

Date: April 5, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Submittal of Addenda to the 2022 Negative Declarations Regarding Central Valley and Klamath River Basin Sport Fishing Regulations, Title 14, Section 7.40, California Code of Regulations (CCR)

In compliance with the California Environmental Quality Act, the Department of Fish and Wildlife (Department) has prepared the enclosed addenda pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing Klamath River Basin (KRB) sport fishing. The Commission proposes to amend the sport fishing regulations for the “Central Valley fishery” for Sacramento River fall-run Chinook Salmon (SRFC), encompassing the following rivers and their respective subsections of Section 7.40, Title 14, CCR: American (b)(4), Feather (b)(43), Mokelumne (b)(66), and Sacramento (b)(80). The Commission also proposes to amend the KRB sport fishing regulations as set forth in Title 14, Section 7.40(b)(50) for Klamath River fall-run Chinook Salmon (KRFC).

In 2022, the Commission certified a Final Negative Declaration (ND) Regarding Central Valley Sport Fishing Regulations (2022 Central Valley Sport Fishing Regulations ND)(SCH No. 2018112036) as the lead agency under CEQA as part of the Commission’s review and adoption of the Central Valley sport fishing regulations which focused on the potential for significant environmental impacts from a potential increase or decrease of SRFC daily bag and possession limits for the American, Feather, Mokelumne, and Sacramento rivers. The 2022 Central Valley Sport Fishing Regulations ND found no significant impacts for the range of daily bag and possession limits for SRFC sport fishing under regulatory Options 1, 2, and 3. The 2024 proposed daily bag and possession limits fall within the previously analyzed range of bag and possession limits and regulatory options. Therefore, there are no new significant or substantially more severe impacts from amending the SRFC sport fishing regulations to either decrease or increase the daily bag and possession limits on the American, Feather, Mokelumne, and Sacramento rivers.

In 2022, the Commission certified a Final ND Regarding Klamath River Basin Sport Fishing Regulations (2022 Klamath River Basin Sport Fishing Regulations ND)(SCH

No. 2022040251) as the lead agency under CEQA as part of the Commission's review and adoption of KRB sport fishing regulations which focused on the potential for significant environmental impacts from a potential increase or decrease of KRFC daily bag and possession limits for the Klamath and Trinity rivers. The 2022 Klamath River Basin Sport Fishing Regulations ND found no significant impacts for the KRB quota range and range of daily bag and possession limits for KRFC sport fishing. The 2024 proposed KRB quota, and daily bag and possession limit ranges fall within the previously analyzed ranges for the KRB quota and proposed bag and possession limits for KRFC stocks. Therefore, there are no new significant or substantially more severe impacts from amending the KRB sport fishing regulations to either decrease or increase the KRFC daily bag and possession limits on the Klamath and Trinity rivers.

If you have any questions regarding the enclosed documents, please contact Karen Mitchell, Senior Environmental Scientist, at (916) 205-0250.

Attachments

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Jay Rowan, Branch Chief
Fisheries Branch

Brett Kormos, Program Manager
Northern Region (Region 1)

Jonathan Nelson, Program Manager
Fisheries Branch

Karen Mitchell, Sr. Environmental Scientist
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Regulations Unit

Chelle Temple-King, Sr. Environmental Scientist
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Mike Randall, Analyst
Regulations Unit

Ari Cornman, Wildlife Advisor
Fish and Game Commission

David Thesell, Program Manager
Fish and Game Commission

ANALYSIS OF THE 2024

CENTRAL VALLEY SPORT FISHING REGULATIONS

ADDENDUM

to the 2022 NEGATIVE DECLARATION
REGARDING CENTRAL VALLEY
SPORT FISHING REGULATIONS

prepared by the

STATE OF CALIFORNIA
NATURAL RESOURCES AGENCY
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on behalf of

CALIFORNIA FISH AND GAME COMMISSION

as

LEAD AGENCY UNDER THE
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

for the

REGULARY NOTICED RULEMAKING ACTION TO AMEND
SECTION 7.40 TITLE 14,
CALIFORNIA CODE OF REGULATIONS
2024 FISHING SEASON

(OAL Notice File No. 2024-0223-01)

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this addendum pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq*., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing Central Valley sport fishing. Annually, CDFW recommends Central Valley sport fishing regulations to the Commission. The Commission then makes the final determination on what amendments to the regulations should be implemented and is the lead agency for the purposes of CEQA. Under Fish and Game Code (F&G Code) Section 200, the Commission has the authority to regulate the taking or possession of fish for the purpose of sport fishing.

Current regulations in subsections (b)(4), (b)(43), (b)(66), and (b)(80) of Section 7.40 prescribe the 2023 season dates and daily bag and possession limits for Sacramento River fall-run Chinook Salmon (*Oncorhynchus tshawytscha*; SRFC) sport fishing in the American, Feather, Mokelumne, and Sacramento rivers, respectively. Collectively, these four rivers constitute the “Central Valley fishery” for SRFC for purposes of this document (Figure 1). Each year, CDFW recommends new SRFC daily bag and possession limits for consideration by the Commission to align with up-to-date management goals, as set forth below.

The Commission established daily bag and possession limits for SRFC on the American, Feather, Mokelumne, and Sacramento rivers in 2022 with the certification of a Final Negative Declaration under CEQA (2022 Central Valley Sport Fishing Regulations Negative Declaration (ND))(SCH No. 2022040250). The 2022 Central Valley Sport Fishing Regulations ND provides relevant and important informational value as the Commission, as the CEQA lead agency, considers proposed amendments to the existing regulations for the 2024 SRFC sport fishing season in California. This addendum documents the Commission’s consideration of related environmental effects.

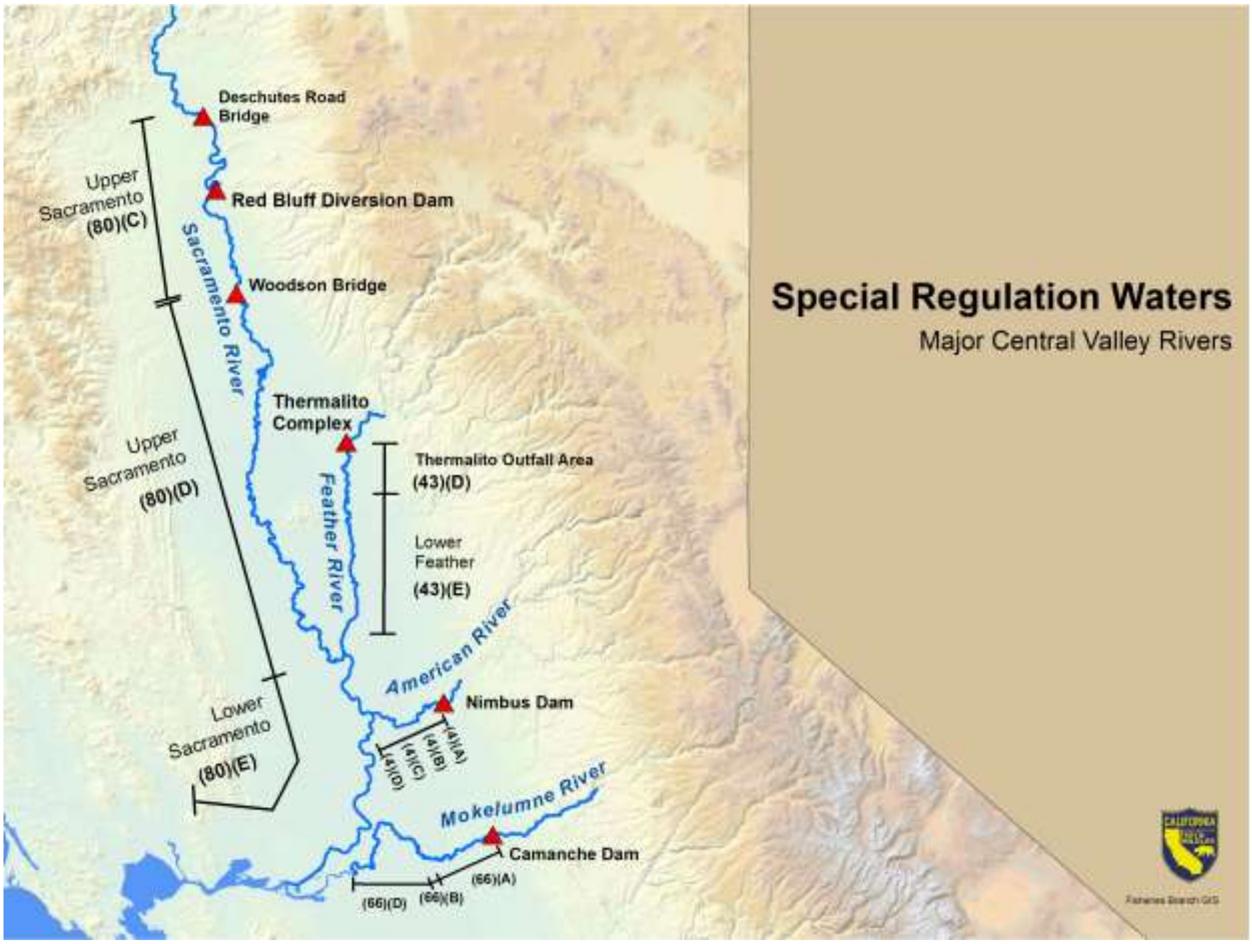

Figure 1. Map of the 2024 "Central Valley fishery" for Sacramento River fall-run Chinook Salmon, encompassing the following rivers and their respective subsections of Section 7.40: American (b)(4), Feather (b)(43), Mokelumne (b)(66), and Sacramento (b)(80).

EARLIER PROJECT APPROVAL

CEQA review of the proposed project was conducted in accordance with the Commission's certified regulatory program approved by the Secretary for the California Natural Resources Agency pursuant to Public Resources Code Section 21080.5 (See generally CCR, Title 14, Sections 781.5 and 15251(b)). CEQA requires all public agencies in the state to evaluate the environmental impacts of discretionary projects they propose to carry out or approve, including promulgating regulations, which may have a potential to significantly affect the environment.

In 2022, the Commission certified a Final ND Regarding Central Valley Sport Fishing Regulations (2022 Central Valley Sport Fishing Regulations ND)(SCH No. 2022040250) as the lead agency under CEQA as part of the Commission's review and adoption of the Central Valley sport fishing regulations which focused on the potential for significant environmental impacts from a potential decrease or increase of SRFC daily bag and possession limits for the American, Feather, Mokelumne, and Sacramento rivers. The

Commission considered the proposed project potential increase of daily bag and possession limits under three regulatory options (i.e., Options 1, 2, and 3 described below). The Commission, as the CEQA lead agency, certified the 2022 ND and determined adoption of the regulations as proposed under Options 1, 2, and 3 or a combination thereof would not result in any new significant or substantially more severe environmental effects. The Commission adopted Option 1 (take and possession of any size Chinook Salmon up to the daily bag and possision limits), with a daily bag limit of two SRFC and a possession limit of four SRFC. This resulted in maintaining the same daily bag and possession limits as the 2021 SRFC sport fishing season.

PROPOSED 2024 CHINOOK SALMON BAG AND POSSESSION LIMITS

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of recreational and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service.

The PFMC developed the annual Pacific coast ocean salmon fisheries regulatory options for public review at its March 2024 meeting and will adopt its final regulatory recommendations at its April 2024 meeting based on the PFMC salmon abundance estimates and recommendations for ocean harvest for the coming season. Based on the April 2024 recommendation by PFMC, CDFW will recommend specific bag and possession limit regulations for the Central Valley fishery to the Commission at its April 18, 2024 meeting. The Commission will then consider adoption of the Central Valley sport fishing regulations at its May 15, 2024, meeting.

CDFW is presenting four regulatory options for the Commission’s consideration to tailor 2024 Central Valley fishery management to target 2024 in-river fisheries harvest projections. The Commission may adopt these options for each river section independently, or in combination to meet SRFC management objectives and determine the recreational salmon fishing opportunities in the Central Valley. Because the PFMC recommendations are not known at this time, a range shown in [brackets] in the text below of bag and possession limits is indicated where it is desirable to continue Chinook Salmon fishing in the American, Feather, Mokelumne, and Sarcamento rivers.

1. Option 1 is the most liberal of the options, and allows take of up to [0-4] Chinook Salmon of any size per day and have [0-12] Chinook Salmon in possession.

2. Option 2 allows for take of up to [0-4] Chinook Salmon per day, with no more than [0-4] of those salmon over 27 inches total length, and have [0-12] Chinook Salmon in

possession, of which no more than [0-12] salmon may be over 27 inches total length.

3. Option 3 is a more conservative option, and allows anglers to take up to [0-4] Chinook Salmon with a maximum size of 27 inches total length and have [0-12] Chinook Salmon in possession, with a maximum size of 27 inches total length.

4. Option 4 is the most conservative option, and prohibits the take and possession of Chinook Salmon in all anadromous areas of and tributaries to the American, Feather, Mokelumne, and Sacramento rivers.

The 2022 Central Valley Sport Fishing Regulations ND found no significant impacts for the range of daily bag and possession limits for SRFC sport fishing under regulatory Options 1, 2, and 3. The 2024 proposed daily bag and possession limits fall within the previously analyzed range of bag and possession limits and regulatory options. Therefore, there are no new significant or substantially more severe impacts from amending the SRFC sport fishing regulations to either reduce or increase the daily bag and possession limits on the American, Feather, Mokelumne, and Sacramento rivers.

NO SUBSEQUENT ENVIRONMENTAL DOCUMENT IS REQUIRED

In general, CEQA applies whenever a public agency proposes to carry out or approve a discretionary project. (Public Resources Code Section 21080(a)). CEQA provides that, where a public agency proposes to modify a previously approved project for which a Final Environmental Document was prepared and certified:

> "An addendum to an adopted negative declaration may be prepared if only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR or negative declaration have occurred." (CCR, Title 14, Section 15164(b))

- A Subsequent Environment Document (Section 15162) when there is substantial evidence that:
  - Substantial changes are proposed in the project, which will require major revisions to the previous environmental impact report (EIR) or environmental document (ED).
  - Substantial changes occur with respect to the circumstances under which the project is being undertaken, which will require major revisions to the previous EIR or environmental documentation.
  - New information, which was not known and could not have been known at the time the previous EIR or ED was certified as complete, becomes available.
- A Supplement to an Environment Document (Section 15163) when:
  - A subsequent ED is not required.
  - Only minor changes to the project are described.

- Only that information to make the ED adequate is provided.
- An Addendum to the Certified ED (Section 15164) is proper when**:**
  - The changes or additions presented in this project are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent ED have occurred.
  - The Commission may properly prepare and may rely on an addendum in accordance with Section 15164 to fulfill its obligations under CEQA.

NO ADDITIONAL IMPACTS UNDER CEQA

The Commission has determined that amending the current SRFC sport fishing regulations based on PFMC salmon abundance estimates will not result in any new or significant or substantially more severe environmental impacts than previously analyzed and disclosed in the 2022 Central Valley Sport Fishing Regulations ND for this project.

This project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. There are no impacts to the habitat of fish and wildlife species.

This approval action adjusts the previous year daily bag and possession limits based on more current salmon abundance estimates. No other aspect of the project is changed. No new significant or substantially more severe impacts under CEQA will occur due to this change.

AMENDMENT OF THE CENTRAL VALLEY SPORT FISHING REGULATIONS

In conclusion, the Commission finds that amending the SRFC sport fishing regulations in CCR, Title 14, Section 7.40, will not result in any new significant or substantially more severe environmental effects than previously analyzed and disclosed in the 2022 Central Valley Sport Fishing Regulations ND. The Commission also finds that subsequent or supplemental review beyond this Addendum is not warranted pursuant to the CCR, Title 14, Section 15164, in connection with this proposed action.

______________________________________ ________________________

Melissa Miller-Henson, Executive Director Date

California Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Subsection (b)(50) of Section 7.40
Title 14, California Code of Regulations
Re: Klamath River Basin Sport Fishing 2024

I. Date of Initial Statement of Reasons: January 15, 2024

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing

Date: February 15, 2024 Location: Sacramento

(b) Discussion Hearing

Date: April 18, 2024 Location: San Jose

(c) Adoption Hearing

Date: May 15, 2024 Location: Teleconference

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations.

The Klamath River Basin, which consists of the Klamath River and Trinity River systems, is managed for fall-run Chinook Salmon (*Oncorhynchus tshawytscha*) through a cooperative system of state, federal, and tribal management agencies. Salmonid regulations are designed to meet natural and hatchery escapement needs for salmonid stocks, while providing equitable harvest opportunities for ocean sport, ocean commercial, river sport, and tribal fisheries.

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of sport and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service (NMFS).

The California Fish and Game Commission (Commission) adopts regulations for the ocean salmon sport (inside three miles) and the Klamath River Basin (in-river) sport fisheries which are consistent with federal fishery management goals.

Tribal entities within the Klamath River Basin maintain fishing rights for ceremonial, subsistence, and commercial fisheries that are managed consistent with federal fishery management goals. Tribal fishing regulations are promulgated by individual tribal governments.

Klamath River Fall-Run Chinook Salmon
Adult Klamath River fall-run Chinook Salmon (KRFC) harvest allocations and natural-area spawning escapement goals are established by PFMC. The KRFC harvest allocation between tribal and non-tribal fisheries is based on court decisions and allocation agreements between the various fishery representatives.

PFMC Overfishing Review
KRFC stocks have been designated as “overfished” by PFMC. This designation is the result of not meeting conservation objectives for these stocks. Management objectives and criteria for KRFC are defined in the PFMC Salmon Fishery Management Plan (FMP). The threshold for overfished status of KRFC is a three-year geometric mean less than or equal to 30,525 natural area adult spawners. This overfished-threshold was met for KRFC during the 2015-2017 period. The 30,525 KRFC natural area adult spawners is considered the minimum stock size threshold, per the FMP. The KRFC adult natural area spawning escapement for 2022 was 22,051 natural area adult spawners, which is below the one-year conservation threshold of 40,700 natural area adult spawners. The most recent three-year geometric mean of 25,857 is still less than the required 40,700 natural area adult spawners conservation threshold, therefore the KRFC are still considered as an “overfished” stock.

Accordingly, the FMP outlines a process for preparing a “rebuilding plan” that includes assessment of the factors that led to the decline of the stock, including fishing, environmental factors, model errors, etc. The rebuilding plan includes recommendations to address conservation of KRFC, with the goal of achieving rebuilt status. Rebuilt status requires meeting a three-year geometric mean of 40,700 adult natural area KRFC spawner escapement. The plan developed by representatives of National Marine Fisheries Service (NMFS), PFMC, U.S. Fish and Wildlife Service, the Department, and tribal entities, was submitted to PFMC in February 2019, adopted by PFMC in June 2019, and submitted to NMFS in August 2019. Forthcoming recommendations from the rebuilding plan may alter how KRFC are managed in the future, including changing the in-river allocation number, and/or allocating less than the normal target number.

Klamath River Spring-Run Chinook Salmon
The Klamath River Basin also supports Klamath River spring-run Chinook Salmon (KRSC). Naturally produced KRSC are both temporally and spatially separated from KRFC in most cases. Presently, KRSC stocks are not managed or allocated by PFMC. This in-river sport fishery is managed by general basin seasons, daily bag limit, and possession limit regulations. KRSC harvest is monitored on the Klamath River below the Highway 96 bridge at Weitchpec to the mouth of the Klamath River by creel survey. The upper Trinity River, upstream of Junction City, is monitored using tag returns from anglers. When needed, KRSC regulations are amended in a separate rulemaking.

KRFC Allocation Management
The PFMC allocation for the Klamath River Basin sport harvest is normally a minimum of 15 percent of the non-tribal PFMC harvest allocation of KRFC. Preseason stock projections of 2024 adult KRFC abundance will not be available from PFMC until March 2024. The 2024 basin allocation will be recommended by PFMC in April 2024. That allocation will inform the

quota that the Department proposes to the Commission for adoption as a quota for the in-river sport harvest at the Commission's May 2024 teleconference meeting.

The Commission may adopt a KRFC in-river sport harvest quota that is different than the quota proposed by the Department or the PFMC 2024 allocation for that fishery. Commission modifications need to meet biological and fishery allocation goals specified in law or established in the FMP.

The annual KRFC in-river sport harvest quota is specified in subsection 7.40(b)(50)(D)1. The quota is split among four geographic areas with a subquota for each area, expressed as a percentage of the total in-river quota, specified in subsection 7.40(b)(50)(D)2. For angler convenience, the subquotas, expressed as the number of fish, are listed for the affected river segments in subsection 7.40(b)(50)(E).

The in-river sport subquota percentages are shown in Figure 1, and are as follows:

1. Main stem Klamath River from 3,500 feet downstream of Iron Gate Dam to the Highway 96 bridge at Weitchpec -- 17 percent of the in-river sport quota;

2. Main stem Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth of the Pacific Ocean -- 50 percent of the in-river sport quota;

The spit area (within 100 yards of the channel through the sand spit formed at the Klamath River mouth) closes to all fishing after 15 percent of the total Klamath River Basin quota has been taken downstream of the Highway 101 bridge.

3. Main stem Trinity River downstream of the Old Lewiston Bridge to the Highway 299 West bridge at Cedar Flat -- 16.5 percent of the in-river sport quota; and

4. Main stem Trinity River downstream of the Denny Road bridge at Hawkins Bar to the confluence with the Klamath River -- 16.5 percent of the in-river sport fishery quota.

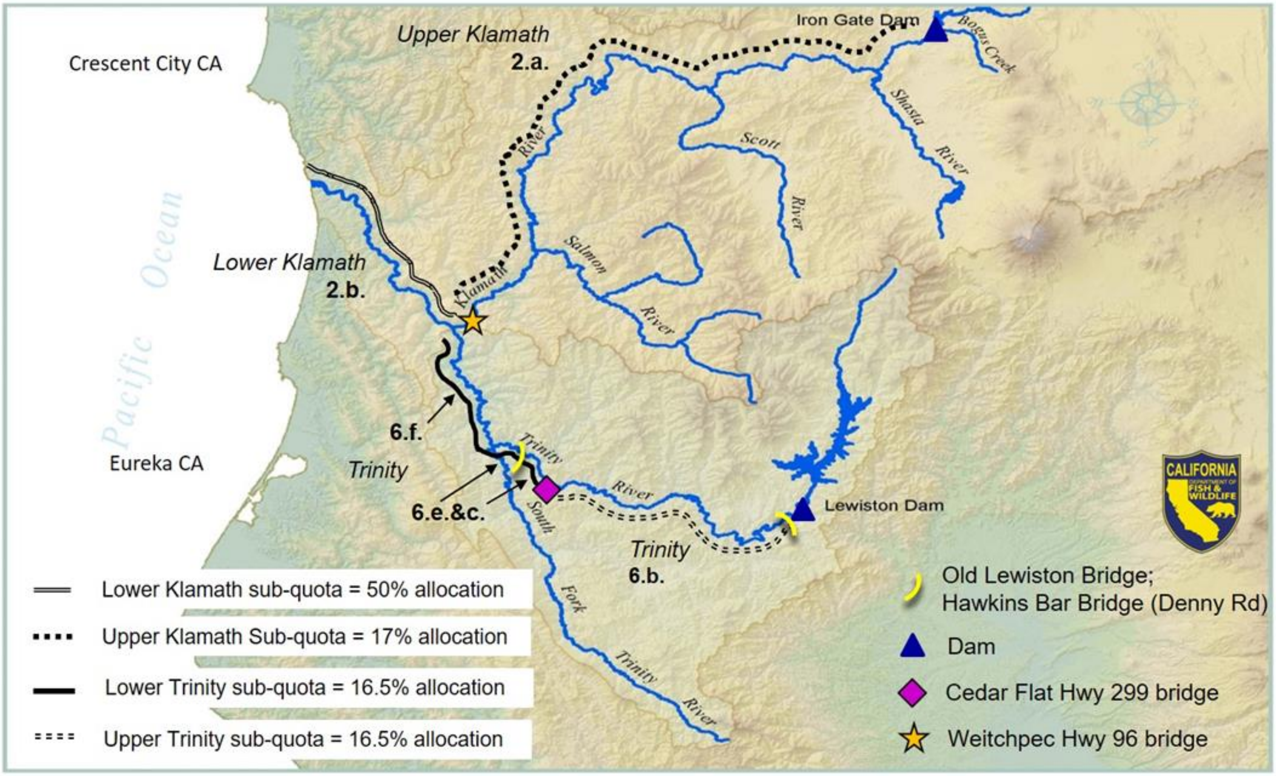

Figure 1. Map of the Klamath River Basin, showing the subquotas by reach of Trinity and Klamath rivers, and the associated subsections of 7.40(b)(50)(E).

These geographic areas are based upon the historical distribution of angler effort to ensure equitable harvest of adult KRFC in the Klamath River and Trinity River. The subquota system requires the Department to monitor or assess angler harvest of adult KRFC in each geographic area. All areas are monitored on a real time basis, except for the Klamath River upstream of Weitchpec and in the Trinity River. Due to funding and personnel reductions, the Department does not currently conduct real time harvest monitoring in the Klamath River upstream of the Weitchpec and in the Trinity River.

The Department has developed Harvest Predictor Models (HPM), which incorporate historic creel survey data from the Klamath River downstream of Iron Gate Dam to the confluence with the Pacific Ocean, and the Trinity River downstream of Lewiston Dam to the confluence with the Klamath River. Each HPM is driven by the positive relationship between KRFC harvested in the respective lower and upper subquota areas of the Klamath River and the Trinity River. The HPMs will be used by the Department to implement fishing closures to ensure that anglers do not exceed established subquota targets. Using this method, the upper Klamath River subquota area generally closes between 28-30 days after the lower Klamath River subquota is reached. Similarly, the upper Trinity River subquota area generally closes 45 days after the lower Klamath River subquota has been met. The Department also takes into consideration several other factors when implementing closure dates for subquota areas, including angler effort, KRFC run timing, weir counts, and ongoing recreational creel surveys performed by the Hoopa Valley Tribe in the lower Trinity River below Willow Creek.

Sport Fishery Management

The KRFC in-river sport harvest quota is divided into geographic areas, and harvest is monitored under real time subquota management. The KRSC in-river sport harvest is managed by general season, daily bag limit, and possession limit regulations.

The Department presently differentiates the two stocks by the following sport fish season in each sub-area:

Klamath River
July 1 through August 14 – General Season KRSC.

For purposes of clarity, daily bag and possession limits apply to that section of the Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth.

August 15 to December 31 **–** KRFC quota management.

Trinity River
July 1 through August 31 – General Season KRSC.

For purposes of clarity, daily bag and possession limits apply to that section of the Trinity River downstream of the Old Lewiston Bridge to the confluence with the South Fork Trinity River.

September 1 through December 31 – KRFC quota management.

The daily bag and possession limits apply to both stocks within the same sub-area and time period. Current regulations in subsections 7.40(b)(50)(E)2.a. and b. specify bag limits for KRFC stocks in the Klamath River. Current regulations in subsections 7.40(b)(50)(E)6.b., e., and f. specify bag limits for KRFC stocks in the Trinity River. Current regulations in subsection 7.40(b)(50)(C)2.b. specify KRFC possession limits.

Proposed Changes
Option 1: KRFC Adult Stocks (Sport Fishery Quota Management)
As in prior years, the Department is proposing a range for the quota and bag and possession limits for KRFC.

Quota: For public notice requirements, the Department recommends the Commission consider a quota range of 0–67,600 adult KRFC in the Klamath River Basin for the in-river sport fishery. This recommended range encompasses the historical range of the Klamath River Basin allocations and allows PFMC and Commission to make adjustments during the 2024 regulatory cycle.

Subquotas: The proposed subquotas for KRFC stocks are as follows:

1. Main stem Klamath River from 3,500 feet downstream of the Iron Gate Dam to the Highway 96 bridge at Weitchpec -- 17 percent of the total quota equates to [0-11,492];

2. Main stem Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth of the Pacific Ocean -- 50 percent of the total quota equates to [0-33,800];

3. Main stem Trinity River downstream of the Old Lewiston Bridge to the Highway 299 West bridge at Cedar Flat -- 16.5 percent of the total quota equates to [0-11,154]; and

4. Main stem Trinity River downstream of the Denny Road bridge at Hawkins Bar to the confluence with the Klamath River -- 16.5 percent of the total quota equates to [0-11,154].

Seasons: No changes are proposed for the Klamath River and Trinity River KRFC seasons:

- Klamath River - August 15 to December 31
- Trinity River - September 1 to December 31

Option 1 Bag and Possession Limits
Because the PFMC recommendations are not known at this time, ranges are shown in [brackets] below of bag and possession limits which encompass historical quotas. All are proposed for the 2024 KRFC fishery in the Klamath and Trinity rivers.

- Bag Limit - [0-4] Chinook Salmon – of which no more than [0-4] fish over [20-24] inches total length may be retained until the subquota is met, then 0 fish over [20-24] inches total length.
- Possession limit - [0-12] Chinook Salmon of which no more than [0–4] fish over [20-24] inches total length may be retained when the take of salmon over [20-24] inches total length is allowed.

The final KRFC bag and possession limits will align with the final federal regulations to meet biological and fishery allocation goals specified in law or established in the FMP.

As in previous years, no retention of adult KRFC is proposed once the subquota has been met.

Size Limits
KRFC are managed based on adult quotas which is the maximum number of adult fish (age three and older) that can be harvested. Last year, the Department moved away from the fixed standing cutoff size between grilse and adult Chinook Salmon of 23 inches total length to using a range between 20 to 24 inches total length as an annual option for cutoff size. This allows for annual variation in size cutoffs, as informed by previous year(s) data to manage the harvest of the adult KRFC quota more effectively. The Department is currently conducting a post season assessment of KRFC length and age data which will be used to help determine the proposed 2024 size cutoff. The 2024 proposed adult cutoff will be presented at the April Commission meeting.

Option 2: KRFC Fishery Closure
This option would close salmon fishing in the Klamath River Basin as specified by river reach(es) in subsection 7.40(b)(50) to provide protection to KRFC should a reduction in the stock be indicated by PFMC abundance projections. In any year, should the PFMC recommend a complete or near complete closure of ocean recreational salmon fishery and/or an allocation of 0 (zero) adult KRFC to the in-river fishery, this option would give the Department flexibility to respond to and support any federal action. This option prohibits all methods of targeting KRFC including catch and release fishing.

KRSC Sport Fishery
No regulatory changes are proposed in this rulemaking for the general KRSC opening and closing season dates, and bag, possession, and size limits.

Klamath River Dam Removal ISOR
At this time, the Commission is considering several proposed changes to the existing sport fishing regulations on the main stem Klamath River as part of the Klamath River Dam Removal project and contained in the *Klamath River Dam Removal Sport Fishing Updates ISOR* (OAL

Z2023-1106-05). Some of the proposed changes currently under consideration would affect Title 14 regulations contained in this ISOR specifically subsections (b)(50)(E)1. and (b)(50)(E)2. of Section 7.40. concerning the main stem Klamath River. The proposed changes to sport fishing regulations in anticipation of dam removals are anticipated to be approved by the Commission in February 2024 and in effect by mid-April, 2024. These new regulations for sport fishing for dam removal along the Klamath River would become the regulatory baseline for the proposed changes contained within this ISOR, and are planned to be updated as such for the Final Statement of Reasons.

(b) Goals and Benefits of the Regulation

It is the policy of this state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the state. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use. Adoption of scientifically-based Klamath River Basin salmon seasons, size limits, and bag and possession limits provide for the maintenance of sufficient populations of salmon to ensure their continued existence.

The benefits of the proposed regulations are conformance with federal fishery management goals, sustainable management of Klamath River Basic fish resources, health and welfare of California residents, and promotion of businesses that rely on salmon sport fishing in the Klamath River Basin.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 205, 265, 270, 315, 316.5, 399, and 2084, Fish and Game Code

Reference: Sections 200, 205, 265, 270, 316.5, and 2084, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change

None.

(e) Identification of Reports or Documents Supporting Regulation Change

In-River Sport Fishing Economics Technical Report, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, September 2011. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=164441&inline

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

The Department discussed the proposed amendments to the annual Klamath River Basin regulations at the Commission's Wildlife Resources Committee meeting on September 19, 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified by or brought to the attention of Commission staff concerning amendments for clarity that would have the same desired regulatory effect.

(b) No Change Alternative

The No Change Alternative for including amendments for clarity would leave the existing 2023 regulations in place. This may mean that anglers not fully understand the size limit cutoff that distinguishes a grilse salmon from an adult salmon in the Klamath River Basin.

(c) Description of Reasonable Alternatives that Would Lessen Adverse Impact on Small Business

None identified.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no significant adverse effect on the environment, and therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed regulation will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed regulations are projected to range from minor to no impact on the net revenues to local businesses servicing sport fishermen. If the 2024 KRFC quota is reduced, visitor spending may correspondingly be reduced, and in the absence of alternative visitor activities, the drop in spending could induce some business contraction. If the 2024 KRFC quota remains similar to the KRFC quotas allocated in previous years, then local economic impacts are expected to be unchanged. Neither scenario is expected to directly affect the ability of California businesses to compete with businesses in other states.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

An estimated 30-50 businesses that serve sport fishing activities are expected to be directly and/or indirectly affected depending on the final KRFC quota. The impacts range from no impact (Projection 1 under the Economic Impact Assessment (EIA), below) to small adverse impacts (Projection 3, EIA, below).

Depending on the final KRFC quota, the Commission anticipates the potential for some impact on the creation or elimination of jobs in California. The potential adverse employment impacts range from no impact to the loss of 13 jobs. Under all alternatives, due to the limited time period of this regulation's impact, the Commission anticipates no impact on the creation of new businesses, the elimination of existing businesses, or the expansion of businesses in California.

For all of the proposed scenarios, the possibility of growth of businesses to serve alternative recreational activities exists. Adverse impacts to jobs and/or businesses would be less if fishing of other species and grilse KRFC is permitted, than under a complete closure to all fishing. The impacted businesses are generally small businesses employing few individuals and, like all small businesses, are subject to failure for a variety of causes. Additionally, the long-term intent of the proposed regulatory action is to increase sustainability in fishable salmon stocks and, consequently, promote the long-term viability of these same small businesses.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State

None.

(e) Nondiscretionary Costs/Savings to Local Agencies

None.

(f) Programs Mandated on Local Agencies or School Districts

None.

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code

None.

(h) Effect on Housing Costs

None.

VII. Economic Impact Assessment

The proposed amendments under consideration will set the 2024 Klamath River Basin salmon sport fishing regulations to conform to the PFMC KRFC allocation. The Klamath River Basin is anticipated to be open for salmon sport fishing at levels similar to the levels in the 2022 sport fishing season (no closure year); however, the possibility of marine fishery area closures still exists. Ocean closures may in turn result in PFMC recommendations for Klamath River Basin salmon sport fishery closures for the take of adult KRFC. Adverse or positive impacts to jobs and businesses will depend on the 2024 KRFC allocation ultimately adopted by the PFMC, and the specific regulations promulgated by the Commission, in conjunction with the Department.

The proposed quota of 0 to 67,600 adult KRFC in 2024 represents a range from 0 percent or no salmon fishing on adult KRFC to greater than 100 percent of the 2022 Klamath River Basin

KRFC quota. Under all scenarios, sport fishing may be allowed for other sport fish species and most likely for grilse KRFC, regardless of PFMC allocation. Thus, any adverse impacts to businesses could be less severe than under a complete closure of fishing.

The preservation of Klamath River salmon stocks is vital for the ongoing success of Klamath River Basin businesses that provide goods and services related to sportfishing. Scientifically-based KRFC allocations are necessary for the continued preservation of the resource, and therefore the prevention of adverse economic impacts.

A 2011 NMFS report (*In-River Sport Fishing Economics Technical Report*), reports that non-resident (outside the Eureka/Crescent City area) salmon or steelhead angler average expenditures are estimated to be $125.51 (2022$) per angler day (for lodging, food, gasoline, fishing gear, boat fuel, and guide fees). The projections do not distinguish between spring and fall runs, however, the report states that the in-river harvest is almost exclusively fall-run. The NMFS report also excluded the Trinity River, the largest tributary to the Klamath. Since the Trinity River is allocated 33 percent of the KRFC total quota, this share is used to expand salmon and steelhead angler effort, and thus impacts on associated businesses that support anglers.

In a normal year, the total non-resident angler contribution to the entire Klamath River Basin (including the Trinity River) is estimated to be about $1,268,757 (2022$) in direct expenditures, resulting in about $2,258,387 (2022$) in total economic output that supports an estimated 26 jobs throughout the state. This is a conservative estimate of total economic impact as it counts only non-resident angler expenditures. The total impact of non-resident angler direct expenditures on labor income, total economic output, and jobs are shown in Table 1.

Table 1. Klamath River Basin* Salmon and Steelhead Economic Impact 2022

Klamath Sportfishing	Salmon	Steelhead	Total Impact
Expenditures	$1,265,329	$3,428	$1,268,757
Labor Income	$708,036	$1,918	$709,954
Total Economic Impact	$2,252,286	$6,101	$2,258,387
Total Jobs Impact	26	0.1	26

Sources: Department Northern Region Creel 2022 surveys, *In-River Sport Fishing Economics Technical Report*, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, September 2011. * Lower Klamath and Trinity Rivers.

Local resident average expenditures per angler day are estimated to be 60 percent less (markedly reduced lodging, gasoline, and food expenditures), which yields an estimate of $50.25 per angler day. Local resident anglers comprise about 22 percent of Klamath River Basin anglers. Any decreases to expenditures by resident anglers associated with reduced fishing opportunities may be offset by increased expenditures on other locally purchased goods and services – with no net change in local economic activity. Thus, the economic impact analysis focuses on non-resident angler expenditures which represent new money whose injection serves to stimulate the local economy.

Creel surveys in the Department’s Northern Region (Del Norte, Humboldt, Lassen, Mendocino, Modoc, Shasta, Siskiyou, Tehama and Trinity counties) reveal that local resident (Eureka/Crescent City) anglers comprise about 22 percent of Klamath River Basin anglers, with a majority (78%) of anglers coming from outside the immediate locale.

Economic Impact Projections

To demonstrate the potential economic impacts that may result from a quota anywhere within the range of 0-67,600 KRFC, three adult salmon catch projections are as follows: 100 percent of the 2022 adult KRFC catch limit; 50 percent of the 2022 adult KRFC catch limit; and 0 percent of the 2022 adult KRFC catch limit.

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

Projection 1: 100 percent of the 2022 adult KRFC catch limit: The Commission does not anticipate any adverse impacts on the creation or elimination of jobs, as the quotas would not decrease effort nor curtail the number of visitors and thus probable visitor expenditures in the fisheries areas.

Projection 2: 50 percent of the 2022 adult KRFC catch limit: The Commission anticipates some impact on the creation or elimination of jobs, which may be partially offset by the potential for continued sport fishing allowed for other sportfish and grilse KRFC. A 50 percent salmon catch reduction will likely reduce visitor spending by slightly less than 50 percent, given price elasticities of demand for salmon fishing activity of less than one. As the “price” of fishing per unit catch increases, the demand for fishing trips declines by a lesser extent, particularly in the short-run. While difficult to predict, job losses associated with a 50 percent reduction in the adult KRFC catch limit are expected to be less than half of the 26 estimated total jobs supported by salmon angler visits (i.e. fewer than 13 jobs).

Projection 3: 0 percent of the 2022 adult KRFC catch limit: In the event of fisheries closures for adult KRFC in some or all Klamath River Basin areas, the Commission anticipates less than 50 percent reduction in fishery-related jobs. As mentioned above, sport fishing for other species and grilse KRFC may still be allowed, thus mitigating potential job losses. A closure on the take of all KRFC was instituted in 2017, and only steelhead could be legally harvested during the fall season. The 2017 closure resulted in nearly a 50 percent drop in angler days. However, job creation or elimination tends to lag in response to short-term changes in consumer demand. Thus, the potential impacts of a closure on the take of adult KRFC are estimated to result in the loss of less than 13 jobs due to adjustment lags, and the continued sport fishing allowed for other species and potentially for grilse KRFC.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

Projection 1: 100 percent of the 2022 adult KRFC catch limit: The Commission does not anticipate any impacts on the creation of new business or the elimination of existing businesses, as the quotas would not decrease effort nor curtail the number of visitors and thus probable visitor expenditures in the fisheries areas.

Projection 2: 50 percent of the 2022 adult KRFC catch limit: The Commission anticipates a decline in visits to the fishery areas of less than 50 percent due to the continued sport fishing allowed for other species and grilse KRFC. This may result in some decline in business activity, but the Commission does not anticipate any impacts on the creation of new businesses or the elimination of existing businesses directly related to fishing activities.

However, with less effort being expended on salmon fishing, the possibility of alternative sportfishing activities and the growth of businesses to serve those activities exists.

Projection 3: 0 percent of the 2022 adult KRFC catch limit: In the event of salmon fisheries closures for adult KRFC in some or all Klamath River Basin areas, the Commission anticipates a decline in regional spending and thus reduced revenues to the approximately 30 to 50 businesses that directly and indirectly serve sport fishing activities with unknown impacts on the creation of new business or the elimination of existing businesses. However, adverse impacts may be mitigated by the continued opportunity to harvest other sportfish and the potential for take of grilse KRFC. Additionally, the long-term intent of the proposed regulatory action is to increase sustainability in fishable salmon stocks and, consequently, promote the long-term viability of these same small businesses.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

Projection 1: 100 percent of the 2022 adult KRFC catch limit: The Commission does not anticipate any impacts on the expansion of businesses in California as the quotas would not increase effort nor increase the number of visitors and thus probable visitor expenditures in the fisheries areas.

Projection 2: 50 percent of the 2022 adult KRFC catch limit: The Commission does not anticipate any impacts on the expansion of businesses currently doing business within the State. Decreases in expenditures by resident anglers associated with reduced fishing opportunities may be offset by increased expenditures on other locally purchased goods and services – with no net change in local economic activity. For non-resident anglers, however, decreases in local expenditures associated with decreases in local fishing opportunities may result in increases in other expenditures outside the Klamath River Basin area.

Projection 3: 0 percent of the 2022 adult KRFC catch limit: In the event of salmon fisheries closures for adult KRFC in some or all Klamath River Basin areas, the Commission does not anticipate any expansion of businesses in California. Decreases in expenditures by anglers associated with reduced fishing opportunities may be partially offset by increased expenditures on other locally purchased goods and services as anglers pursue other sportfish, potentially including grilse KRFC, or the substitution of salmon fishing with other recreational activities.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Under all projections, the Commission anticipates benefits to the health and welfare of California residents. Providing opportunities for a Klamath River Basin salmon sport fishery and other sport fisheries encourages a healthy outdoor activity and the consumption of a nutritious food. Sport fishing also contributes to increased mental health of its practitioners, as fishing is a hobby and form of relaxation for many. Sport fishing also provides opportunities for multi-generational family activities and promotes respect for California’s environment by the future stewards of California’s natural resources.

(e) Benefits of the Regulation to Worker Safety

Under all projections, the Commission does not anticipate benefits to worker safety because the proposed regulations will not impact working conditions.

(f) Benefits of the Regulation to the State's Environment

Under all projections, the Commission anticipates benefits to the environment in the sustainable management of Klamath River Basin salmonid resources. It is the policy of this State to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the State for the benefit of all the citizens of the State and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law, respecting fishing and the conservation of the living resources of the ocean and other waters under the jurisdiction and influence of the State. The objectives of this policy include, but are not limited to, the maintenance of sufficient populations of all species of aquatic organisms to ensure their continued existence, and the maintenance of a sufficient resource to support a reasonable sport use. Adoption of scientifically-based Klamath River Basin salmon seasons, size limits, and bag and possession limits provides for the maintenance of sufficient populations of salmon to ensure their continued existence.

(g) Other Benefits of the Regulation

Consistency with Federal Fishery Management Goals: California's salmon sport fishing regulations need to align with the new Federal regulations to achieve optimum yield in California. The PFMC annually reviews the status of west coast salmon populations. As part of that process, it recommends west coast adult salmon fisheries regulations aimed at meeting biological and fishery allocation goals specified in law or established in the FMP. These recommendations coordinate west coast management of sport and commercial ocean salmon fisheries off the coasts of Washington, Oregon, and California, and California inland salmon sport fisheries. These recommendations are subsequently implemented as ocean fishing regulations by the NMFS, and as salmon sport regulations for State marine and inland waters by the Commission.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations.

The Klamath River Basin, which consists of the Klamath River and Trinity River systems, is managed for fall-run Chinook Salmon (*Oncorhynchus tshawytscha*) through a cooperative system of state, federal, and tribal management agencies. Salmonid regulations are designed to meet natural and hatchery escapement needs for salmonid stocks, while providing equitable harvest opportunities for ocean sport, ocean commercial, river sport, and tribal fisheries.

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of sport and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service (NMFS).

The California Fish and Game Commission (Commission) adopts regulations for the ocean salmon sport (inside three miles) and the Klamath River Basin (in-river) sport fisheries which are consistent with federal fishery management goals.

Tribal entities within the Klamath River Basin maintain fishing rights for ceremonial, subsistence, and commercial fisheries that are managed consistent with federal fishery management goals. Tribal fishing regulations are promulgated by individual tribal governments.

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Adult Klamath River fall-run Chinook Salmon (KRFC) harvest allocations and natural spawning escapement goals are established by PFMC. The KRFC harvest allocation between tribal and non-tribal fisheries is based on court decisions and allocation agreements between the various fishery representatives.

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KRFC stocks have been designated as “overfished” by PFMC. This designation is the result of not meeting conservation objectives for these stocks. Management objectives and criteria for KRFC are defined in the PFMC Salmon Fishery Management Plan (FMP). The threshold for overfished status of KRFC is a three-year geometric mean less than or equal to 30,525 natural area adult spawners. This overfished-threshold was met for KRFC during the 2015-2017 period. The 30,525 KRFC natural area adult spawners is considered the minimum stock size threshold, per the FMP. The KRFC adult natural area spawning escapement for 2022 was 22,051 natural area adult spawners, which is below the one-year conservation threshold of 40,700 natural area adult spawners. The most recent three-year geometric mean of 25,857 is still less than the required 40,700 natural area adult spawners conservation threshold, therefore the KRFC are still considered as an “overfished” stock.

Accordingly, the FMP outlines a process for preparing a “rebuilding plan” that includes assessment of the factors that led to the decline of the stock, including fishing, environmental factors, model errors, etc. The rebuilding plan includes recommendations to address conservation of KRFC, with the goal of achieving rebuilt status. Rebuilt status requires meeting a three-year geometric mean of 40,700 adult natural area KRFC spawner escapement. The plan developed by representatives of National Marine Fisheries Service (NMFS), PFMC, U.S. Fish and Wildlife Service, the Department, and tribal entities, was submitted to PFMC in February 2019, adopted by PFMC in June 2019, and submitted to NMFS in August 2019. Forthcoming recommendations from the rebuilding plan may alter how KRFC are managed in the future, including changing the in-river allocation number, and/or allocating less than the normal target number.

Klamath River Spring-Run Chinook Salmon
The Klamath River Basin also supports Klamath River spring-run Chinook Salmon (KRSC). Naturally produced KRSC are both temporally and spatially separated from KRFC in most cases. Presently, KRSC stocks are not managed or allocated by PFMC. This in-river sport fishery is managed by general basin seasons, daily bag limit, and possession limit regulations. KRSC harvest is monitored on the Klamath River below the Highway 96 bridge at Weitchpec to the mouth of the Klamath River by creel survey. The upper Trinity River, upstream of Junction City, is monitored using tag returns from anglers. When needed, KRSC regulations are amended in a separate rulemaking.

KRFC Allocation Management
The PFMC allocation for the Klamath River Basin sport harvest is normally a minimum of 15 percent of the non-tribal PFMC harvest allocation of KRFC. Preseason stock projections of 2024 adult KRFC abundance will not be available from PFMC until March 2024. The 2024 basin allocation will be recommended by PFMC in April 2024. That allocation will inform the quota that the Department proposes to the Commission for adoption as a quota for the in-river sport harvest at the Commission's May 2024 teleconference meeting.

The Commission may adopt a KRFC in-river sport harvest quota that is different than the quota proposed by the Department or the PFMC 2024 allocation for that fishery. Commission modifications need to meet biological and fishery allocation goals specified in law or established in the FMP.

The annual KRFC in-river sport harvest quota is specified in subsection 7.40(b)(50)(D)1. The quota is split among four geographic areas with a subquota for each area, expressed as a percentage of the total in-river quota, specified in subsection 7.40(b)(50)(D)2. For angler convenience, the subquotas, expressed as the number of fish, are listed for the affected river segments in subsection 7.40(b)(50)(E).

The in-river sport subquota percentages are as follows:

1. Main stem Klamath River from 3,500 feet downstream of Iron Gate Dam to the Highway 96 bridge at Weitchpec -- 17 percent of the in-river sport quota;

2. Main stem Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth of the Pacific Ocean -- 50 percent of the in-river sport quota;

   The spit area (within 100 yards of the channel through the sand spit formed at the Klamath River mouth) closes to all fishing after 15 percent of the total Klamath River Basin quota has been taken downstream of the Highway 101 bridge.

3. Main stem Trinity River downstream of the Old Lewiston Bridge to the Highway 299 West bridge at Cedar Flat -- 16.5 percent of the in-river sport quota; and

4. Main stem Trinity River downstream of the Denny Road bridge at Hawkins Bar to the confluence with the Klamath River -- 16.5 percent of the in-river sport fishery quota.

These geographic areas are based upon the historical distribution of angler effort to ensure equitable harvest of adult KRFC in the Klamath River and Trinity River. The subquota system requires the Department to monitor or assess angler harvest of adult KRFC in each geographic area. All areas are monitored on a real time basis, except for the Klamath River upstream of Weitchpec and in the Trinity River. Due to funding and personnel reductions, the Department does not currently conduct real time harvest monitoring in the Klamath River upstream of the Weitchpec and in the Trinity River.

The Department has developed Harvest Predictor Models (HPM), which incorporate historic creel survey data from the Klamath River downstream of Iron Gate Dam to the confluence with the Pacific Ocean, and the Trinity River downstream of Lewiston Dam to the confluence with the Klamath River. Each HPM is driven by the positive relationship between KRFC harvested in the respective lower and upper subquota areas of the Klamath River and the Trinity River. The HPMs will be used by the Department to implement fishing closures to ensure that anglers do not exceed established subquota targets. Using this method, the upper Klamath River subquota area generally closes between 28-30 days after the lower Klamath River subquota is reached. Similarly, the upper Trinity River subquota area generally closes 45 days after the lower Klamath River subquota has been met. The Department also takes into consideration several other factors when implementing closure dates for subquota areas, including angler effort, KRFC run timing, weir counts, and ongoing recreational creel surveys performed by the Hoopa Valley Tribe in the lower Trinity River below Willow Creek.

Sport Fishery Management
The KRFC in-river sport harvest quota is divided into geographic areas, and harvest is monitored under real time subquota management. The KRSC in-river sport harvest is managed by general season, daily bag limit, and possession limit regulations.

The Department presently differentiates the two stocks by the following sport fish season in each sub-area:

Klamath River
July 1 through August 14 – General Season KRSC.

For purposes of clarity, daily bag and possession limits apply to that section of the Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth.

August 15 to December 31 **–** KRFC quota management.

Trinity River
July 1 through August 31 – General Season KRSC.

For purposes of clarity, daily bag and possession limits apply to that section of the Trinity River downstream of the Old Lewiston Bridge to the confluence with the South Fork Trinity River.

September 1 through December 31 – KRFC quota management.

The daily bag and possession limits apply to both stocks within the same sub-area and time period. Current regulations in subsections 7.40(b)(50)(E)2.a. and b. specify bag limits for KRFC stocks in the Klamath River. Current regulations in subsections 7.40(b)(50)(E)6.b., e., and f. specify bag limits for KRFC stocks in the Trinity River. Current regulations in subsection 7.40(b)(50)(C)2.b. specify KRFC possession limits.

Proposed Changes

Option 1: KRFC Adult Stocks (Sport Fishery Quota Management)

Quota: For public notice requirements, the Department recommends the Commission consider a quota range of 0–67,600 adult KRFC in the Klamath River Basin for the in-river sport fishery. This recommended range encompasses the historical range of the Klamath River Basin allocations and allows PFMC and Commission to make adjustments during the 2024 regulatory cycle.

Subquotas: The proposed subquotas for KRFC stocks are as follows:

1. Main stem Klamath River from 3,500 feet downstream of the Iron Gate Dam to the Highway 96 bridge at Weitchpec -- 17 percent of the total quota equates to [0-11,492];

2. Main stem Klamath River downstream of the Highway 96 bridge at Weitchpec to the mouth of the Pacific Ocean -- 50 percent of the total quota equates to [0-33,800];

3. Main stem Trinity River downstream of the Old Lewiston Bridge to the Highway 299 West bridge at Cedar Flat -- 16.5 percent of the total quota equates to [0-11,154]; and

4. Main stem Trinity River downstream of the Denny Road bridge at Hawkins Bar to the confluence with the Klamath River -- 16.5 percent of the total quota equates to [0-11,154].

Seasons: No changes are proposed for the Klamath River and Trinity River KRFC seasons:

- Klamath River - August 15 to December 31
- Trinity River - September 1 to December 31

Bag and Possession Limits

Because the PFMC recommendations are not known at this time, ranges are shown in [brackets] below of bag and possession limits which encompass historical quotas. All are proposed for the 2024 KRFC fishery in the Klamath and Trinity rivers.

- Bag Limit - [0-4] Chinook Salmon – of which no more than [0-4] fish over [20-24] inches total length may be retained until the subquota is met, then 0 fish over [20-24] inches total length.
- Possession limit - [0-12] Chinook Salmon of which no more than [0–4] fish over [20-24] inches total length may be retained when the take of salmon over [20-24] inches total length is allowed.

The final KRFC bag and possession limits will align with the final federal regulations to meet biological and fishery allocation goals specified in law or established in the FMP.

As in previous years, no retention of adult KRFC is proposed once the subquota has been met.

Size Limits

KRFC are managed based on adult quotas which is the maximum number of adult fish (age three and older) that can be harvested. Last year, the Department moved away from the fixed standing cutoff size between grilse and adult Chinook Salmon of 23 inches total length to using a range between 20 to 24 inches total length as an annual option for cutoff size. This allows for annual variation in size cutoffs, as informed by previous year(s) data to manage the harvest of the adult KRFC quota more effectively. The Department is currently conducting a post season assessment of KRFC length and age data which will be used to help determine the proposed 2024 size cutoff. The 2024 proposed adult cutoff will be presented at the April Commission meeting.

Option 2: KRFC Fishery Closure
This option would close salmon fishing in the Klamath River Basin as specified by river reach(es) in subsection 7.40(b)(50) to provide protection to KRFC should a reduction in the stock be indicated by PFMC abundance projections. In any year, should the PFMC recommend a complete or near complete closure of ocean recreational salmon fishery and/or an allocation of 0 (zero) adult KRFC to the in-river fishery, this option would give the Department flexibility to respond to and support any federal action. This option prohibits all methods of targeting KRFC including catch and release fishing.

Klamath River Dam Removal ISOR
At this time, the Commission is considering several proposed changes to the existing sport fishing regulations on the main stem Klamath River as part of the Klamath River Dam Removal project and contained in the *Klamath River Dam Removal Sport Fishing Updates ISOR* (OAL Z2023-1106-05). Some of the proposed changes currently under consideration would affect Title 14 regulations contained in this ISOR specifically subsections (b)(50)(E)1. and (b)(50)(E)2. of Section 7.40. concerning the main steam Klamath River. The proposed changes to sport fishing regulations in anticipation of dam removals are anticipated to be approved by the Commission in February 2024 and in effect by mid-April, 2024. These new regulations for sport fishing for dam removal along the Klamath River would become the regulatory baseline for the proposed changes contained within this ISOR, and are planned to be updated as such for the Final Statement of Reasons.

Benefit of the Regulations

The benefits of the proposed regulations are conformance with federal fishery management goals, sustainable management of Klamath River Basic fish resources, health and welfare of California residents, and promotion of businesses that rely on salmon sport fishing in the Klamath River Basin.

Consistency and Compatibility with Existing Regulations

Article IV, Section 20 of the State Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated authority to the Commission to promulgate sport fishing regulations (Fish and Game Code sections 200, 205, 315, and 316.5). The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. Commission staff has searched the California Code of Regulations and has found no other state regulations related to sport fishing in the Klamath River Basin.

State of California
Department of Fish and Wildlife

M e m o r a n d u m

Original on file;
Recieved April 8, 2024

Date: April 5, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Submittal of Addenda to the 2022 Negative Declarations Regarding Central Valley and Klamath River Basin Sport Fishing Regulations, Title 14, Section 7.40, California Code of Regulations (CCR)**

In compliance with the California Environmental Quality Act, the Department of Fish and Wildlife (Department) has prepared the enclosed addenda pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing Klamath River Basin (KRB) sport fishing. The Commission proposes to amend the sport fishing regulations for the "Central Valley fishery" for Sacramento River fall-run Chinook Salmon (SRFC), encompassing the following rivers and their respective subsections of Section 7.40, Title 14, CCR: American (b)(4), Feather (b)(43), Mokelumne (b)(66), and Sacramento (b)(80). The Commission also proposes to amend the KRB sport fishing regulations as set forth in Title 14, Section 7.40(b)(50) for Klamath River fall-run Chinook Salmon (KRFC).

In 2022, the Commission certified a Final Negative Declaration (ND) Regarding Central Valley Sport Fishing Regulations (2022 Central Valley Sport Fishing Regulations ND)(SCH No. 2018112036) as the lead agency under CEQA as part of the Commission's review and adoption of the Central Valley sport fishing regulations which focused on the potential for significant environmental impacts from a potential increase or decrease of SRFC daily bag and possession limits for the American, Feather, Mokelumne, and Sacramento rivers. The 2022 Central Valley Sport Fishing Regulations ND found no significant impacts for the range of daily bag and possession limits for SRFC sport fishing under regulatory Options 1, 2, and 3. The 2024 proposed daily bag and possession limits fall within the previously analyzed range of bag and possession limits and regulatory options. Therefore, there are no new significant or substantially more severe impacts from amending the SRFC sport fishing regulations to either decrease or increase the daily bag and possession limits on the American, Feather, Mokelumne, and Sacramento rivers.

In 2022, the Commission certified a Final ND Regarding Klamath River Basin Sport Fishing Regulations (2022 Klamath River Basin Sport Fishing Regulations ND)(SCH

No. 2022040251) as the lead agency under CEQA as part of the Commission's review and adoption of KRB sport fishing regulations which focused on the potential for significant environmental impacts from a potential increase or decrease of KRFC daily bag and possession limits for the Klamath and Trinity rivers. The 2022 Klamath River Basin Sport Fishing Regulations ND found no significant impacts for the KRB quota range and range of daily bag and possession limits for KRFC sport fishing. The 2024 proposed KRB quota, and daily bag and possession limit ranges fall within the previously analyzed ranges for the KRB quota and proposed bag and possession limits for KRFC stocks. Therefore, there are no new significant or substantially more severe impacts from amending the KRB sport fishing regulations to either decrease or increase the KRFC daily bag and possession limits on the Klamath and Trinity rivers.

If you have any questions regarding the enclosed documents, please contact Karen Mitchell, Senior Environmental Scientist, at (916) 205-0250.

Attachments

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ANALYSIS OF THE 2024

KLAMATH RIVER BASIN SPORT FISHING REGULATIONS

ADDENDUM

to the 2022 NEGATIVE DECLARATION
REGARDING KLAMATH RIVER BASIN
SPORT FISHING REGULATIONS

prepared by the

STATE OF CALIFORNIA
NATURAL RESOURCES AGENCY
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on behalf of

CALIFORNIA FISH AND GAME COMMISSION

as

LEAD AGENCY UNDER THE
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

for the

REGULARY NOTICED RULEMAKING ACTION TO AMEND
SECTION 7.40 TITLE 14,
CALIFORNIA CODE OF REGULATIONS
2024 FISHING SEASON

(OAL Notice File No. 2024-0223-02)

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this addendum pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing Klamath River Basin sport fishing. Annually, CDFW recommends Klamath River Basin (KRB) sport fishing regulations to the Commission. The Commission then makes the final determination on what amendments to the regulations should be implemented and is the lead agency for the purposes of CEQA. Under Fish and Game Code Section 200, the Commission has the authority to regulate the taking or possession of fish for the purpose of sport fishing.

The Commission proposes to amend the Klamath River Basin sport fishing regulations as set forth in Title 14, subsection 7.40(b)(50) of the California Code of Regulations for Klamath River fall-run Chinook Salmon (KRFC) based on federal fisheries management goals (project). Each year, CDFW evaluates the potential need to update the KRB sport fishing regulations for KRFC to align with federal fisheries management goals and presents any proposed amendments to the Commission for consideration.

The Commission established an in-basin quota and daily bag and possession limits for KRFC on the Klamath and Trinity rivers in 2022 with the certification of a Final Negative Declaration under CEQA (2022 Klamath River Basin Sport Fishing Regulations Negative Declaration (ND))(SCH No. 2022040251). The 2022 Klamath River Basin Sport Fishing Regulations ND provides relevant and important informational value as the Commission, as the CEQA lead agency, considers proposed amendments to the existing regulations for the 2024 KRB sport fishing season in California. This addendum documents the Commission's consideration of related environmental effects.

EARLIER PROJECT APPROVAL

CEQA review of the proposed project was conducted in accordance with the Commission's certified regulatory program approved by the Secretary for the California Natural Resources Agency pursuant to Public Resources Code Section 21080.5 (See generally CCR, Title 14, Sections 781.5 and 15251(b)). CEQA requires all public agencies in the state to evaluate the environmental impacts of discretionary projects they propose to carry out or approve, including promulgating regulations, which may have a potential to significantly affect the environment.

In 2022, the Commission certified a Final ND Regarding Klamath River Basin Sport Fishing Regulations (2022 Klamath River Basin Sport Fishing Regulations ND)(SCH No. 2022040251) as the lead agency under CEQA as part of the Commission's review and adoption of KRB sport fishing regulations which focused on the potential for significant environmental impacts from a potential decrease or increase of KRFC daily bag and possession limits for the Klamath and Trinity rivers. The Commission considered a quota range of 0–67,600 adult KRFC in the KRB, a daily bag limit range of 0-4 KRFC, and a possession limit range of 0-12 KRFC. The Commission, as the CEQA lead agency, certified the 2022 ND and determined adoption of the regulations as proposed would not result in any new significant or substantially more severe environmental effects. The Commission adopted a daily bag limit of two KRFC of which no more than one fish over 23 inches total length may be retained when the take of salmon over 23 inches total length is allowed and a possession limit of six KRFC of which no more than three fish over 23 inches total length may be retained when the take of salmon over 23 inches total length is allowed. The Commission also adopted a Klamath River Basin quota of 2,119 adult KRFC.

PROPOSED 2024 CHINOOK SALMON BAG AND POSSESSION LIMITS

The Pacific Fishery Management Council (PFMC) is responsible for adopting recommendations for the management of recreational and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California. When approved by the Secretary of Commerce, the recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service.

The PFMC developed the annual Pacific coast ocean salmon fisheries regulatory options for public review at its March 2024 meeting and will adopt its final regulatory recommendations at its April 2024 meeting based on the PFMC salmon abundance estimates and recommendations for ocean harvest for the coming season. Based on the April 2024 recommendation by PFMC, CDFW will recommend a KRB quota and specific bag and possession limit regulations for the KRB sport fishery to the Commission at its April 18, 2024 meeting. The Commission will then consider adoption of the KRB sport fishing regulations at its May 15, 2024 meeting.

Annually, CDFW recommends the Commission consider a quota range of 0 - 67,600 adult KRFC in the Klamath River Basin for the in-river sport fishery. This recommended range encompasses the historical range of the Klamath River Basin allocations and allows PFMC and the Commission to make adjustments during the 2024 regulatory cycle.

The proposed subquotas for KRFC are shown in **Figure 1.**, and are as follows:

1. Main stem Klamath River from 3,500 feet downstream of the Iron Gate Dam to the Highway 96 bridge at Weitchpec -- 17 percent of the total quota equates to [0-11,492];
2. Main stem Klamath River from downstream of the Highway 96 bridge at

Weitchpec to the mouth -- 50 percent of the total quota equates to [0-33,800];

3. Main stem Trinity River downstream of the Old Lewiston Bridge to the Highway 299 West bridge at Cedar Flat -- 16.5 percent of the total quota equates to [0- 11,154]; and

4. Main stem Trinity River downstream from the Denny Road bridge at Hawkins Bar to the confluence with the Klamath River -- 16.5 percent of the total quota equates to [0-11,154]

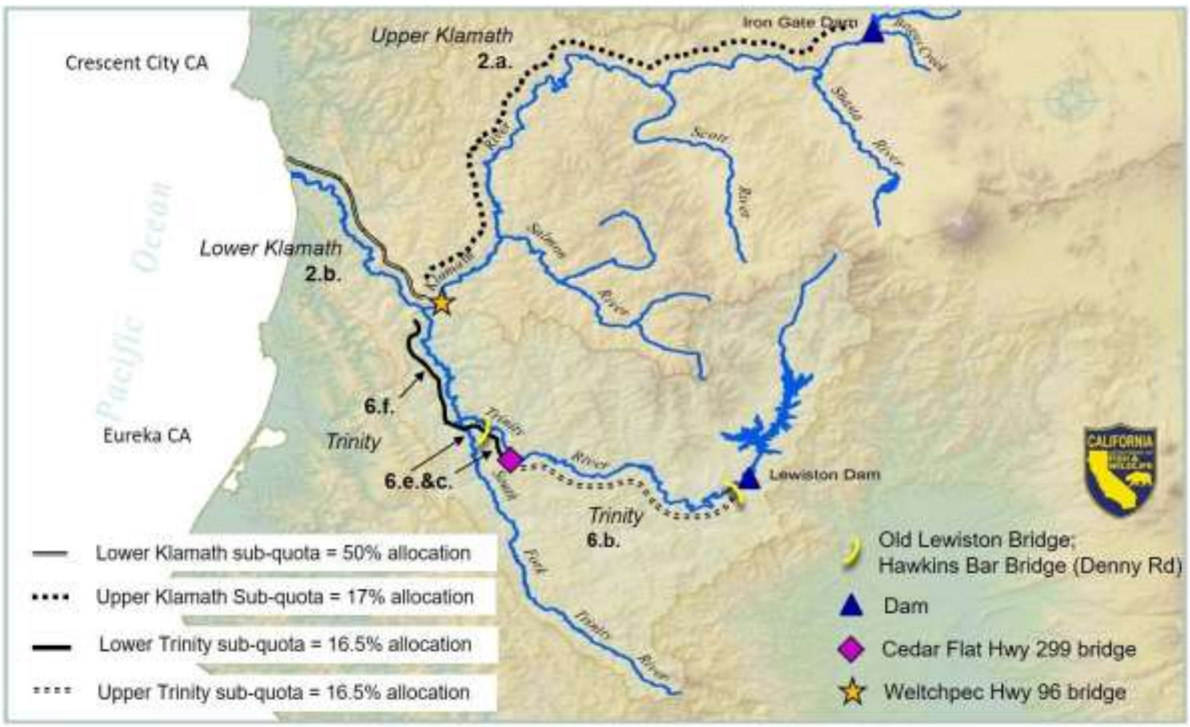

Figure 1. Map of the Klamath River Basin, showing the subquotas by reach of Trinity and Klamath rivers, and the associated subsections of 7.40(b)(50)(E).

No changes are proposed for the Klamath River and Trinity River KRFC seasons:

- Klamath River - August 15 to December 31
- Trinity River - September 1 to December 31

As in previous years, no retention of adult KRFC is proposed once the subquota has been met.

The range of proposed bag and possession limits for KRFC stocks are:

- Bag Limit - [0-4] Chinook Salmon – of which no more than [0-4] fish over [20-24] inches total length may be retained until the subquota is met, then 0 fish over [20-24] inches total length.

- Possession limit - [0-12] Chinook Salmon of which no more than [0–4] fish over [20-24] inches total length may be retained when the take of salmon over [20-24] inches total length is allowed.

In addition to the above quota, daily bag and possession limits, the 2024 proposed KRB fishing regulations include an option for closure of the KFRC should the PFMC recommend a complete or near complete closure of ocean recreational salmon fishery and/or an allocation of 0 (zero) adult KRFC to the in-river fishery. The 2022 Klamath River Basin Sport Fishing Regulations ND found no significant impacts for the KRB quota range and range of proposed daily bag and possession limits for KRFC sport fishing. The proposed 2024 KRB quota, and daily bag and possession limit ranges fall within the previously analyzed ranges for the KRB quota and proposed bag and possession limits for KRFC stocks. Therefore, there are no new significant or substantially more severe impacts from amending the KRB sport fishing regulations to either reduce or increase the KRFC daily bag and possession limits on the Klamath and Trinity rivers.

NO SUBSEQUENT ENVIRONMENTAL DOCUMENT IS REQUIRED

In general, CEQA applies whenever a public agency proposes to carry out or approve a discretionary project. (Public Resources Code, Section 21080(a)). CEQA provides that, where a public agency proposes to modify a previously approved project for which a Final Environmental Document was prepared and certified:

> "An addendum to an adopted negative declaration may be prepared if only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR or negative declaration have occurred.." (CCR, Title 14, section 15164(b))

- A Subsequent Environment Document (Section 15162) when there is substantial evidence that:
  - Substantial changes are proposed in the project, which will require major revisions to the previous environmental impact report (EIR) or environmental document (ED).
  - Substantial changes occur with respect to the circumstances under which the project is being undertaken, which will require major revisions to the previous EIR or environmental documentation.
  - New information, which was not known and could not have been known at the time the previous EIR or ED was certified as complete, becomes available.
- A Supplement to an Environment Document (Section 15163) when:
  - A subsequent ED is not required.
  - Only minor changes to the project are described.
  - Only that information to make the ED adequate is provided.

- An Addendum to the Certified ED (Section 15164) is proper when**:**
  - The changes or additions presented in this project are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent ED have occurred.
  - The Commission may properly prepare and may rely on an addendum in accordance with Section 15164 to fulfill its obligations under CEQA.

NO ADDITIONAL IMPACTS UNDER CEQA

The Commission has determined that amending the current KRB sport fishing regulations based on PFMC salmon abundance estimates will not result in any new or significant or substantially more severe environmental impacts than previously analyzed and disclosed in the 2022 Klamath River Basin Sport Fishing Regulations ND for this project.

This project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. There are no impacts to the habitat of fish and wildlife species.

This approval action adjusts the previous year daily bag and possession limits based on more current salmon abundance estimates. No other aspect of the project is changed. No new significant or substantially more severe impacts under CEQA will occur due to this change.

AMENDMENT OF THE KLAMATH RIVER BASIN SPORT FISHING REGULATIONS

In conclusion, the Commission finds that amending the KRB sport fishing regulations in CCR, Title 14, Section 7.40, will not result in any new significant or substantially more severe environmental effects than previously analyzed and disclosed in the 2022 Klamath River Basin Sport Fishing Regulations ND. The Commission also finds that subsequent or supplemental review beyond this Addendum is not warranted pursuant to the CCR, Title 14, Section 15164, in connection with this proposed action.

______________________________________ ________________________

Melissa Miller-Henson, Executive Director Date

California Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Section 502
Title 14, California Code of Regulations
Re: Waterfowl, Migratory; American Coot and Common Moorhen (Common Gallinule)

I. Date of Initial Statement of Reasons: October 2, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

The U.S. Fish and Wildlife Service (Service) annually establishes federal regulation frameworks (Frameworks) for migratory bird hunting. California shall set its waterfowl hunting regulations within the Frameworks. The Frameworks describe the earliest dates that waterfowl hunting seasons may open, the maximum number of days hunting can occur, the latest dates that hunting seasons must close, and the maximum daily bag limit. The proposed hunting season Frameworks for a given year are developed in the fall of the prior year for a majority of species and populations. For example, the breeding populations (including the California Breeding Population Survey) and habitat conditions observed in 2023 and the regulatory alternatives selected for the 2023 hunting season will be used to develop the Frameworks for the 2024-25 season.

States may make recommendations to change the Frameworks. These recommendations are made to the four regional Flyway councils in late summer (July, August or September). Flyway councils may elect to forward recommendations to the Service. The Service may elect to incorporate proposed changes in the Frameworks. The Service considers these and other recommendations at the Service’s Regulation Committee public meeting held in September or October. Proposed season Frameworks are typically published in the Federal Register by mid-December and final Frameworks published by late February.

Section 355 of the Fish and Game Code authorizes the Fish and Game Commission (Commission) to adopt annual regulations pertaining to the hunting of migratory birds that conform with or further restrict the regulations prescribed by the Service pursuant to its authority under the Migratory Bird Treaty Act. The Commission selects and establishes state regulations that specify hunting season dates and daily bag limits.

Current regulations in Section 502, Title 14, California Code of Regulations (CCR), provide definitions, hunting zone descriptions, season opening and closing dates, and daily bag and possession limits for hunting of waterfowl. The proposed Frameworks for the 2024-25 season were approved by the Flyway councils in August and at the Service's Regulations Committee meeting in October. The Frameworks allow for a liberal duck season which includes: a 107-day season; a 7 daily duck limit including 7 mallards but only 2 hen mallards, 1 pintail, 2 canvasback, 2 redheads, and 2 scaup (during an 86-day season); and closing no later than January 31. The duck daily bag limits and season length, as well as the season lengths for geese, are provided as ranges below, to allow the Commission flexibility in determining the final regulations.

A range of season length and bag limit (zero bag limit represents a closed season) are also provided for black brant. The range is necessary, as the black brant Framework cannot be determined until the Pacific Flyway Winter Brant Survey is conducted in January 2024. The black brant regulatory package is determined by the most current Winter Brant Survey, rather than the prior year survey. The proposed season length and bag limit will be updated per the Black Brant Harvest Strategy pending results of the January 2024 survey. See the Summary of Proposed Waterfowl Hunting Regulations for 2024-25 table in the Informative Digest/Policy Statement Overview for the range of season and bag limits.

Lastly, federal regulations provide that California's hunting regulations shall conform to those of Arizona in the Colorado River Zone and those of Oregon in the North Coast Special Management Area.

The Department-recommended changes to Section 502 are:

1) Decrease the duck season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone, in subsection 502(d)(3)(B) for the Southern California Zone, and in subsection 502(d)(5)(B) for the Balance of State Zone.

   The existing duck season length for the referenced zones is 103 days. Adjusting the season length from 103 to 98 days is necessary for the upcoming season in order to close on January 31 and maintain a traditional opening Saturday in late October. In prior rulemakings, the Commission adopted the latest possible closing date of January 31 rather than the historical closing day of the last Sunday in January. This annual adjustment also results in modifications to falconry-only seasons.

2) Decrease the goose season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone,in subsection 502(d)(3)(B) for the Southern California Zone, and in subsection 502(d)(5)(B) for the Balance of State Zone.

   The existing goose season length for the Southern San Joaquin Valley and Southern California zones is 103 days and 100 days in the Balance of State Zone. See item 1 above for the justification. This annual adjustment also results in modifications to Veterans and Active Military Personnel Waterfowl Hunting Days (VAMP Days) and falconry-only seasons.

3) Allow geese to be taken during VAMP Days in subsection 502(f)(B)4 for the Balance of

State Zone.

The existing regulation does not allow geese because all available hunting days in the Balance of State Zone were allocated prior to implementation of VAMP Days. See item 1 above. The decrease in the goose season to 98 days allows the option of goose hunting during VAMP Days in this zone while still offering the existing early and late goose seasons. See option 2 in regulatory text in subsection 502(f)(B)4. However, in future rulemakings, either modifying the timing or reducing the Late Season will need to be considered to allow goose hunting during VAMP Days in this zone.

4) Allow up to five days of falconry-only season in subsection 502(g)(1)(B) for the Southern San Joaquin Valley, Southern California and Balance of State zones.

   The existing regulation does not allow a falconry-only season because all available hunting days have been allocated. The length of the falconry-only season is contingent upon the number of days used for the general duck and goose seasons, in addition to the Youth and Veteran Hunt Days, as seasons cannot exceed 107 days.

   In addition, an alternative was offered by the public regarding timing of the Late Season for geese in subsection 502(d)(5)(B) for the Balance of State Zone, see item IV below. The proposal was to move the Late Season for geese to coincide with VAMP Days in subsection 502(f)(B)4. Two options have been provided for consideration to both subsections: option 1 retains the closure of geese on Type A and B wildlife areas during the Late Season and does not allow geese during VAMP Days; option 2 allows goose hunting during the Late Season on Type A and B wildlife areas and allows geese during VAMP Days.

Minor editorial changes are also proposed to clarify and simplify the regulations and to comply with existing federal Frameworks.

(b) Goals and Benefits of the Regulation

The goals and benefits of the regulations are to provide for the conservation and maintenance of sufficient waterfowl populations to ensure their continued existence, while providing for balanced hunting opportunity, consistent with Commission and Department policies.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Section(s) 265 and 355, Fish and Game Code
Reference: Section(s) 265, 355, and 356, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change: None.

(e) Identification of Reports or Documents Supporting Regulation Change: None.

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

This proposal was discussed at the Commission’s Wildlife Resources Committee (WRC) meeting held on September 19, 2023, and a public scoping session will be held in late November 2022.

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

An alternative was offered by the public regarding timing of the Late Season for geese in the Balance of State Zone. The proposal was to move the Late Season for geese to coincide with the VAMP Days. The current regulation for VAMP Days in this zone does not allow geese because all goose days have been allocated. This was discussed at the Wildlife Resources Committee (WRC) meeting on September 19, 2023. The WRC indicated further consideration of this proposal would be warranted.

The Department did not include this recommendation because the intent of the Late Season for geese. The Late Season was implemented for the 2011-12 season as a tool to alleviate crop depredation on private pasture lands due to increasing concerns raised by the agricultural community. The timing of the Late Season was placed in later February when geese were still present in large concentrations in the Balance of State Zone. Further, the Type A and B wildlife areas are closed during the Late Season so geese can move onto public lands.

The Department has recommended to maintain the timing and length for the Early and Late goose seasons, and a 98 day Regular Season for geese. This allows goose hunting during the two VAMP days (see item 3 above). However, in the following seasons (2025-26 and later) the Regular Season length may be subject to increases so excess goose days for VAMP Days is reduced or eliminated. For the 2025-26 season, the Late Season would have to be reduced to allow geese during VAMP Days in addition to ducks. Prior to moving the Late Season, the Department would like feedback from the agricultural community on the effectiveness of the regulation to alleviate crop depredation. The Department is concerned about reducing the effectiveness of the Late Season for geese, regulation complexity, and enforcement concerns.

(b) No Change Alternative

The No Change Alternative would retain the 2023-24 regulations for the 2024-25 season which may place the state out of compliance with federal regulations. This alternative was rejected because in prior rulemakings, the Commission preferred the latest possible closing date of January 31 and maintaining a traditional opening Saturday in late October. This results in an annual adjustment to the season length; 98 days rather than 103 days for the 2024-25 season because of calendar progression. In addition, modifying the season length affects available days for falconry-only seasons, and must also be adjusted annually so as not to exceed 107 days.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states.

The proposed regulations are expected to maintain a similar level of recreational waterfowl hunting opportunity for the public. Shifting days for general duck season affects available days for falconry-only seasons, which must also be adjusted annually so total season length does not exceed 107 days.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate any impacts on the creation or elimination of jobs, the creation of new business, the elimination of existing businesses, or the expansion of businesses in California. The proposed waterfowl regulations will set the 2024-25 waterfowl hunting season dates and bag limits within the federal Frameworks. The total hunting season length of 107 remains the same, with only modifications to the season types (duck, goose or falconry-only) will have little to no impacts to jobs and/or businesses that provide services to waterfowl hunters. The Commission anticipates that the proposed 2024-25 waterfowl hunting regulations provide benefit for the health and welfare of California residents by providing opportunity for outdoor activity. The Commission expects no benefits to worker safety but does expect benefit to the environment in that setting these regulations facilitates maintenance of sufficient waterfowl populations and their habitats while providing for the public's beneficial use and enjoyment. The most recent Service National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for California estimated that migratory bird hunters contributed about $169 million to the state economy during the 2011 migratory bird hunting season. However, minor variations in hunting regulations such as the ones proposed for waterfowl are, by themselves, unlikely to provide notable economic stimulus to the state. Businesses that support waterfowl hunting are generally small businesses employing a few individuals and, like all small businesses, are subject to failure for a variety of causes. The long-term intent of the proposed regulations is to sustainably manage waterfowl populations, and consequently, the long-term viability of the same small businesses.

(c) Cost Impacts on a Representative Private Person or Business

The agency is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None.

(e) Nondiscretionary Costs/Savings to Local Agencies: None.

(f) Programs Mandated on Local Agencies or School Districts: None.

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None.

(h) Effect on Housing Costs: None.

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The proposed conformance to federal regulations is expected to maintain similar levels of hunting opportunity and activity as previous seasons such that little to no net impacts on the creation or elimination of jobs are anticipated within the state from the adoption of the proposed waterfowl hunting regulations for the 2024-25 season. The most recent Service National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for California estimated that waterfowl hunters contributed about $169,115,000 to businesses in California during the 2011 waterfowl hunting season. The proposed regulations in themselves should not affect the typical level of waterfowl hunting expenditures. Businesses within the state that provide goods and services to waterfowl hunters are generally small businesses employing few individuals and, like all small businesses, are subject to failure for a variety of causes. The long-term intent of the proposed regulations is to sustainably manage waterfowl populations, and consequently, the long-term viability of the same small businesses.

The 2011 National Survey is posted on the U.S. Census Bureau website https://www.census.gov/content/dam/Census/library/publications/2014/demo/fhw11-nat.pdf and the 2011 National Survey of Fishing and Hunting, and Wildlife-Associated Recreation Report for California can be found at https://www2.census.gov/programs-surveys/fhwar/publications/2011/fhw11-ca.pdf.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The proposed regulation is not anticipated to prompt the creation of new businesses or the elimination of existing businesses within the state. Minor variations in regulations pertaining to hunting are, by themselves, unlikely to stimulate the creation of new businesses or cause the elimination of existing businesses. The number of hunting trips and the economic contributions from the trips are not expected to change substantially.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The proposed minor variations in season lengths are, by themselves, unlikely to stimulate substantial expansion of businesses currently doing business in the state. The long-term intent of the proposed regulations is to sustainably manage waterfowl populations, and consequently, the long-term viability of various businesses that serve recreational waterfowl hunters.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat and humans. With that awareness comes an understanding of the role humans play in being caretakers of the environment. Hunting is a tradition that is often passed from one generation to the next, creating a special bond between family members and friends.

(e) Benefits of the Regulation to Worker Safety

The regulations will not affect worker safety because they do not address working conditions.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code Section 1801, it is the policy of the state to encourage the preservation, conservation, and maintenance of waterfowl resources for all citizens of the state. The objectives of this policy include, but are not limited to, maintenance of sufficient populations and their habitats, provide for beneficial use and enjoyment, to perpetuate the waterfowl resource for their intrinsic and ecological values, and to maintain diversified recreation use including sport hunting consistent with the status of this resource. Adoption of scientifically based waterfowl hunting regulations provides for the maintenance of sufficient waterfowl populations to ensure these objectives are met. Further, the fees that hunters pay for licenses and stamps fund wildlife conservation.

(g) Other Benefits of the Regulation

Hunting seasons provide an incentive for private landowners to maintain waterfowl habitat, mainly wetlands, that benefit waterfowl and other wetland dependent wildlife.

Informative Digest/Policy Statement Overview

Current regulations in Section 502, Title 14, California Code of Regulations (CCR), provide definitions, hunting zone descriptions, season opening and closing dates, and daily bag and possession limits for hunting of waterfowl. The proposed Frameworks for the 2024-25 season were approved by the four regional Flyway councils in August and at the U.S. Fish and Wildlife Service (Service's) Regulations Committee meeting in October. The Frameworks allow for a liberal duck season which includes: a 107-day season; a 7 daily duck limit including 7 mallards but only 2 hen mallards, 1 pintail, 2 canvasback, 2 redheads, and 2 scaup (during an 86-day season); and closing no later than January 31. The duck daily bag limits and season length, as well as the season lengths for geese, are provided as ranges below, to allow the Commission flexibility in determining the final regulations.

A range of season length and bag limit (zero bag limit represents a closed season) are also provided for black brant. The range is necessary, as the black brant Framework cannot be determined until the Pacific Flyway Winter Brant Survey is conducted in January 2024. The black brant regulatory package is determined by the most current Winter Brant Survey, rather than the prior year survey. The proposed season length and bag limit will be updated per the Black Brant Harvest Strategy pending results of the January 2024 survey. See the Summary of Proposed Waterfowl Hunting Regulations for 2024-25 table, below.

Lastly, Federal regulations provide that California's hunting regulations shall conform to those of Arizona in the Colorado River Zone and those of Oregon in the North Coast Special Management Area.

The Department recommended changes to Section 502 are:

1) Decrease the duck season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone, in subsection 502(d)(3)(B) for the Southern California Zone, and in subsection 502(d)(5)(B) for the Balance of State Zone.
2) Decrease the goose season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone and in subsection 502(d)(3)(B) for the Southern California Zone.
3) Allow geese to be taken during Veterans and Active Military Personnel Waterfowl Hunting (VAMP) Days in subsection 502(f)(B)4. for the Balance of State Zone.
4) Allow up to five days of falconry-only season in subsection 502(g)(1)(B) for the Southern San Joaquin Valley, Southern California and Balance of State zones.

In addition, an alternative was offered by the public regarding timing of the Late Season for geese in subsection 502(d)(5)(B) for the Balance of State Zone. The proposal was to move the Late Season for geese to coincide with VAMP Days in subsection 502(f)(B)4. Two options have been provided for consideration in the regulatory text to both subsections: option 1 retains the closure of geese on Type A and B wildlife areas during the Late Season and does not allow geese during VAMP Days; option 2 allows goose hunting during the Late Season on Type A and B wildlife areas and allows geese during VAMP Days.

The Department has recommended to maintain the timing and length for the Early and Late goose seasons, and a 98 day Regular Season for geese. This allows goose hunting during the two VAMP days (see item 3 above). However, in the following seasons (2025-26 and later) the Regular Season length may be subject to increases so excess goose days for VAMP Days is reduced or eliminated. For the 2025-26 season, the Late Season would have to be reduced to allow geese during VAMP Days in addition to ducks. Prior to moving the Late Season, the Department would like feedback from the agricultural community on the effectiveness of the regulation to alleviate crop depredation. The Department is concerned about reducing the effectiveness of the Late Season for geese, regulation complexity, and enforcement concerns.

Minor editorial changes are also proposed to clarify and simplify the regulations and to comply with existing federal Frameworks.

Benefits of the regulations

The benefits of the proposed regulations are consistency with federal law and the sustainable management of the state’s waterfowl resources. Continued benefits to jobs and/or businesses that provide services to waterfowl hunters will be realized with the continued adoption of waterfowl hunting seasons in 2024-25.

Evaluation of incompatibility with existing regulations

The Commission has reviewed its regulations in Title 14, CCR, and conducted a search of other regulations on this topic and has concluded that the proposed amendments to Section 502 are neither inconsistent nor incompatible with existing State regulations. No other State agency has the authority to promulgate waterfowl hunting regulations.

Summary of Proposed Waterfowl Hunting Regulations for 2024-25

AREA	SPECIES	SEASONS	DAILY BAG & POSSESSION LIMITS
Statewide	Coots & Moorhens (Gallinules)	Concurrent w/duck season	25/day. Possession limit triple the daily bag.
Northeastern Zone	Ducks	No longer than 103 days	[4-7]/day, which may include: [3-7] mallards no more than [1-2] females. 1 pintail, 2 canvasback, 2 redheads. Possession limit triple the daily bag.
Northeastern Zone *Season may be split for Scaup*	Scaup	No longer than 86 days	2 scaup. Possession limit triple the daily bag.
Northeastern Zone *Season may be split*	Geese	No longer than 105 days except for Canada geese	30/day, which may include: 20 white geese, 10 dark

AREA	SPECIES	SEASONS	DAILY BAG & POSSESSION LIMITS
for Dark and White geese		which cannot exceed 100 days or beyond Jan 12	geese, no more than 2 Large Canada geese. Possession limit triple the daily bag.
Southern San Joaquin Valley Zone	Ducks	No longer than 98 days	[4-7]/day, which may include: [3-7] mallards no more than [1-2] females. 1 pintail, 2 canvasback, 2 redheads. Possession limit triple the daily bag.
Southern San Joaquin Valley Zone *Season may be split for Scaup*	Scaup	No longer than 86 days	2 scaup. Possession limit triple the daily bag.
Southern San Joaquin Valley Zone	Geese	No longer than 98 days	30/day, which may include: 20 white geese, 10 dark geese. Possession limit triple the daily bag.
Southern California Zone	Ducks	No longer than 98 days	[4-7]/day, which may include: [3-7] mallards no more than [1-2] females. 1 pintail, 2 canvasback, 2 redheads. Possession limit triple the daily bag.
Southern California Zone *Season may be split for Scaup*	Scaup	No longer than 86 days	2 scaup. Possession limit triple the daily bag.
Southern California Zone	Geese	No longer than 98 days	23/day, which may include: 20 white geese, 3 dark geese. Possession limit triple the daily bag.
Colorado River Zone	Ducks	No longer than 101 days	7/day, which may include: 7 mallards no more than 2 females or Mexican ducks. 1 pintail, 2 canvasback, 2 redheads. Possession limit triple the daily bag.

AREA	SPECIES	SEASONS	DAILY BAG & POSSESSION LIMITS
Colorado River Zone *Season may be split for Scaup*	Scaup	No longer than 86 days	2 scaup. Possession limit triple the daily bag.
Colorado River Zone	Geese	No longer than 101 days	25/day, up to 20 white geese, up to 5 dark geese. Possession limit triple the daily bag.
Balance of State Zone	Ducks	No longer than 98 days	[4-7]/day, which may include: [3-7] mallards no more than [1-2] females. 1 pintail, 2 canvasback, 2 redheads. Possession limit triple the daily bag.
Balance of State Zone *Season may be split for Scaup*	Scaup	No longer than 86 days	2 scaup. Possession limit triple the daily bag.
Balance of State Zone *Season may be split for Dark and White Geese.*	Geese	Early Season: 3 days (Canada goose only) Regular Season: no longer than 98 days Late Season: Canada geese no longer than 2 days and white-fronted and white geese no longer than 5 days	30/day, which may include: 20 white geese, 10 dark geese. Possession limit triple the daily bag.

SPECIAL MANAGEMENT AREAS

AREA	SPECIES	SEASON	DAILY BAG & POSSESSION LIMITS
North Coast *Season may be split*	All Canada Geese	No longer than 105 days except for Large Canada geese which cannot exceed 100 days or extend beyond Jan 31	10/day, only 1 may be a Large Canada goose. Possession limit triple the daily bag. Large Canada geese are closed during the Late Season.
Humboldt Bay South Spit (West Side)	All species	Closed during brant season	
Klamath Basin	Dark and white geese	105 days except for Canada geese which cannot exceed 100 days or extend beyond Jan 12	30/day, which may include: 20 white geese, 10 dark geese only 2 may be a Large Canada goose.

AREA	SPECIES	SEASON	DAILY BAG & POSSESSION LIMITS
			Possession limit triple the daily bag.
Sacramento Valley	White-fronted geese	Open concurrently with general goose season through Dec 21	3/day. Possession limit triple the daily bag.
Morro Bay	All species	Open in designated areas only	Waterfowl season opens concurrently with brant season.
Martis Creek Lake	All species	Closed until Nov 16	
Northern Brant	Black Brant	No longer than 37 days and closing no later than Dec 14.	[0-2]/day. Possession limit triple the daily bag.
Balance of State Brant	Black Brant	No longer than 37 days and closing no later than Dec 15.	[0-2]/day. Possession limit triple the daily bag.
Imperial County *Season may be split*	White Geese	No longer than 105 days	20/day. Possession limit triple the daily bag.

YOUTH WATERFOWL HUNTING DAYS (NOTE: To participate in these Youth Waterfowl Hunts, youth must be accompanied by a non-hunting adult 18 years of age or older. Federal regulations require that hunters must be 17 years of age or younger.)

AREA	SPECIES	SEASON	DAILY BAG & POSSESSION LIMITS
Northeastern Zone	Same as regular season	The Saturday fourteen days before the opening of waterfowl season extending for 2 days.	Same as regular season
Southern San Joaquin Valley Zone	Same as regular season	The first Saturday in February extending for 2 days.	Same as regular season
Southern California Zone	Same as regular season	The first Saturday in February extending for 2 days.	Same as regular season
Colorado River Zone	Same as regular season	The first Saturday in February extending for 2 days.	Same as regular season
Balance of State Zone	Same as regular season	The first Saturday in February extending for 2 days.	Same as regular season

Veterans and Active Military Personnel Waterfowl Hunting Days (NOTE: Veterans (as defined in Section 101 of Title 38, United States Code) and members of the Armed Forces on active duty, including members of the National Guard and Reserves on active duty (other than training), may participate.

AREA	SPECIES	SEASON	DAILY BAG & POSSESSION LIMITS
Northeastern Zone	Ducks, Coots, and Moorhens	The Saturday following the closing of the regular duck season extending for 2 days.	Same as regular season
Balance of State Zone	Same as regular season	The second Saturday in February extending for 2 days.	Same as regular season
Southern San Joaquin Valley Zone	Same as regular season	The second Saturday in February extending for 2 days.	Same as regular season
Southern California Zone	Same as regular season	The second Saturday in February extending for 2 days.	Same as regular season

FALCONRY

AREA	SPECIES	SEASON	DAILY BAG & POSSESSION LIMITS
Northeastern Zone	Same as regular season	No longer than 107 days.	3/day. Possession limit 9
Balance of State Zone	Same as regular season	No longer than 107 days.	3/day. Possession limit 9
Southern San Joaquin Valley Zone	Ducks, Coots, and Moorhens	No longer than 107 days.	3/day. Possession limit 9
Southern California Zone	Same as regular season	No longer than 107 days.	3/day. Possession limit 9
Colorado River Zone	Ducks, Coots, and Moorhens	No longer than 107 days.	3/day. Possession limit 9

Proposed Regulatory Language

Section 502, Title 14, CCR, is amended as follows:

§502. Waterfowl, Migratory; American Coot and Common Moorhen (Common Gallinule).

[No changes to subsections (a) through (b)]

(c) Seasons and Bag and Possession Limits for American Coots, and Common Moorhens.

(1) Statewide Provisions.

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
American Coot and Common Moorhen	Concurrent with duck season(s)	Daily bag limit: 25, either all of one species or a mixture of these species. Possession limit: triple the daily bag limit.

(d) Seasons and Bag and Possession Limits for Ducks and Geese by Zone.

(1) Northeastern California Zone (NOTE: SEE SUBSECTION 502(d)(6) BELOW FOR SPECIAL SEASONS AND CLOSURES.)

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers)	~~From the first Saturday in October extending for 103 days.~~ ~~Scaup: from the first Saturday in October extending for a period of 58 days and from the third Thursday in December extending for a period of 28 days.~~ [Opening no earlier than the first Saturday in October and closing no later than January 31. Season may be split into two segments and no longer than 103 days except for scaup season can be no longer than 86 days.]	Daily bag limit: ~~7~~ [4-7] Daily bag limit may include: • ~~7~~ [3-7] mallards, but not more than ~~2~~ [1-2] females. • 1 pintail (either sex). • 2 canvasback (either sex). • 2 redheads (either sex). • 2 scaup (either sex). Possession limit: triple the daily bag limit.

(A) Species	(B) Season	(C) Daily Bag and Possession Limits
Geese	Regular Season: ~~Small and Large~~ Canada Geese: ~~from the first Saturday in October extending for 100 days.~~ [Opening no earlier than the first Saturday in October and closing no later than January 12. Season will be no longer than 100 days.] White-fronted and white geese ~~from the first Saturday in October extending for a period of 58 days and from January 4 extending for a period of 14 days.~~ [Opening no earlier than the first Saturday in October and closing no later than January 31. Season may be split into two segments and no longer than 100 days.] Late Season: ~~White-fronted and white geese from February 7 extending for 33 days.~~ [Season will be no longer than 34 days and closing no later than March 10.] During the Late Season, hunting is only permitted on Type C wildlife areas listed in sections 550-552, navigable waters, and private lands with the permission of the landowner under provisions of Section 2016, Fish and Game Code. Hunting is prohibited on Type A and Type B wildlife areas, the Klamath Basin National Wildlife Refuge Complex, the Modoc National Wildlife Refuge, and any waters which are on, encompassed by, bounded over, flow over, flow through, or are adjacent to any Type A and Type B wildlife areas, the Klamath Basin National Wildlife Refuge Complex, or the Modoc National Wildlife Refuge.	Daily bag limit: 30 Daily bag limit may include: • 20 white geese. • 10 dark geese but not more than 2 Large Canada geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

(2) Southern San Joaquin Valley Zone (NOTE: SEE SUBSECTION 502(d)(6) BELOW FOR SPECIAL SEASONS AND CLOSURES.)

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers)	~~From the third Saturday in October extending for 103 days.~~ ~~Scaup: from November 7 extending for 86 days.~~ [Opening no earlier than the fourth Saturday in October and closing no later than January 31. Season may be split into two segments and no longer than 98 days except for scaup season can be no longer than 86 days.]	Daily bag limit: ~~7~~ [4-7] Daily bag limit may include: • ~~7~~ [3-7] mallards, but not more than ~~2~~ [1-2] females. • 1 pintail (either sex). • 2 canvasback (either sex). • 2 redheads (either sex). • 2 scaup (either sex). Possession limit: triple the daily bag limit.
Geese	~~From the third Saturday in October extending for 103 days.~~ [Opening no earlier than the fourth Saturday in October and closing no later than January 31. Season will be no longer than 98 days.]	Daily bag limit: 30 Daily bag limit may include: • 20 white geese. • 10 dark geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

(3) Southern California Zone (NOTE: SEE SUBSECTION 502(d)(6) BELOW FOR SPECIAL SEASONS AND CLOSURES.)

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers)	~~From the third Saturday in October extending for 103 days.~~ ~~Scaup: from November 7 extending for 86 days.~~ [Opening no earlier than the fourth Saturday in October and closing no later than January 31. Season may be split into two segments and no longer than 98 days except for scaup season can be no longer than 86 days.]	Daily bag limit: ~~7~~ [4-7] Daily bag limit may include: • ~~7~~ [3-7] mallards, but not more than ~~2~~ [1-2] females. • 1 pintail (either sex). • 2 canvasback (either sex). • 2 redheads (either sex). • 2 scaup (either sex). Possession limit: triple the daily bag limit.

(A) Species	(B) Season	(C) Daily Bag and Possession Limits
Geese	~~From the third Saturday in October extending for 103 days.~~ [Opening no earlier than the fourth Saturday in October and closing no later than January 31. Season will be no longer than 98 days.]	Daily bag limit: 23 Daily bag limit may include: • 20 white geese. • 3 dark geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

(4) Colorado River Zone (NOTE: SEE SUBSECTION 502(d)(6) BELOW FOR SPECIAL SEASONS AND CLOSURES.)

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers).	From October 23 extending for 101 days. Scaup: from November extending for 86 days.	Daily bag limit: 7 Daily bag limit may include: • 7 mallards, but not more than 2 females or Mexican ducks. • 1 pintail (either sex). • 2 canvasback (either sex). • 2 redheads (either sex). • 2 scaup (either sex). Possession limit: triple the daily bag limit.
Geese	From October 23 extending for 101 days.	Daily bag limit: ~~24~~25 Daily bag limit may include: • 20 white geese. • ~~4~~5 dark geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

(5) Balance of State Zone (NOTE: SEE SUBSECTION 502(d)(6) BELOW FOR SPECIAL SEASONS AND CLOSURES.)

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers).	~~From the third Saturday in October extending for 103 days.~~ ~~Scaup: from November 7 extending for 86 days.~~ [Opening no earlier than the fourth Saturday in October and closing no later than January 31. Season may be split into two segments and no longer than 98 days except for scaup season can be no longer than 86 days.]	Daily bag limit: ~~7~~ [4-7] Daily bag limit may include: • ~~7~~ [3-7] mallards, but not more than ~~2~~ [1-2] females. • 1 pintail (either sex). • 2 canvasback (either sex). • 2 redheads (either sex). • 2 scaup (either sex). Possession limit: triple the daily bag limit.

Geese	Early Season: Large Canada geese only from the Saturday closest to October 1 for a period of 3 days EXCEPT in the North Coast Special Management Area where Large Canada geese are closed during the early season. Regular Season: Dark and white geese [opening no earlier than the fourth Saturday in October and closing no later than January 31. Season will be no longer than 98 days] ~~from the third Saturday in October extending for 100 days~~ EXCEPT in the Sacramento Valley Special Management Area where the white-fronted goose season will close after December 21. Late Season: Canada geese ~~from~~ [opening after January 31 and closing no later than March 10. Season will be no longer than 2 days] ~~the third Saturday in February extending for 2 days~~. White-fronted and white geese ~~from~~ [opening after January 31 and closing no later than March 10. Season will be no longer than 5 days] ~~the third Saturday in February extending for a period of 5 days~~ EXCEPT in the Sacramento Valley Special Management Area where the white-fronted goose season is closed. **Option 1:** During the Late Season, hunting is not permitted on wildlife areas listed in sections 550-552 EXCEPT on Type C wildlife areas in the North Central and Central regions. **Option 2:** ~~During the Late Season, hunting is not permitted on wildlife areas listed in sections 550-552~~	Daily bag limit: 30 Daily bag limit may include: • 20 white geese. • 10 dark geese EXCEPT in the Sacramento Valley Special Management Area where only 3 may be white-fronted geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
	~~EXCEPT on Type C wildlife areas in the North Central and Central regions.~~	

(6) Special Management Areas (see descriptions in 502(b)(6))

	(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
1. North Coast	All Canada Geese	~~From October 7 extending for a period of 77 days (Regular Season) and from February 12 extending for a period of 28 days (Late Season).~~ [Season may be split and closing no later than March 10. Season will be no longer than 105 days.] During the Late Season, hunting is only permitted on private lands with the permission of the landowner under provisions Section 2016, Fish and Game Code.	Daily bag limit: 10 Canada Geese of which only 1 may be a Large Canada goose (see definitions: 502(a)), EXCEPT during the Late Season, the bag limit on Large Canada geese is zero. Possession limit: triple the daily bag limit.
2. Humboldt Bay South Spit (West Side)	All Species	Closed during brant season	
3. Klamath Basin	Geese	~~Small and Large~~ Canada Geese [opening no earlier than the first Saturday in October and closing no later than January 12. Season will be no longer than 100 days] ~~from the first Saturday in October extending for 100 days.~~ White-fronted and white geese [opening no earlier than the first Saturday in October and closing no later than January 31. Season will be no longer than 105 days] ~~from the first Saturday in October extending~~	Daily bag limit: 30 Daily bag limit may include: • 20 white geese. • 10 dark geese but not more than 2 Large Canada geese (see definitions: 502(a)). Possession limit: triple the daily bag limit.

	(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
		~~for 105 days.~~	
4. Sacramento Valley	White-Fronted Geese	Open concurrently with the goose season through December 21, and during Youth Waterfowl Hunting Days.	Daily bag limit: 3 white-fronted geese. Possession limit: triple the daily bag limit.
5. Morro Bay	All species	Open in designated area only from the opening day of brant season through the remainder of waterfowl season.	
6. Martis Creek Lake	All species	Closed until November 16.	
7. Northern Brant	Black Brant	~~From November 18 extending for 27 days.~~ [Season will be between 0 and 37 days, closing no later than December 14.]	Daily bag limit: 2 Possession limit: triple the daily bag limit.
8. Balance of State Brant	Black Brant	~~From November 19 extending for 27 days.~~ [Season will be between 0 and 37 days, closing no later than December 15.]	Daily bag limit: 2 Possession limit: triple the daily bag limit.
9. Imperial County	White Geese	~~From November 4 extending for a period of 89 days (Regular Season) and February 1-2, 2024, February 5-9, 2024 and February 12-20, 2024 (Late Season).~~ [Season may be split and closing no later than March 10. Season will be no longer than 105 days.] During the Late Season, hunting is only permitted on private lands with the permission of the landowner under provisions of Section 2016, Fish and Game Code.	Daily bag limit: 20 Possession limit: triple the daily bag limit.

(e) Youth Waterfowl Hunting Days Regulations (NOTE: To participate in these Youth Waterfowl Hunts, youth must be accompanied by a non-hunting adult 18 years of age or older. Federal regulations require that hunters must be 17 years of age or younger.)

(1) Statewide Provisions.

(A) Species	*(B) Season*	*(C) Daily Bag Limit*
Ducks (including Mergansers), American Coot, Common Moorhen, Black Brant, Geese	1. Northeastern California Zone: The Saturday fourteen days before the opening of waterfowl season extending for 2 days. 2. Southern San Joaquin Valley Zone: The first Saturday in February extending for 2 days. 3. Southern California Zone: The first Saturday in February extending for 2 days. 4. Colorado River Zone: The Saturday following the closing of waterfowl season extending for 2 days. 5. Balance of State Zone: The first Saturday in February extending for 2 days.	Same as regular season.

(f) Veterans and Active Military Personnel Waterfowl Hunting Days Regulations. NOTE: Veterans (as defined in Section 101 of Title 38, United States Code) and members of the Armed Forces on active duty, including members of the National Guard and Reserves on active duty (other than training), may participate. Persons participating in this special hunt must possess and present upon demand verification of eligibility to participate in this hunt. Verification includes: Veteran’s ID Card, or Military ID Card for active duty, or a State-issued driver’s license or Identification Card with Veteran Designation.

(1) Statewide Provisions.

(A) Species	*(B) Season*	*(C) Daily Bag Limit*
Ducks (including Mergansers), Geese, American Coot, Common Moorhen	1. Northeastern California Zone: The Saturday following the closing of the regular duck season extending for 2 days. Goose hunting in this zone is not permitted during these days. 2. Southern San Joaquin Valley Zone: The second Saturday in February extending for 2 days. 3. Southern California Zone: The second Saturday in February extending for 2 days. 4. Balance of State Zone: The second Saturday in February extending for 2 days. **Option 1:** Goose hunting in this zone is not permitted during these days. **Option 2:** ~~Goose hunting in this zone is not permitted during these days.~~	Same as regular season.

(g) Falconry Take of Ducks (including Mergansers), Geese, American Coots, and Common Moorhens.

(1) Statewide Provisions.

(A) Species	*(B) Season*	*(C) Daily Bag and Possession Limits*
Ducks (including Mergansers), Geese, American Coot and Common Moorhen	1. Northeastern California Zone. ~~Open concurrently with duck season through January 17, 2024.~~ [No longer than 107 days.] 2. Balance of State Zone. ~~Open concurrently with duck season, February 3-4, 2024 and February 17-18, 2024.~~ [No longer than 107 days.] EXCEPT in the North Coast Special Management Area where the falconry season for geese runs concurrently with the season for Small Canada geese (see 502(d)(6)). 3. Southern San Joaquin Valley Zone. ~~Open concurrently with duck season, February 3-4, 2024 and February 17-18, 2024~~ [No longer than 107 days.] Goose hunting in this zone by means of falconry is not permitted. 4. Southern California Zone. ~~Open concurrently with duck season, February 3-4, 2024 and February 17-18, 2024.~~ [No longer than 107 days.] EXCEPT in the Imperial County Special Management Area where the falconry season for geese runs concurrently with the season for white geese.	Daily bag limit: 3 Daily bag limit makeup: • Either all of 1 species or a mixture of species allowed for take. Possession limit: 9
	5. Colorado River Zone. ~~Open concurrently with duck season and February 1-4, 2024.~~ [No longer than 107 days.] Goose hunting in this zone by means of falconry is not permitted. Federal regulations require that California's hunting regulations conform to those of Arizona, where goose hunting by means of falconry is not permitted.	

Note: Authority cited: Sections 265 and 355, Fish and Game Code.
Reference: Sections 265, 355 and 356, Fish and Game Code.

FGC@FGC

From: Weaver, Melanie@Wildlife
Sent: Wednesday, March 20, 2024 3:07 PM
To: [redacted]
Cc: [redacted]
Subject: Email in Lieu of PSOR for Section 502-Waterfowl

Ari and Jennifer,

There have been no substantive comments received, amendments to the regulatory text, or additional information gathered for this rulemaking. Therefore, a Pre-adoption Statement of Reason is not necessary.

Please let me know if you have any questions.

Melanie Weaver

Waterfowl Program Leader
Senior Environmental Scientist
P.O. Box 944209
Sacramento, CA 94244-2090
(916)502-1139

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STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT (REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

ECONOMIC IMPACT STATEMENT

DEPARTMENT NAME	CONTACT PERSON	EMAIL ADDRESS	TELEPHONE NUMBER
Fish and Game Commission	David Thesell	fgc@fgc.ca.gov	916 902-9291
DESCRIPTIVE TITLE FROM NOTICE REGISTER OR FORM 400			NOTICE FILE NUMBER
Amend Sect. 502, Title 14, CCR re: Waterfowl, Migratory; American Coot and Common Moorhen 2024-25			Z

A. ESTIMATED PRIVATE SECTOR COST IMPACTS *Include calculations and assumptions in the rulemaking record.*

1. Check the appropriate box(es) below to indicate whether this regulation:

- ☐ a. Impacts business and/or employees
- ☐ b. Impacts small businesses
- ☐ c. Impacts jobs or occupations
- ☐ d. Impacts California competitiveness
- ☐ e. Imposes reporting requirements
- ☐ f. Imposes prescriptive instead of performance
- ☐ g. Impacts individuals
- ☒ h. None of the above (Explain below):

Annual conformance with Federal Regulations introduces no cost impacts

If any box in Items 1 a through g is checked, complete this Economic Impact Statement.
If box in Item 1.h. is checked, complete the Fiscal Impact Statement as appropriate.

2. The ______________________ (Agency/Department) estimates that the economic impact of this regulation (which includes the fiscal impact) is:

- ☐ Below $10 million
- ☐ Between $10 and $25 million
- ☐ Between $25 and $50 million
- ☐ Over $50 million *[If the economic impact is over $50 million, agencies are required to submit a Standardized Regulatory Impact Assessment as specified in Government Code Section 11346.3(c)]*

3. Enter the total number of businesses impacted: ____________

Describe the types of businesses (Include nonprofits): ____________

Enter the number or percentage of total businesses impacted that are small businesses: ____________

4. Enter the number of businesses that will be created: ____________ eliminated: ____________

Explain: ____________

5. Indicate the geographic extent of impacts: ☐ Statewide

☐ Local or regional (List areas): ____________

6. Enter the number of jobs created: ____________ and eliminated: ____________

Describe the types of jobs or occupations impacted: ____________

7. Will the regulation affect the ability of California businesses to compete with other states by making it more costly to produce goods or services here? ☐ YES ☐ NO

If YES, explain briefly: ____________

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STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT
(REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

ECONOMIC IMPACT STATEMENT (CONTINUED)

B. ESTIMATED COSTS *Include calculations and assumptions in the rulemaking record.*

1. What are the total statewide dollar costs that businesses and individuals may incur to comply with this regulation over its lifetime? $ ______

   a. Initial costs for a small business: $ ______ Annual ongoing costs: $ ______ Years: ______

   b. Initial costs for a typical business: $ ______ Annual ongoing costs: $ ______ Years: ______

   c. Initial costs for an individual: $ ______ Annual ongoing costs: $ ______ Years: ______

   d. Describe other economic costs that may occur: ______

2. If multiple industries are impacted, enter the share of total costs for each industry: ______

3. If the regulation imposes reporting requirements, enter the annual costs a typical business may incur to comply with these requirements. *Include the dollar costs to do programming, record keeping, reporting, and other paperwork, whether or not the paperwork must be submitted.* $ ______

4. Will this regulation directly impact housing costs? ☐ YES ☐ NO

   If YES, enter the annual dollar cost per housing unit: $ ______

   Number of units: ______

5. Are there comparable Federal regulations? ☐ YES ☐ NO

   Explain the need for State regulation given the existence or absence of Federal regulations: ______

   Enter any additional costs to businesses and/or individuals that may be due to State - Federal differences: $ ______

C. ESTIMATED BENEFITS *Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. Briefly summarize the benefits of the regulation, which may include among others, the health and welfare of California residents, worker safety and the State's environment: ______

2. Are the benefits the result of: ☐ specific statutory requirements, or ☐ goals developed by the agency based on broad statutory authority?

   Explain: ______

3. What are the total statewide benefits from this regulation over its lifetime? $ ______

4. Briefly describe any expansion of businesses currently doing business within the State of California that would result from this regulation: ______

D. ALTERNATIVES TO THE REGULATION *Include calculations and assumptions in the rulemaking record. Estimation of the dollar value of benefits is not specifically required by rulemaking law, but encouraged.*

1. List alternatives considered and describe them below. If no alternatives were considered, explain why not: ______

Reset Form

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT (REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

ECONOMIC IMPACT STATEMENT (CONTINUED)

2. Summarize the total statewide costs and benefits from this regulation and each alternative considered:

   Regulation: Benefit: $ ____________ Cost: $ ____________

   Alternative 1: Benefit: $ ____________ Cost: $ ____________

   Alternative 2: Benefit: $ ____________ Cost: $ ____________

3. Briefly discuss any quantification issues that are relevant to a comparison of estimated costs and benefits for this regulation or alternatives: ____________

4. Rulemaking law requires agencies to consider performance standards as an alternative, if a regulation mandates the use of specific technologies or equipment, or prescribes specific actions or procedures. Were performance standards considered to lower compliance costs? ☐ YES ☐ NO

   Explain: ____________

E. MAJOR REGULATIONS *Include calculations and assumptions in the rulemaking record.*

California Environmental Protection Agency (Cal/EPA) boards, offices and departments are required to submit the following (per Health and Safety Code section 57005). Otherwise, skip to E4.

1. Will the estimated costs of this regulation to California business enterprises **exceed $10 million**? ☐ YES ☐ NO

If YES, complete E2. and E3
If NO, skip to E4

2. Briefly describe each alternative, or combination of alternatives, for which a cost-effectiveness analysis was performed:

   Alternative 1: ____________

   Alternative 2: ____________

   (Attach additional pages for other alternatives)

3. For the regulation, and each alternative just described, enter the estimated total cost and overall cost-effectiveness ratio:

   Regulation: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

   Alternative 1: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

   Alternative 2: Total Cost $ ____________ Cost-effectiveness ratio: $ ____________

4. Will the regulation subject to OAL review have an estimated economic impact to business enterprises and individuals located in or doing business in California exceeding $50 million in any 12-month period between the date the major regulation is estimated to be filed with the Secretary of State through12 months after the major regulation is estimated to be fully implemented?

   ☐ YES ☐ NO

   If YES, agencies are required to submit a Standardized Regulatory Impact Assessment (SRIA) as specified in Government Code Section 11346.3(c) and to include the SRIA in the Initial Statement of Reasons.

5. Briefly describe the following:

   The increase or decrease of investment in the State: ____________

   The incentive for innovation in products, materials or processes: ____________

   The benefits of the regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, and the state's environment and quality of life, among any other benefits identified by the agency: ____________

Reset Form

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT
(REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

FISCAL IMPACT STATEMENT

A. FISCAL EFFECT ON LOCAL GOVERNMENT *Indicate appropriate boxes 1 through 6 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year which are reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________________

☐ a. Funding provided in ______________________

Budget Act of ____________ or Chapter ____________ , Statutes of ____________

☐ b. Funding will be requested in the Governor's Budget Act of ______________________

Fiscal Year: ____________

☐ 2. Additional expenditures in the current State Fiscal Year which are NOT reimbursable by the State. (Approximate)
(Pursuant to Section 6 of Article XIII B of the California Constitution and Sections 17500 et seq. of the Government Code).

$ ______________________

Check reason(s) this regulation is not reimbursable and provide the appropriate information:

☐ a. Implements the Federal mandate contained in ______________________

☐ b. Implements the court mandate set forth by the ______________________ Court.

Case of: ______________________ vs. ______________________

☐ c. Implements a mandate of the people of this State expressed in their approval of Proposition No. ____________

Date of Election: ______________________

☐ d. Issued only in response to a specific request from affected local entity(s).

Local entity(s) affected: ______________________

☐ e. Will be fully financed from the fees, revenue, etc. from: ______________________

Authorized by Section: ____________ of the ____________ Code;

☐ f. Provides for savings to each affected unit of local government which will, at a minimum, offset any additional costs to each;

☐ g. Creates, eliminates, or changes the penalty for a new crime or infraction contained in ______________________

☐ 3. Annual Savings. (approximate)

$ ______________________

☐ 4. No additional costs or savings. This regulation makes only technical, non-substantive or clarifying changes to current law regulations.

☒ 5. No fiscal impact exists. This regulation does not affect any local entity or program.

☐ 6. Other. Explain ______________________

Reset Form

STATE OF CALIFORNIA — DEPARTMENT OF FINANCE

ECONOMIC AND FISCAL IMPACT STATEMENT (REGULATIONS AND ORDERS)

STD. 399 (Rev. 10/2019)

FISCAL IMPACT STATEMENT (CONTINUED)

B. FISCAL EFFECT ON STATE GOVERNMENT *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________________

It is anticipated that State agencies will:

☐ a. Absorb these additional costs within their existing budgets and resources.

☐ b. Increase the currently authorized budget level for the ______________ Fiscal Year

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________________

☒ 3. No fiscal impact exists. This regulation does not affect any State agency or program.

☐ 4. Other. Explain ______________________

C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS *Indicate appropriate boxes 1 through 4 and attach calculations and assumptions of fiscal impact for the current year and two subsequent Fiscal Years.*

☐ 1. Additional expenditures in the current State Fiscal Year. (Approximate)

$ ______________________

☐ 2. Savings in the current State Fiscal Year. (Approximate)

$ ______________________

☒ 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.

☐ 4. Other. Explain ______________________

FISCAL OFFICER SIGNATURE	DATE
DocuSigned by: Dan Reagan 6550B701E2D347D...	1/12/2024

The signature attests that the agency has completed the STD. 399 according to the instructions in SAM sections 6601-6616, and understands the impacts of the proposed rulemaking. State boards, offices, or departments not under an Agency Secretary must have the form signed by the highest ranking official in the organization.

AGENCY SECRETARY	DATE
DocuSigned by: Melissa A. Miller-Henson 74DED80ABE5A488... Bryan Cash 1/16/2024	1/9/2024

Finance approval and signature is required when SAM sections 6601-6616 require completion of Fiscal Impact Statement in the STD. 399.

DEPARTMENT OF FINANCE PROGRAM BUDGET MANAGER	DATE

STD. 399 Addendum

Amend Section 502
Title 14, California Code of Regulations
Re: Waterfowl, Migratory; American Coot and Common Moorhen (Common Gallinule)

ECONOMIC IMPACT STATEMENT

Proposed Regulations

Section 355 of the Fish and Game Code authorizes the Fish and Game Commission (Commission) to adopt annual regulations pertaining to the hunting of migratory birds that conform with or further restrict the regulations prescribed by the U.S. Fish and Wildlife Service (Service) pursuant to its authority under the Migratory Bird Treaty Act. The Service annually establishes federal regulation frameworks (Frameworks) for migratory bird hunting. The Frameworks describe the earliest dates that waterfowl hunting seasons may open, the maximum number of days hunting can occur, the latest dates that hunting seasons must close, and the maximum daily bag limit. States may make recommendations to change the Frameworks. This annual update allows the Commission to select and establish state regulations that specify hunting season dates and daily bag limits.

The Department-recommended changes to Section 502, Title 14, California Code of regulations are:

1) Decrease the duck season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone, in subsection 502(d)(3)(B) for the Southern California Zone, and in subsection 502(d)(5)(B) for the Balance of State Zone.

The existing duck season length for the referenced zones is 103 days. Adjusting the season length from 103 to 98 days is necessary for the upcoming season in order to close on January 31 and maintain a traditional opening Saturday in late October. In prior rulemakings, the Commission adopted the latest possible closing date of January 31 rather than the historical closing day of the last Sunday in January. This annual adjustment also results in modifications to falconry-only seasons.

2) Decrease the goose season length to 98 days in subsection 502(d)(2)(B) for the Southern San Joaquin Valley Zone, in subsection 502(d)(3)(B) for the Southern California Zone, and in subsection 502(d)(5)(B) for the Balance of State Zone.

The existing goose season length for the Southern San Joaquin Valley and Southern California zones is 103 days and 100 days in the Balance of State Zone. See item 1 above for the justification. This annual adjustment also results in modifications to Veterans and Active Military Personnel Waterfowl Hunting Days (VAMP Days) and falconry-only seasons.

3) Allow geese to be taken during VAMP Days in subsection 502(f)(B)4 for the Balance of State Zone.

The existing regulation does not allow geese because all available hunting days in the Balance of State Zone were allocated prior to implementation of VAMP Days. See item 1 above. The decrease in the goose season to 98 days allows the option of goose hunting during VAMP Days in this zone while still offering the existing early and late goose seasons. See option 2 in regulatory text in subsection 502(f)(B)4. However, in future rulemakings, either modifying the timing or reducing the Late Season will need to be considered to allow goose hunting during VAMP Days in this zone.

4) Allow up to five days of falconry-only season in subsection 502(g)(1)(B) for the Southern San Joaquin Valley, Southern California and Balance of State zones.

The existing regulation does not allow a falconry-only season because all available hunting days have been allocated. The length of the falconry-only season is contingent upon the number of days used for the general duck and goose seasons, in addition to the Youth and Veteran Hunt Days, as seasons cannot exceed 107 days.

SECTION A. ESTIMATED PRIVATE SECTOR COST IMPACTS

Question 1. Answer h. None of the above (Explain below):

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action because the proposed amendments to state regulations in accordance with Federal Frameworks will not introduce new compliance costs to the private sector – the total season length of 107 remains the same.

FISCAL IMPACT STATEMENT

SECTION A. FISCAL EFFECT ON LOCAL GOVERNMENT

Answer 5. No Fiscal impact exists. This regulation does not affect any local entity or program.

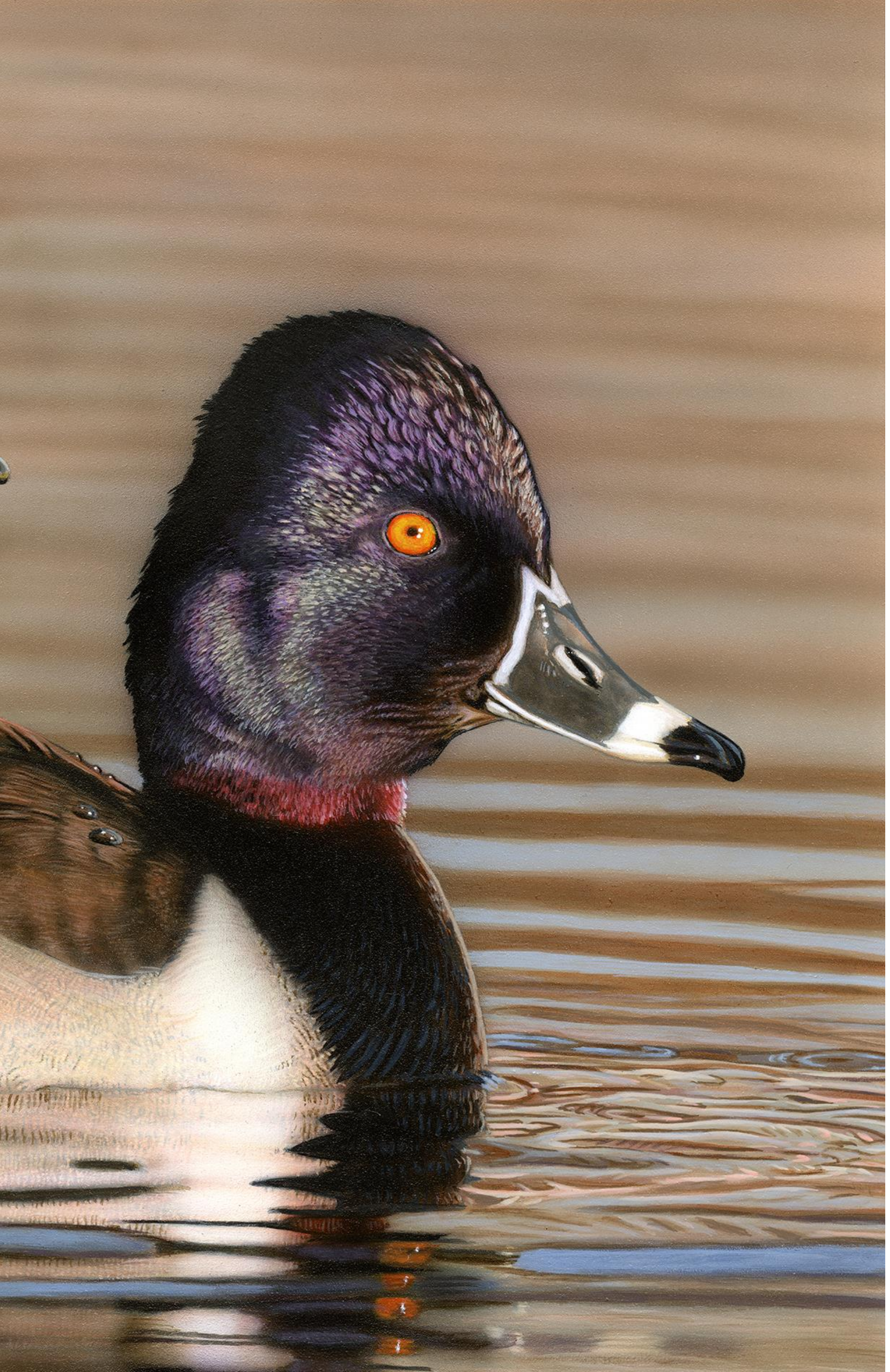
SECTION B. FISCAL IMPACT ON STATE GOVERNMENT

Answer 3. No Fiscal impact exists. This regulation does not affect any state agency or program.

Explanation: The Department Wildlife program oversight, Law Enforcement Branch, and License and Revenue Branch work is projected to be unchanged from currently existing budgets and resources.

SECTION C. FISCAL EFFECT ON FEDERAL FUNDING OF STATE PROGRAMS

Answer 3. No fiscal impact exists. This regulation does not affect any federally funded State agency or program.



2024-25 SECTION 502 WATERFOWL HUNTING

Adoption Meeting

PRESENTATION TO THE CALIFORNIA FISH AND GAME COMMISSION

April 18, 2024
Melanie Weaver
Wildlife Branch

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

Overview

Federal Frameworks

No Change

Department Recommendation

Summary of Department Recommendation

Decrease duck season length in most zones to 98 days

Allow geese during VAMP Days in the Balance of State Zone*

Falconry-only season 5 days in most zones

Duck Season Recommendation

Northeast Zone

- Regular Season: Oct 5 – Jan 15
- Scaup: Oct 5 – Dec 1 & Dec 19 – Jan 15

Bal of State, So San Joaquin Valley, So CA zones

- Regular Season: Oct 26 – Jan 31 (98 days)
- Scaup: Nov 7 – Jan 31

Colorado River Zone

- Regular Season: Oct 23 – Jan 31
- Scaup: Nov 7 – Jan 31

7 ducks/7 mallards (2 hens)/1 pintail/ 2 scaup, canvasback, redhead

Balance of State Zone – Goose Season Recommendation

Early Season Canada geese
- Sept 28 – 30

Regular Season
- Oct 26 – Jan 31 (98 days)

Late Season*
- Canada geese: Feb 15 – 16 or Feb 8 – 9
- White & white-fronted geese: Feb 15 – 19 or Feb 8 – 12
  - **Option 1** maintain goose closure on Type A/B areas
  - **Option 2** allow geese on Type A/B areas

30/day: 20 white/10 dark geese

Northeast Zone Goose Recommendation

Regular Season

- Canada geese: Oct 5 – Jan 12
- White & white-fronted geese: Oct 5 – Dec 1 & Jan 3 – 15

Late Season

- White & white-fronted geese: Feb 5 – Mar 10

30/day: 20 white/10 dark geese, no more than 2 Large Canada geese

Goose Season Recommendation Continued

So San Joaquin Valley and So CA zones

- Oct 26 – Jan 31 (98 days)
- 30/day: 20 white/10 dark geese in S.S.J. Valley Zone
- 3 dark geese in So CA Zone

Colorado River Zone

- Oct 23 – Jan 31
- 25/day: up to 20 white/5 dark geese

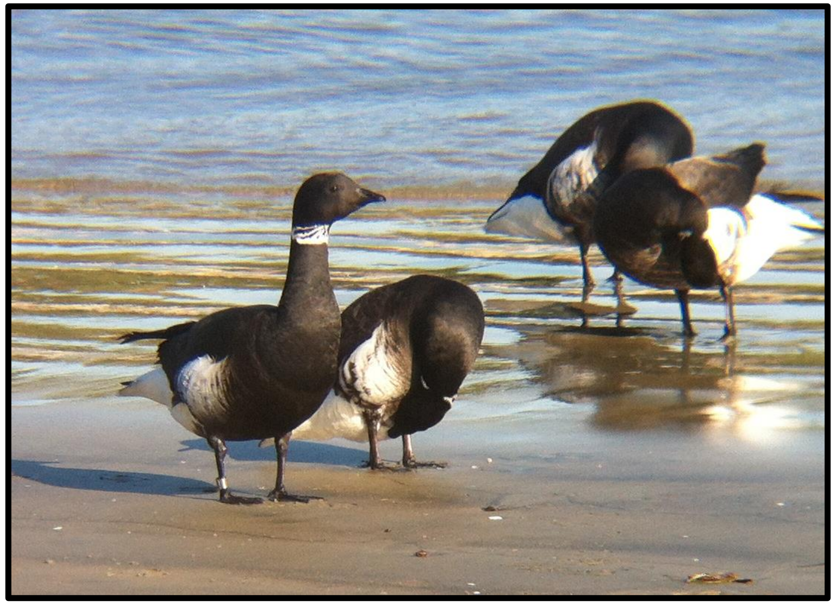
Brant Season Recommendation

Northern Brant

- Nov 18 – Dec 14

Balance of State Brant

- Nov 19 – Dec 15



Special Management Area Recommendation

North Coast

- Regular Season: Oct 5 – Dec 21
- Late Season: Feb 12 – Mar 10

Klamath Basin

- Canada Goose: Oct 5 – Jan 12
- White & white-fronted Geese: Oct 5 – Jan 17

Sac Valley

- Oct 26 – Dec 21

Imperial County

- Regular Season: Nov 4 – Jan 31
- Late Season: Feb 3 – 9, 12- 20

Youth & Veteran Hunt Days Recommendation

Youth Hunt Days

- NE Zone: Sept 21 – 22
- Other zones: Feb 1 – 2 (except Co Zone: Feb 8 – 9)

Veteran Hunt Days

- NE Zone: Jan 18 – 19
- All other zones: Feb 8 – 9
    - **Option 1** Goose hunting not allowed
    - **Option 2** Goose hunting allowed

Options to Allow Goose Hunting on VAMP Days in Bal of State Zone

- **Provide 2 unused goose days to VAMP**

  Will not be possible after 24/25, occurs every 5-6 years (like Falconry-only days)

- **Move Late Goose Season to overlap VAMP Days (Feb 8 – 12)**
  - Maintain closure on type a/b areas in North Central/Central regions

  Or

  - Allow geese during Late Goose Season

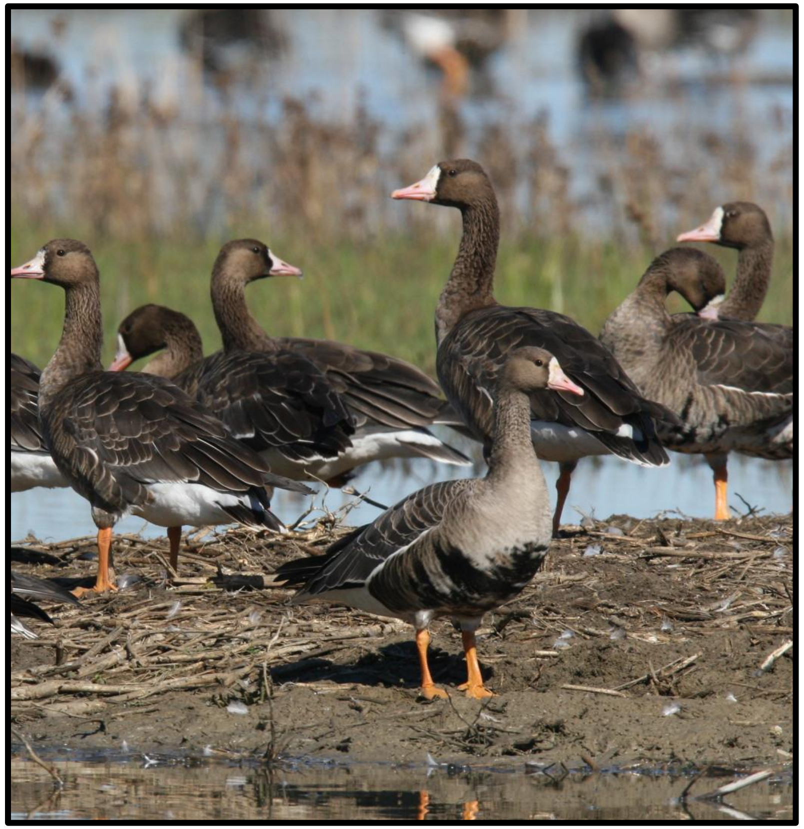
Falconry-Only Recommendation

Northeastern Zone: None

Balance of State, So San Joaquin Valley & So CA zones:
Feb 22 - 26 (5 days)

Colorado River Zone: Feb 1 – 4

Questions | Contact



Melanie Weaver

Waterfowl Coordinator

Wildlife Branch/Game Programs

February 13, 2024

President Eric Sklar
California Fish and Game Commission
1416 Ninth Street, Room 1320 (fgc@fgc.ca.gov)
Sacramento, CA 95814

RE: Section 502, Balance of State Zone Late Goose Season

Dear President Sklar:

On behalf of the California Farm Bureau, which represents more than 30,000 members who strive to protect and improve the ability of farmers and ranchers engaged in production agriculture all over this state. We are also proud stewards of the land who provide reliable and affordable food and fiber for not only Californians but for people around the world. The focus of our comments will be on late-season hunting, which has proven important in reducing crop and pasture losses.

Our two areas of interest center around two issues. First, we believe that goose hunting should not include a change to allow public land to be hunted on during late season because it could scare birds to go back to agricultural properties with the potential for increased damage for impacted farms in those areas. Secondly, the change in date to move to the start of the season met with differing opinions within our membership. After looking at all the available options, the bottom line of all this is that we urge the duration of the goose hunt to stay the same and not be shortened.

The Farm Bureau recognizes there is no perfect solution to this issue. The California Department of Fish and Wildlife (DFW) has been responsive to many concerns surrounding late season hunting and we will continue to work with the department, California Fish and Game Commission and interested parties to insure we can continue this in the future. As always, we appreciate your thoughtful review of our comments and look forward to working with you in the future.

Sincerely,

Chris Reardon
Director, Government Affairs
California Farm Bureau

cc: Members of the California Fish and Game Commission
Melanie Weaver, California Department of Fish and Wildlife

From: Dustin Kuehn [redacted]
Sent: Tuesday, March 12, 2024 11:55 AM
To: FGC
Subject: 2024 Waterfowl Regs Comment (North Coast Management Area)

Dear CAFGC,

Dear California Fish and Game Commission,

I am your average, everyday waterfowl hunter, and I am writing to respectfully urge you to place the early Aleutian Goose season dates back into the regular season for the North Coast Management Area. The current regulations are inequitable and only benefit the select few that have private property or private property access. I'm unclear as to why the dates were taken out of the peak part of the season and moved to early October when hardly any Aleutian Geese are around, public refuges and areas are closed to hunting, and most hunters in the area are out in the mountains big game hunting and could care less about shooting geese. I've heard rumors that the commission succumbed to pressure from a select group of private ranchers and did not have the general public at heart. It was extremely painful this year to watch tens of thousands of geese fly mere feet over my head in the peak of the waterfowl season for weeks on end with me unable to pull the trigger because the season was closed. Most Aleutian geese I harvest are in late December and early January. It is the prime part of the season when Aleutians number in the tens of thousands, yet these days were taken away from us for what reason? To appease ranchers? To benefit only a select few? In a state that prides itself on equity, the current goose regulations in the North Coast Management Area are anything but equitable. Please place the Aleutian Goose season dates back into the regular season to benefit everyone and not the few.

Respectfully,

Dustin Kuehn

McKinleyville, CA

--

Dustin Kuehn
Mathematics Instructor
Eureka High School
1915 J Street
Eureka, CA 95501

"With the full knowledge of the responsibilities I am undertaking, I pledge to serve my [students] with all of the knowledge, skills, and understanding that I possess, without regard to race, color, creed, politics, or social status." - Florence Nightingale

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Sections 362
Title 14, California Code of Regulations
Re: Nelson bighorn sheep

I. Date of Initial Statement of Reasons: October 1, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The Fish and Game Commission (Commission) periodically considers the recommendations of the Department of Fish and Wildlife (Department) in updating Nelson bighorn sheep regulations. Considerations include recommendations for adjusting tag quotas, setting hunt periods, modifying zone boundaries, authorizing methods of take, among others, to help achieve management goals and objectives for Nelson bighorn sheep. Section 362 provides descriptions of hunt zone boundaries, season opening and closing dates, and tag quotas (total number of hunting tags to be made available) for Nelson bighorn sheep. To maintain appropriate harvest levels and hunting quality, tags must be adjusted periodically in response to dynamic environmental, biological, and social conditions.

The proposed changes focus on Nelson bighorn sheep hunting tag quotas under Section 362(d). The last time these regulations were subject to major amendment was 2022-2023. The proposed amendments here represent the cumulation of the Department’s internal discussions/data analysis. The proposed changes are necessary to maintain sustainable hunt opportunities, consistency with management unit plan recommendations, and Fish and Game Code. Subdivision (b)(2) of Fish and Game Code Section 4902 states the Commission may not adopt regulations authorizing the sport hunting in a single year of more than 15 percent of the mature Nelson bighorn rams in a single management unit, management recommendations are consistent with this mandate.

BACKGROUND

Current regulations in Section 362 specify Nelson bighorn sheep tag quotas for each hunt zone and establish hunt zone boundaries in accordance with management goals and objectives described in the management unit plans. The Department's goal is to increase bighorn sheep hunting opportunities where feasible and compatible with population objectives, in which case recommendations will be offered to the Commission.

CURRENT REGULATIONS

Current laws governing bighorn sheep hunting are as follows:

Section 362 provides definitions, hunting zone descriptions, season opening and closing dates, tag quotas (total number of hunting tags to be made available), and bag and possession limits for bighorn sheep hunting. Individuals are awarded a bighorn sheep hunting tag through the Department's Big Game Drawing. A limited number of fundraising tags are also available for purchase, usually by auction, via non-governmental organizations that assist the Department with fundraising.

Harvest of a bighorn sheep is authorized for an individual with a tag for a respective hunt zone and season. Tag quotas are established based on a variety of factors, including population density and abundance, age and sex composition, and distribution.

PROPOSED REGULATIONS

The proposed changes to Section 362 include amending Subsection 362(d) to modify hunt tag quotas for each zone to ranges as identified in the 2019 Environmental Document on Bighorn Sheep Hunting. Periodic adjustments of tag quotas in response to dynamic environmental, and biological conditions are necessary to maintain sustainable populations of bighorn sheep and hunt opportunities, as well as keeping with mandates and management recommendations. Unfortunately, administrative procedures and the Fish and Game Code require the Fish and Game Commission to receive proposed changes to existing regulations prior the completion of surveys and analyses, thus necessitating a range of numbers. Analyses are scheduled for completion by March 2024.

Additional changes are made in subsection 362(a) for punctuation and re-arrangement of certain language regarding the descriptions of the hunt zones adds clarity to how the hunt zone areas are described and consistency with other big game sections in Title 14. Additional changes in subsection 362(b) clarify the duration of the hunt seasons per zone, and other corrections to punctuation throughout Section 362 are non-substantive.

(b) Goals and Benefits of the Regulation

The goals and benefits of the regulations are to help maintain sustainable populations of desert bighorn sheep, maintain sustainable hunt opportunities, achieve management recommendations in existing unit plans, and so as not to exceed the 15 percent threshold identified in subdivision (b)(2) of Fish and Game Code Section 4902.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: 200, 203, 203.1, 265, 1050, and 4902 Fish and Game Code

Reference: 1050, 3950, and 4902 Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change: None

(e) Identification of Reports or Documents Supporting Regulation Change:

- 2019 Environmental Document Regarding Bighorn Sheep Hunting

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

- Wildlife Resources Committee, May 2023
- Wildlife Resources Committee, September 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified or brought to the attention of the Commission staff that would have the same desired regulatory effect.

(b) No Change Alternative

Without the proposed changes, the outstanding issues concerning the regulations currently governing bighorn sheep hunting would remain unaddressed. The no change alternative was considered and rejected because it would not be consistent with maintaining bighorn sheep populations within desired population objectives. Subdivision (b) of Fish and Game Code Section 4902 and management unit plans specify desired harvest levels. Retaining the current tag quota for each zone may not be responsive to environmental and biological changes in the status of various herds. The no-change alternative would not allow for adjustment of tag quotas in response to changing environmental and biological conditions.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed action adjusts tag quotas for existing hunts. Given the number of tags available and the area over which they are distributed, these proposals are economically neutral to business.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate impacts on the creation or elimination of jobs within the state, the creation of new business, the elimination of existing businesses, or the expansion of businesses in California because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to substantially stimulate demand for goods or services related to Nelson bighorn sheep hunting. If greater numbers of hunters visit the areas in the state with increased opportunities, businesses that provide goods and services to Nelson bighorn sheep hunters could benefit from small increases in sales. Conversely, if fewer tags are awarded and less hunters visit the areas in the state with decreased opportunities, businesses that provide goods and services to Nelson bighorn sheep hunters could be negatively affected from small decreases in sales. The Commission does not anticipate direct benefits to the general health and welfare of California residents, the environment, or to worker safety, however California residents will benefit generally through access to recreational opportunities created by the proposed changes.

(c) Cost Impacts on a Representative Private Person or Business

The total net number of tags is anticipated to be same as the previous year, so no net economic impacts to individuals or to businesses that support Nelson bighorn sheep hunts are anticipated. As such, the Commission does not anticipate significant impacts on the representative private persons or businesses.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None

(e) Nondiscretionary Costs/Savings to Local Agencies: None

(f) Programs Mandated on Local Agencies or School Districts: None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None

(h) Effect on Housing Costs: None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate impacts on the creation or elimination of jobs within the State.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate impacts on the creation of new business, the elimination of existing businesses within the state because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to stimulate demand for goods or services related to Nelson bighorn sheep hunting.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate impacts on the expansion of businesses currently doing business within the state because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to stimulate demand for goods or services related to Nelson bighorn sheep hunting.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat, and humans, and can be a family tradition and a bonding activity.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate impacts on worker safety.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code section 1700, it is the policy of the state to encourage the conservation, maintenance, and utilization of fish and wildlife resources for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of populations of Nelson bighorn sheep to ensure their continued existence and supporting recreational opportunity. Adoption of scientifically tag quotas provides for the maintenance of Nelson bighorn sheep populations to ensure those objectives are met. The fees that hunters pay for licenses and tags help fund wildlife conservation.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

Current regulations in Section 362 provide definitions, hunting zone descriptions, season opening and closing dates, tag quotas (total number of hunting tags to be made available), and bag and possession limits for bighorn sheep hunting. Individuals are awarded a bighorn sheep hunting tag through the California Department of Fish and Wildlife (Department's) Big Game Drawing. A limited number of fundraising tags are also available for purchase, usually by auction, via non-governmental organizations that assist the Department with fundraising.

Harvest of a bighorn sheep is authorized for an individual with a tag for a respective hunt zone and season. Tag quotas are established based on a variety of factors including population density and abundance, age and sex composition, and distribution.

The proposed changes are as follows:

> **Amend Subsection 362(d)** to modify hunt tag quotas to ranges for each hunt zone.
>
> Periodic adjustments of tag quotas in response to dynamic environmental and biological conditions are necessary to maintain sustainable populations of bighorn sheep and hunt opportunities, as well as keeping with mandates and management recommendations. Unfortunately, administrative procedures and the Fish and Game Code require the Fish and Game Commission to receive proposed changes to existing regulations prior the completion of surveys and analyses, thus necessitating a range of numbers. Analyses are scheduled for completion by March 2024.
>
> Non-substantive editing to improve the clarity and consistency of the regulatory language has been made in section 362.

Benefit of the Regulations:

The goals and benefits of the regulations are to help maintain sustainable populations of desert bighorn sheep, maintain sustainable hunt opportunities, achieve management recommendations in existing unit plans, and so as not to exceed the 15 percent threshold identified in subdivision (b)(2) of Fish and Game Code Section 4902.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing nelson bighorn sheep (California Fish and Game Code Section 4902). No other state agency has the authority to adopt regulations governing Nelson bighorn sheep. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of Nelson bighorn sheep regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

Proposed Regulatory Language

Section 362, Title 14 CCR, is amended to read:

§ 362. Nelson Bighorn Sheep.

(a) Areas:

(1) ~~Zone 1—Marble/Clipper Mountains:~~ Zone 1 (Marble/Clipper Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the intersection of Kelbaker Road and the National Trails Highway; north on Kelbaker Road to the junction with Interstate Highway 40; east on Interstate Highway 40 to the intersection with National Trails Highway; southwest on National Trails Highway to junction with Kelbaker Road.

(2) ~~Zone 2—Kelso Peak and Old Dad Mountains:~~ Zone 2 (Kelso Peak and Old Dad Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the intersection of Kelbaker Road and the Union Pacific Railroad in Kelso; southwest along the Union Pacific Railroad to intersection with unnamed road at Crucero; north on unnamed road to the merging with Mojave Road; northeast on Mojave Road to the junction with Zzyzx Road; north on Zzyzx Road to intersection with Interstate Highway 15; northeast on Interstate Highway 15 to the intersection with Cima Road; south on Cima Road to the intersection with the Union Pacific Railroad in Cima; southwest on the Union Pacific Railroad to the intersection with Kelbaker Road in Kelso.

(3) ~~Zone 3—Clark and Kingston Mountain Ranges:~~ Zone 3 (Clark and Kingston Mountain Ranges)

(A) Area: In that ~~That~~ portion of San Bernardino and Inyo counties beginning at the intersection of Interstate Highway 15 and California State Highway 127 in Baker; north on California State Highway 127 to the junction with Old Spanish Gentry Road at Tecopa; southeast on Old Spanish Gentry Road to the junction with Furnace Creek Road; southeast on Furnace Creek Road to the junction with Mesquite Valley Road; north on Mesquite Valley Road to Old Spanish Trail Highway; north and east on Old Spanish Trail Highway to the~~California/Nevada~~ California-Nevada state line; southeast ~~on California/Nevada~~ along the California-Nevada state line to the intersection with Interstate Highway 15; southwest on Interstate Highway 15 to the junction with California State Highway 127.

(4) ~~Zone 4—Orocopia Mountains:~~ Zone 4 (Orocopia Mountains)

(A) Area: In that ~~That~~ portion of Riverside County beginning at the intersection of Interstate Highway 10 and Cottonwood Springs Road; east on Interstate Highway 10 to the junction with Red Cloud Mine Road; south on Red Cloud Mine Road to the junction with the Eagle Mountain Mining Railroad; southwest on the Eagle Mountain Mining Railroad to the junction with the Bradshaw Trail; southwest on the Bradshaw Trail to the Intersection with the Coachella Canal; west along the Coachella Canal to the junction with Box Canyon Road; northeast on Box Canyon Road to the junction with Cottonwood Springs Road; north on Cottonwood Springs Road to the intersection with Interstate Highway 10.

(5) ~~Zone 5—San Gorgonio Wilderness:~~ Zone 5 (San Gorgonio Wilderness)

(A) Area: In that ~~That~~ portion of Riverside and San Bernardino counties beginning at the intersection of Interstate Highway 10 and California State Highway 62, west on Interstate Highway 10 to the junction with California State Highway 30; north on California State Highway 30 to the junction with California State Highway 38; east and north on California State Highway 38 to the junction with Forest Service Route 1N01; east on Forest Service Route 1N01 to its joining with Pipes Road; east on Pipes Road to the junction with Pioneertown Road; southeast on Pioneertown Road to the junction with California State Highway 62; southwest on California State Highway 62 to the intersection with Interstate Highway 10.

(6) ~~Zone 6—Sheep Hole Mountains:~~ Zone 6 (Sheep Hole Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the junction of California State Highway 62 and Ironage Road; northwest on Ironage Road to the intersection with Amboy Road; north on Amboy Road to the intersection with National Trails Highway; east on National Trails Highway to the junction with Saltus Road; southeast on Saltus Road to the junction with unnamed road in Saltus that runs through Cadiz Valley; southeast on unnamed road to the intersection with California State Highway 62; west on California State Highway 62 to the junction with Ironage Road.

(7) ~~Zone 7—White Mountains:~~ Zone 7 (White Mountains)

(A) Area: In that ~~That~~ portion of Mono County within a line beginning at U.S. Highway 6 and the Mono−Inyo county line; northward on Highway 6 to the California−Nevada ~~State Line~~ state line; southeasterly along the California−Nevada ~~State Line~~ state line to the Mono−Inyo ~~County Line~~ county line; westward along the Mono−Inyo ~~County Line~~ county line to the point of beginning.

(8) ~~Zone 8 — South Bristol Mountains:~~ Zone 8 (South Bristol Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the junction of Kelbaker Road and the National Trails Highway; west on the National Trails Highway to the intersection with Interstate Highway 40; east on Interstate Highway 40 to the junction with Kelbaker Road; south on Kelbaker Road to the point of beginning.

(9) ~~Zone 9 — Cady Mountains:~~ Zone 9 (Cady Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the junction of Interstate Highway 40 and Newberry Road; north on Newberry Road to intersection with Riverside Road; ~~East~~east on Riverside Road to junction with Harvard Road; north on Harvard Road to junction with Interstate Highway 15; northeast on Interstate Highway 15 to junction with Basin Road; south on Basin Road to intersection with Union Pacific Railroad; east ~~on~~ along Union Pacific Railroad to intersection with Crucero Road; south on Crucero Road to intersection with Interstate Highway 40; west on Interstate Highway 40 to the point of beginning.

(10) ~~Zone 10 — Newberry, Rodman and Ord Mountains:~~ Zone 10 (Newberry, Rodman, and Ord Mountains)

(A) Area: In that ~~That~~ portion of San Bernardino County beginning at the junction Interstate 40 and Barstow Road; ~~South~~ south on Barstow Road to the junction with Northside Road; ~~East~~ east on Northside Road to the intersection with Camp Rock Road; ~~Northeast~~ northeast on Camp Rock Road to the intersection with Powerline Road; ~~East~~ east on Powerline Road ~~and continue on~~ to Transmission Line Road to the intersection with Interstate 40~~, West along Interstate 40,~~ ; west on Interstate 40 to the point of the beginning.

(b) Seasons:

(1) Open Zone ~~Fund-raising~~ Fundraising Tag: The holder of the ~~fund-raising~~ fundraising license tag issued pursuant to subsection 4902(d) of the Fish and Game Code may hunt:

(A) Zones 1 through 4, 6, 8 and 9: Beginning the first Saturday in November and extending through the first Sunday in February.

(B) Zone 5: Beginning the third Saturday in November and extending through the third Sunday in February.

(C) Zone 7: Beginning the first Saturday in August and extending through the last Sunday in September.

(2) Marble/Clipper/South Bristol Mountains ~~Fund-raising~~ Fundraising Tag: The holder of the ~~fund-raising~~ fundraising license tag issued pursuant to subsection 4902(d) of the Fish and Game Code may hunt:

(A) Zones 1 and 8: Beginning the first Saturday in November and extending through the first Sunday in February.

(3) Cady Mountains ~~Fund-raising~~ Fundraising Tag: The holder of the ~~fund-raising~~ fundraising license tag issued pursuant to subsection 4902(d) of the Fish and Game Code may hunt:

(A) Zone 9: Beginning the first Saturday in November and extending through the first Sunday in February.

(4) Except as provided in subsection 362(b)(1), the Nelson bighorn sheep season in the areas described in subsection 362(a) shall be defined as follows:

(A) Zones 1, 2, 3, 4, 6, 8, 9, and 10: Beginning the ~~The~~ first Saturday in December and ~~extend~~ extending through the first Sunday in February.

(B) Zone 5: Beginning the ~~The~~ third Saturday in December and ~~extend~~ extending through the third Sunday in February.

(C) Zone 7: Beginning the third Saturday in August and extending through the last Sunday in September.

(5) Except as specifically provided in section 362, the take of bighorn sheep is prohibited.

(c) Bag and possession Limit: One mature ram defined as follows: a male Nelson bighorn sheep (Ovis canadensis nelsoni) having at least one horn, the tip of which extends beyond a point in a straight line beginning at the front (anterior) edge of the horn base, and extending downward through the rear (posterior) edge of the visible portion of the eye and continuing downward through the horn. All reference points are based on viewing the ram directly from a 90 degree angle from which the head is facing. A diagram showing the correct viewing procedure shall be distributed by the department to each successful applicant.

(d) Number of License Tags:

Nelson Bighorn Sheep Hunt Zones	*Tag Allocation*
Zone 1 – Marble/Clipper Mountains	~~1~~0-5
Zone 2 – Kelso Peak/Old Dad Mountains	~~1~~ 0-2
Zone 3 – Clark/Kingston Mountain Ranges	~~4~~ 0-4
Zone 4 – Orocopia Mountains	~~1~~ 0-2
Zone 5 – San Gorgonio Wilderness	~~0~~ 0-3
Zone 6 – Sheep Hole Mountains	~~0~~ 0-2
Zone 7 – White Mountains	~~6~~ 0-6
Zone 8 – South Bristol Mountains	~~2~~ 0-3
Zone 9 – Cady Mountains	~~2~~ 0-4
Zone 10 – Newberry, Rodman, Ord Mountains	~~6~~ 0-6
Open Zone ~~Fund-Raising~~ Fundraising Tag	~~1~~ 0-1
Marble/Clipper/South Bristol Mountains Fundraising~~Fund-Raising~~ Tag	~~1~~ 0-1
Cady Mountains ~~Fund-Raising~~ Fundraising Tag	~~1~~ 0-1
Total:	~~26~~ 0-42

(e) Conditions:

(1) Nelson bighorn rams shall only be taken between one−half hour before sunrise and one−half hour after sunset.

(2) Only methods specified in sections 353 and 354, Title 14, CCR, for taking bighorn sheep may be used.

(3) Each tagholder shall possess a spotting telescope capable of magnification of 15 power (15X), which is not affixed to a rifle, while hunting.

(4) Successful general tagholders shall present the head and edible portion of the carcass of a bighorn ram to the department's checking station within 48 hours after killing the animal. All successful tagholders shall notify the department's Bishop office by telephone at (760) 872−1171 or (760) 872−1346 within 24 hours of killing the animal and arrange for the head and carcass to be examined.

(5) All successful bighorn sheep tagholders shall make the horns of each ram available to the department to be permanently marked in the manner prescribed by the department for identification purposes within 48 hours of killing the animal. The purpose of the permanent marking shall be to identify Nelson bighorn rams which were legally taken and which may be transported and possessed outside the areas described in subsection 362(a).

(6) The department reserves the right to take and use any part of the tagholder's bighorn ram, except the horns, for biological analysis as long as no more than one pound of edible meat is removed.

NOTE: Authority cited: Sections 200, 203, 203.1, 265, 1050 and 4902, Fish and Game Code. Reference: Sections 1050, 3950 and 4902, Fish and Game Code.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 11, 2024

Memorandum

Date: April 10, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Agenda Item for the April 17-18, 2024, Fish and Game Commission Meeting Re: Nelson Bighorn Sheep Hunting – Pre-Adoption Memo**

The Department of Fish and Wildlife (Department) has prepared this Memorandum to transmit its final recommended tag allocations for Nelson bighorn sheep hunting for the 2024-2025 season. The Department is not recommending changes to the proposed regulatory language in the original public notice, and all tag allocation recommendations fall within the proposed tag range included in the notice.

The Department recommends the Commission adopt the proposed rulemaking for Nelson bighorn sheep hunting with the tag allocations listed below.

362(d) Number of License Tags

Nelson Bighorn Sheep Hunt Zones	*2023-2024 Tag Allocation*	*2024-2025 Proposed Tag Range*	*2024-2025 Recommended Tag Allocation*
Zone 1 – Marble/Clipper Mountains	1	0-5	1
Zone 2 – Kelso Peak/Old Dad Mountains	1	0-2	2
Zone 3 – Clark/Kingston Mountain Ranges	4	0-4	3
Zone 4 – Orocopia Mountains	1	0-2	1
Zone 5 – San Gorgonio Wilderness	0	0-3	0
Zone 6 – Sheep Hole Mountains	0	0-2	1
Zone 7 – White Mountains	6	0-6	4
Zone 8 – South Bristol Mountains	2	0-3	1
Zone 9 – Cady Mountains	2	0-4	2
Zone 10 – Newberry, Rodman, Ord Mountains	6	0-6	6
Open Zone Fundraising Tag	1	0-1	1
Marble/Clipper/South Bristol Mountains Fundraising Tag	1	0-1	0
Cady Mountains Fundraising Tag	1	0-1	1

Nelson Bighorn Sheep Hunt Zones	*2023-2024 Tag Allocation*	*2024-2025 Proposed Tag Range*	*2024-2025 Recommended Tag Allocation*
Total:	26	0-42	23

If you have any questions on this item, please contact Scott Gardner, Wildlife Branch Chief, via phone at (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Scott Gardner, Branch Chief
Wildlife Branch
Department of Fish and Wildlife

Robert Pelzman, Captain
Law Enforcement Division
Department of Fish and Wildlife

Mario Klip, Game Conservation and Wildlife Connectivity Program Manager
Wildlife Branch
Department of Fish and Wildlife

Dr. Tom Batter, Elk and Pronghorn Coordinator
Wildlife Branch
Department of Fish and Wildlife

Regina Vu, Regulations Specialist
Wildlife Branch
Department of Fish and Wildlife

Ona Alminas, Env. Program Manager
Regulations Unit
Department of Fish and Wildlife

Chelle Temple-King, Senior Regulatory Analyst
Regulations Unit
Department of Fish and Wildlife

David Thesell, Program Manager
Fish and Game Commission

David Haug, Analyst
Fish and Game Commission

Ari Cornman, Wildlife Advisor
Fish and Game Commission

ANALYSIS OF THE 2024 BIGHORN SHEEP HUNTING REGULATIONS

ADDENDUM

to the 2019 ENVIRONMENTAL DOCUMENT

REGARDING BIGHORN SHEEP HUNTING

prepared by the

STATE OF CALIFORNIA

NATURAL RESOURCES AGENCY

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on behalf of

CALIFORNIA FISH AND GAME COMMISSION

as

LEAD AGENCY UNDER THE

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

for the

REGULARY NOTICED RULEMAKING ACTION TO AMEND

SECTION 362 BIGHORN SHEEP

TITLE 14, CALIFORNIA CODE OF REGULATIONS

2024 HUNTING SEASON

(OAL Notice File No. **2024-0123-07**)

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this addendum pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing bighorn sheep hunting in California. (California Code of Regulations (CCR), Title 14, Section 362.) Fish and Game Code (F&G Code), Section 3950(b) designates Nelson bighorn sheep as a game mammal in California. F&G Code Section 203 authorizes the Commission to fix the area or areas, seasons and hours, bag and possession limit, sex, and total number of bighorn sheep that may be taken pursuant to its regulations. F&G Code Section 203.1 requires the Commission to consider populations, habitat, food supplies, the welfare of individual animals, and other pertinent facts when establishing hunting regulations for bighorn sheep. The Commission establishes bighorn sheep hunting tag quotas through regulations amended annually, as needed, based on current population estimates derived from surveys by CDFW.

The Commission serves as the CEQA lead agency when it promulgates and amends the bighorn sheep hunting regulations. (Public Resources Code, Section 21067; CEQA Guidelines Section 15367.)[1] The Commission established maximum tag quotas for all bighorn sheep hunting zones in California in 2019 with the certification of a Final Environmental Document under CEQA (2019 Bighorn Sheep Hunting ED) (SCH No. 2018112036). The 2019 Bighorn Sheep ED provides relevant and important informational value as the Commission as CEQA lead agency considers proposed amendments to the existing regulations for bighorn sheep hunting in California. In 2023, an addendum documented the Commission’s consideration of adjusting tag quotas for the 2023-2024 hunt season and subsequently determined that the adjustments would have no additional effects than previously analyzed in the 2019 Bighorn Sheep Hunting ED. This addendum documents the Commission’s consideration of related environmental effects for 2024 and subsequent hunt seasons.

EARLIER PROJECT APPROVAL

CEQA review of the proposed project was conducted in accordance with the Commission’s certified regulatory program approved by the Secretary for the California Natural Resources Agency pursuant to Public Resources Code Section 21080.5 (See generally Title 14, CCR, Sections 781.5 and 15251(b)). CEQA requires all public agencies in the State to evaluate the environmental impacts of discretionary projects

[1] The “CEQA Guidelines” are found in Title 14 of the California Code of Regulations, commencing with section 15000.

they propose to carry out or approve, including promulgating regulations, which may have a potential to significantly affect the environment.

In 2019, the Commission certified a Final Environmental Document Regarding Bighorn Sheep Hunting (2019 Bighorn Sheep Hunting ED) (SCH No. 2018112036) as the lead agency under CEQA as part of the Commission's review and adoption of the Bighorn Sheep Hunting regulations which focused on the potential for significant environmental impacts from 1) an increase in the tag quota ranges for Marble Mountains Hunt Zone by one tag, the Clark/Kingston Mountain Range Hunt Zone by two tags, and the White Mountains Hunt Zone by one tag; 2) increasing the individual tag quotas in other zones within previously analyzed quota ranges; 3) establishing a new hunt zone in the Newberry, Rodman, and Ord Mountains; and 4) reallocating a fundraising tag. The Commission considered the proposed project increase of 10 tags and two alternatives. The Commission as lead agency certified the ED and determined adoption of the amended regulations as proposed would not result in any new significant or substantially more severe environmental effects The Commission approved the increase of 10 tags for the 2019-20 bighorn sheep hunting regulations.

PROPOSED 2024 TAG ALLOCATIONS FOR THE MARBLE AND CLIPPER MOUNTAINS HUNT ZONE

The bighorn sheep tag quota ranges described in the 2019 Bighorn Sheep Hunting ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 bighorn sheep hunting season by the Commission are based on survey data collected by the Department in its survey efforts. Data collection and analyses for hunt zones was completed in March of 2024, resulting in the below proposed tag allocations.

Nelson Bighorn Sheep Hunt Zones	*2019 ED Tag Allocation Range*	*2024 Proposed Tag Allocation*
Zone 1 – Marble/Clipper Mountains	0-5	1
Zone 2 – Kelso Peak/Old Dad Mountains	0-2	2
Zone 3 – Clark/Kingston Mountain Ranges	0-4	3
Zone 4 – Orocopia Mountains	0-2	1
Zone 5 – San Gorgonio Wilderness	0-3	0
Zone 6 – Sheep Hole Mountains	0-2	1
Zone 7 – White Mountains	0-6	4
Zone 8 – South Bristol Mountains	0-3	1
Zone 9 – Cady Mountains	0-4	2
Zone 10 – Newberry, Rodman, Ord Mountains	0-6	6
Open Zone Fundraising Tag	0-1	1
Marble/Clipper/South Bristol Mountains Fundraising Tag	0-1	0

Nelson Bighorn Sheep Hunt Zones	*2019 ED Tag Allocation Range*	*2024 Proposed Tag Allocation*
Cady Mountains Fundraising Tag	0-1	1
Total:	0-40	23

The 2024 proposed tag allocation falls within the previously analyzed range. Therefore, there are no new significant or substantially more severe impacts from amending the bighorn sheep hunt regulations to reduce tags in the Marble and Clipper Mountains.

NO SUBSEQUENT ENVIRONMENTAL DOCUMENT IS REQUIRED

In general, CEQA applies whenever a public agency proposes to carry out or approve a discretionary project. (Public Resources Code Section 21080(a)). CEQA provides that, where a public agency proposes to modify a previously approved project for which a Final Environmental Document was prepared and certified:

> “The lead agency or a responsible agency shall prepare an ***addendum*** to a previously certified EIR if some changes or additions are necessary but none of the conditions described in §15162 calling for preparation of a subsequent EIR have occurred.” (Title 14, CCR, Section 15164)

- A Subsequent Environment Document (Section 15162) when there is substantial evidence that:
  - Substantial changes are proposed in the project, which will require major revisions to the previous environmental impact report (EIR) or environmental document (ED).
  - Substantial changes occur with respect to the circumstances under which the project is being undertaken, which will require major revisions to the previous EIR or environmental documentation.
  - New information, which was not known and could not have been known at the time the previous EIR or ED was certified as complete, becomes available.
- A Supplement to an Environment Document (Section 15163) when:
  - A subsequent ED is not required.
  - Only minor changes to the project are described.
  - Only that information to make the ED adequate is provided.
- An Addendum to the Certified ED (Section 15164) is proper when**:**
  - The changes or additions presented in this project are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent ED have occurred.

- The Commission may properly prepare and may rely on an addendum in accordance with Section 15164 to fulfill its obligations under CEQA.

NO ADDITIONAL IMPACTS UNDER CEQA

The Commission has determined that amending the current bighorn sheep hunting regulations based on annual survey results will not result in any new or significant or substantially more severe environmental impacts than previously analyzed and disclosed in the 2019 Bighorn Sheep ED for this project.

This project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. There are no impacts to the habitat of fish and wildlife species.

This approval action adjusts the previous year tag quotas based on more current population information. No other aspect of the project is changed. No new significant or substantially more severe impacts under CEQA will occur due to this change.

AMENDMENT OF THE BIGHORN SHEEP HUNTING REGULATIONS

In conclusion, the Commission finds that amending the bighorn sheep hunt regulations in Title 14, CCR, Section 362, will not result in any new significant or substantially more severe environmental effects than previously analyzed and disclosed in the 2019 Bighorn Sheep Hunting ED. The Commission also finds that subsequent or supplemental review beyond this Addendum is not warranted pursuant to the Title 14, Section 15164, in connection with this proposed action.

Melissa A. Miller-Henson　　　　April 12, 2024

Melissa Miller-Henson, Executive Director　　　　Date

California Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Section 363
Title 14, California Code of Regulations
Re: Pronghorn Antelope

I. Date of Initial Statement of Reasons: October 1, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2023 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The Fish and Game Commission (Commission) periodically considers the recommendations of the Department of Fish and Wildlife (Department) in updating pronghorn antelope regulations. Considerations include recommendations for adjusting tag quotas, setting hunt periods, modifying zone boundaries, authorizing methods of take, among others, to help achieve management goals and objectives for pronghorn antelope. Section 363 provides descriptions of hunt zone boundaries, season opening and closing dates, methods of take (e.g., general methods, archery only, apprentice), tag designations (buck, doe), tag quotas (total number of hunting tags to be made available), bag and possession limits, and special conditions for pronghorn antelope. To maintain appropriate harvest levels and hunting quality, tags must be adjusted periodically in response to dynamic environmental, biological, and social conditions.

The proposed changes focus on pronghorn antelope tag quotas under subsection 363(m). The last time these regulations were subject to major amendment was 2020-2021. The proposed amendments here represent the cumulation of the Department’s internal discussion/data analysis. The proposed changes are necessary to maintain appropriate harvest levels.

BACKGROUND

The goal of the Department’s pronghorn antelope program is to maintain viable, healthy pronghorn populations, provide a variety of recreational activities, including harvest opportunity, and to minimize conflicts with humans (Pyshora 1982, California Department of Fish and Game [CDFG] 2004). A limited number of pronghorn antelope hunting tags are offered annually via the Big Game Drawing, and public demand for pronghorn antelope hunting tags has annually exceeded tag availability for the last ten years. In addition to harvest opportunity, public pronghorn antelope hunting also provides data that enhances the Department's ability to monitor pronghorn antelope populations including spatial, age, genetic, and disease information.

CURRENT REGULATIONS

Current regulations provide descriptions of hunt zone boundaries, season opening and closing dates, methods of take (e.g., general methods, archery only, apprentice), tag designations (buck, doe), tag quotas (total number of hunting tags to be made available), bag and possession limits, and special conditions for pronghorn antelope. Individuals are awarded a pronghorn antelope hunting tag through the Department's Big Game Drawing.

PROPOSED REGULATIONS

The proposed regulations amend subsection 363(m) to adjust hunting tag numbers across all six hunt zones. While the observed range wide buck (bb) -doe (dd) ratio (42 bb:100dd) is above objective (24bb:100dd), fawn-doe ratios, hunter harvest success, and age-at-harvest data suggest pronghorn antelope populations may be declining in Hunt Zone 3 – Likely Tables and Hunt Zone 5 – Big Valley (Batter 2023). Data for other hunt zones suggest populations may be relatively stable. Proposed regulations are in compliance with CDFW's Pronghorn Antelope Management Plan (Pyshora 1982, Sommer 2012). The proposed amendment to the number of pronghorn antelope hunting tags in subsection 363(m) is necessary to allow for a biologically appropriate harvest of bucks in the pronghorn antelope populations and will achieve/maintain buck ratios at or above the 24bb:100dd objective in relation to population abundance/trends as described in the appropriate management plans and related documents (Pyshora 1982, Sommer 2012, Batter 2023). Proposed tag quota ranges provided in Table 1 are the recommendations of the Department and are within conservative ranges identified in the 2004 Final Environmental Document Regarding Pronghorn Antelope Hunting (CDFG 2004). Administrative procedures and the Fish and Game Code require the Commission to receive proposed changes to existing regulations prior the completion of surveys and analyses, thus necessitating the proposed range of tags per zone. Analyses are scheduled for completion by March 2024.

Additional changes are made in subsection 363 for punctuation and re-arrangement of certain language regarding the descriptions of the hunt zones adds clarity to how the hunt zone areas and seasons are described and consistency with other big game sections in Title 14. Additional changes include corrections for gender neutral language, updates to the Department's name, and other corrections to punctuation throughout Section 363 are non-substantive.

Section 363(m).

The regulatory changes the Department is proposing are described below by subsection.

The proposed changes to Section 363 include the following:

- Amend subsection 363(m) to modify tag quotas as ranges for general season pronghorn antelope Period 1 and Period 2 (Table 1, Table 2).

The Department recommends decreasing tag quotas for Hunt Zones 3 and 5 (Likely Tables Period 1 and Period 2 and Big Valley), respectively, to adjust for reduced population abundance and depressed productivity (low fawn ratios). Adjustments in other zones may also be recommended as appropriate. The final recommended number of tags will be based upon findings from annual harvest, summer composition counts, and 2023–2024 winter abundance estimates.

Table 1. Subsection 363(m) with proposed tag ranges for pronghorn antelope to begin with the 2024 hunt season. Parenthetical values next to ranges indicate the current condition. Numbers without ranges indicate no change from the current condition is proposed. Final recommendations will be made after completion of winter abundance surveys.

Hunt Area	Archery-Only Season Buck	Archery-Only Season Doe	General Season Period 1 Buck	General Season Period 1 Doe	General Season Period 1 Apprentice Either-Sex	General Season Period 2 Buck	General Season Period 2 Doe	Fundraising
Zone 1 - Mount Dome	0	0	0-5	0	N/A	0	0	0
Zone 2 - Clear Lake	1	0	5-15	0	N/A	0	0	0
Zone 3 - Likely Tables	15	0	15-25	0	5	10-25	0	0
Zone 4 - Lassen	5	0	25-50	0	5	25-50	0	0
Zone 5 - Big Valley	1	0	5-20	0	1	0	0	0
Zone 6 - Surprise Valley	1	0	10-15	0	4	0	0	0
Zones 1-6	0	0	0	0	0	0	0	2

Table 2. Current buck tag quota (2023), proposed buck tag quota range (2024), and the potential net change from the current and proposed conditions for general season pronghorn antelope tag quota adjustments.

Hunt Code	**Hunt Zone**	***2023***	***2024***	***Potential Net Change***
710	Zone 1 – Mount Dome	2	0-5	-2, +3
720	Zone 2 – Clear Lake	15	5-15	-10, +0
730	Zone 3 – Likely Tables Period 1	25	15-25	-10, +0
732	Zone 3 – Likely Tables Period 2	25	10-25	-15, +0
740	Zone 4 – Lassen Period 1	35	25-50	-10, +15
742	Zone 4 – Lassen Period 2	35	25-50	-10, +15
750	Zone 5 – Big Valley	20	5-20	-15, +0
760	Zone 6 – Surprise Valley	10	10-15	-0, +5
	Total General Tags	167		-65, +18

(b) Goals and Benefits of the Regulation

The proposed regulations will contribute to the sustainable management of pronghorn antelope populations in California. Population objectives are maintained and managed in part by periodically modifying the number of hunting tags distributed.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 204, 219, 331, 1050, and 10502, Fish and Game Code

Reference: Sections 331, 1050, 10500, and 10502, Fish and Game Code.

(d) Specific Technology or Equipment Required by Regulatory Change: None

(e) Identification of Reports or Documents Supporting Regulation Change

Batter, T.J. 2023. Summary report on pronghorn antelope road composition surveys in northeastern California, July 2023. West Sacramento, CA. 11 pp. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213789

CDFG (California Department of Fish and Game). 2004. Final environmental document regarding pronghorn antelope hunting. Sacramento, CA. 91 pp.

Pyshora, L. 1982. Pronghorn antelope management plan. California Department of Fish and Game. Redding, CA. 122 pp. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=216423

Sommer, M. 2012. 2012 California pronghorn antelope status report and management plan update. Sacramento, CA. 48 pp. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=216424

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

- Wildlife Resources Committee, May 2023
- Wildlife Resources Committee, September 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified or brought to the attention of the Commission staff that would have the same desired regulatory effect.

(b) No Change Alternative

Without the proposed changes, the outstanding issues concerning the regulations currently governing subsection 363(m) would remain unaddressed. Retaining the current number of tags for the hunts listed would not be responsive to changes in population status. The pronghorn antelope management plant specifies objective levels for pronghorn numbers and the proportion of bucks in the herds. These numbers and ratios are maintained and managed in part by modifying the number of tags allocated for hunting. The “no change” alternative would not allow management of the desired proportion of bucks stated in the pronghorn management plan (Pyshora 1982).

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed. The maximum number of tags available in the proposed range is at or below the number of tags analyzed in the 2004 Final Environmental Document Regarding Pronghorn Antelope Hunting.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed regulation will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. This regulatory action will not impose cost impacts that a representative business would necessarily incur in reasonable compliance with the proposed regulation.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate impacts on the creation or elimination of jobs within the state, the creation of new business, the elimination of existing businesses, or the expansion of businesses in California because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to substantially stimulate demand for goods or services related to pronghorn antelope hunting. If greater numbers of hunters visit the areas in the state with increased opportunities, businesses that provide goods and services to pronghorn antelope hunters could benefit from small increases in sales. Conversely, if fewer tags are awarded and less hunters visit the areas in the state with decreased opportunities, businesses that provide goods and services to pronghorn antelope hunters could be negatively affected from small decreases in sales. The Commission does not anticipate direct benefits to the general health and welfare of California residents, the environment, or to worker safety, however California residents will benefit generally through access to the expanded recreational opportunities created by the proposed changes.

(c) Cost Impacts on a Representative Private Person or Business

The Commission does not anticipate significant impacts on the representative private persons or businesses.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None. The Department Wildlife program oversight, Law Enforcement Branch, and License and Revenue Branch work is projected to be unchanged from currently existing budgets and resources. However, the Department revenue is expected to decline with a reduced number of tags available in zones 3 and 5 (See STD399 and Addendum).

(e) Nondiscretionary Costs/Savings to Local Agencies: None.

(f) Programs Mandated on Local Agencies or School Districts: None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed

Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None

(h) Effect on Housing Costs: None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate impacts on the creation or elimination of jobs within the state.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate impacts on the creation of new business, the elimination of existing businesses within the state because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to stimulate demand for goods or services related to pronghorn antelope hunting.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate impacts on the expansion of businesses currently doing business within the state because the expected economic impacts of the proposed regulations are unlikely to be substantial enough to stimulate demand for goods or services related to pronghorn antelope hunting.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat, and humans, and can be a family tradition and a bonding activity.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate impacts on worker safety.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code section 1700, it is the policy of the state to encourage the conservation, maintenance, and utilization of fish and wildlife resources for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of populations of pronghorn antelope to ensure their continued existence and supporting recreational opportunity. Adoption of scientifically based pronghorn antelope seasons and tag quotas provides for the maintenance of pronghorn antelope populations to ensure those objectives are met. The fees that hunters pay for licenses and tags help fund wildlife conservation.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

Current regulations in Section 363 provide definitions, hunting zone descriptions, season opening and closing dates, tag quotas (total number of hunting tags to be made available), and bag and possession limits for pronghorn antelope hunting. Individuals are awarded a pronghorn antelope hunting tag through the California Department of Fish and Wildlife (Department's) Big Game Drawing. A limited number of fundraising tags are also available for purchase, usually by auction, via non-governmental organizations that assist the Department with fundraising.

Harvest of a pronghorn antelope is authorized for an individual with a tag for a respective hunt zone and season. Tag quotas are established based on a variety of factors including population density and abundance, age and sex composition, and distribution.

The proposed changes are as follows:

Amend Subsection 363(m) to modify hunt tag quotas as ranges for each zone.

Periodic adjustments of tag quotas in response to dynamic environmental and biological conditions are necessary to maintain sustainable populations of pronghorn antelope and hunt opportunities, as well as keeping with mandates and management recommendations. Unfortunately, administrative procedures and the Fish and Game Code require the Fish and Game Commission (Commission) to receive proposed changes to existing regulations prior to the completion of surveys and analyses, thus necessitating a range of numbers. Analyses are scheduled for completion by March 2024.

Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language have been made in Section 363.

Benefit of the Regulations:

The goals and benefits of the regulations are to help maintain sustainable populations of pronghorn antelope, maintain sustainable hunt opportunities, and achieve management recommendations in existing unit plans.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing pronghorn antelope hunting (California Fish and Game Code Section 331). No other state agency has the authority to adopt regulations governing pronghorn antelope hunting. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of pronghorn antelope hunting regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

Section 363, Title 14 CCR, is amended to read:

§ 363. Pronghorn Antelope.

The Lava Beds National Monument and Federal and State Game Refuges lying within ~~the~~ a given pronghorn hunt boundary are closed to pronghorn antelope hunting, except for the state's Hayden Hill (1S) and Blacks Mountain (1F) game refuges in Lassen County and the Clear Lake National Wildlife Refuge in Modoc County. Refer to subsection 363(b)(5) for special conditions for permission to enter and hunt pronghorn antelope in the Clear Lake National Wildlife Refuge.

(a) ~~Zone 1—Mount Dome:~~ Zone 1 (Mount Dome):

(1) Area: That portion of Siskiyou County within a line beginning at the junction of Interstate 5 and the California-Oregon state line; east along the California-Oregon state line to ~~the~~ Ainsworth Corners-Lava Beds National Monument Road; south ~~along~~ on ~~the~~ Ainsworth Corners-Lava Beds National Monument Road to ~~the~~ Mammoth Crater-Medicine Lake Road; southwest ~~along the~~ on Mammoth Crater-Medicine Lake Road to ~~the~~ Medicine Lake-Telephone Flat Road; east and south ~~along the~~ on Medicine Lake-Telephone Flat Road to ~~the~~ Telephone Flat-Bartle Road; southwest ~~along the~~ on Telephone Flat-Bartle Road to Highway 89; west ~~along~~ on Highway 89 to Interstate 5; north ~~along~~ on Interstate 5 to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(b) ~~Zone 2—Clear Lake:~~ Zone 2 (Clear Lake):

(1) Area: Those portions of Modoc and Siskiyou counties within a line beginning at the junction of the Lava Beds National Monument Road and the California-Oregon state line at Ainsworth Corners; east along the California-Oregon state line to ~~the~~ Crowder Flat Road; south ~~along the~~ on Crowder Flat Road to Modoc County Road 73; south ~~along~~ on Modoc County Road 73 to Modoc County Road 136; west ~~along~~ on Modoc County Road 136 to ~~the~~ Blue Mountain-Mowitz Road; west and south ~~along the~~ on Blue Mountain-Mowitz Road to ~~the~~ Deadhorse Flat-Badger Well Road; southwest ~~along the~~ on Deadhorse Flat-Badger Well Road to ~~the~~ Badger Well-Browns Well Road; south ~~along the~~ on Badger Well-Browns Well Road to ~~the~~ Sorholus Tank-Hackamore Road; southwest ~~along the~~ on Sorholus Tank-Hackamore Road to Highway 139; southeast ~~along~~ on Highway 139 to Modoc County Road 91; south ~~along~~ on Modoc County Road 91 to ~~the~~ Mud Lake-Mud Springs Road; west ~~along the~~ on Mud Lake-Mud Springs Road to ~~the~~ North Main Road; southwest ~~along the~~ on North Main Road to ~~the~~ Long Bell-Iodine Prairie Road at Long Bell Forest Service Station; northwest ~~along the~~ on Long Bell-Iodine Prairie Road to ~~the~~ Bartle-Telephone Flat Road; north ~~along the~~ on Bartle-Telephone Flat Road to ~~the~~ Telephone Flat-Medicine Lake Road; north and west ~~along the~~ on Telephone Flat-Medicine Lake Road to ~~the~~ Medicine Lake-Mammoth Crater Road; northeast ~~along the~~ on Medicine Lake-Mammoth Crater Road to ~~the~~ Lava Beds National

Monument-Ainsworth Corners Road; north ~~along the~~ on Lava Beds National Monument-Ainsworth Corners Road to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: The special regulations regarding the Peninsula "U" portion of the Clear Lake National Wildlife Refuge are summarized as follows:

(A) The area will be open on weekends and holidays only during the general season.

(B) Permission to enter this area must be obtained at the gate entrance located on the Clear Lake Road. Hunters for this area will be selected by public drawing. Persons selected for pronghorn antelope tags for Zone 2 (Clear Lake) may apply for this drawing by submitting an application upon receipt of their license tag to the ~~Department of Fish and Game~~ Department of Fish and Wildlife, 601 Locust Street, Redding, CA 96001. Applicants may apply as a party of two. Applications shall consist of the following: a standard U.S. Postal Service postcard with the applicant's tag number, name, address, city, zip code, area code, telephone number, and the notation "Application for Pronghorn Antelope Hunt Access Permit, Clear Lake Peninsula." Applications must reach the Redding office before the close of the business day on the first Friday in August. Successful applicants will be notified. A two-party application will not be split. The specific number of hunters will be determined each year by the Department. No more than five hunters will be allowed on the area at any one time unless a party of two is drawn for the fifth place. If the fifth place is the first member of a party, then no more than six hunters will be allowed on the area at any time.

(C) The gate entrance will be open from 6:00 a.m. to one hour after sunset.

(D) The fence near the gate entrance constitutes the south boundary of the area.

(E) The specific number of pronghorn antelope to be taken from this area is determined by the number of pronghorn antelope present. This area will be closed once this number is reached.

(c) ~~Zone 3—Likely Tables:~~ Zone 3 (Likely Tables):

(1) Area: Those portions of Modoc and Lassen counties within a line beginning at the junction of the Crowder Flat Road and the California-Oregon state line; east along the California-Oregon state line to the crest of the Warner Mountains; south along the crest of the Warner Mountains to the Summit Trail at Pepperdine Camp; south along the Summit Trail to the South Warner Road near Patterson Forest Service Station; west along the South Warner Road to ~~the~~ Long Valley-Clarks Valley Road; south ~~along the~~ on Long Valley-Clarks Valley Road to ~~the~~ Clarks Valley-Madeline Road; west ~~along the~~ on Clarks Valley-Madeline Road to Highway 395 at the town of Madeline; north ~~along~~ on Highway 395 to ~~the~~ Madeline-Adin Road; northwest ~~along the~~ on Madeline-Adin Road to ~~the~~ Hunsinger Draw-Sweagert Flat Road; east and north ~~along the~~ on Hunsinger Draw-Sweagert Flat Road to ~~the~~ Sweagert Flat-Hunters Ridge Road; north and west ~~along the~~ on Sweagert Flat-Hunters Ridge Road to Highway 299 near Lower Rush Creek Recreation Site; north ~~along~~ on Highway 299 to ~~the~~ Canby Bridge-Cottonwood Flat Road; northwest ~~along the~~ on Canby Bridge-Cottonwood Flat

Road to ~~the~~ Cottonwood Flat-Happy Camp Road; northwest ~~along the~~ on Cottonwood Flat-Happy Camp Road to Modoc County Road 91; north ~~along~~ on Modoc County Road 91 to Highway 139; north ~~along~~ on Highway 139 to ~~the~~ on Hackamore-Sorholus Tank Road; northeast ~~along the~~ on Hackamore-Sorholus Tank Road to ~~the~~ Browns Well-Badger Well Road; north ~~along the~~ on Browns Well-Badger Well Road to ~~the~~ Badger Well-Deadhorse Flat Road; northeast and east ~~along the~~ on Badger Well-Deadhorse Flat Road to ~~the~~ Mowitz-Blue Mountain Road; north and east ~~along the~~ on Mowitz-Blue Mountain Road to Modoc County Road 136; east ~~along~~ on Modoc County Road 136 to Modoc County Road 73; north ~~along~~ on Modoc County Road 73 to ~~the~~ Crowder Flat Road; north ~~along the~~ on Crowder Flat Road to the California-Oregon state line~~,~~ to the point of beginning.

(2) Seasons:

(A) Period One of the general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days. Period Two of the general season shall open on the first Saturday in September and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(d) ~~Zone 4—Lassen:~~ Zone 4 (Lassen):

(1) Area: Those portions of Lassen, Plumas and Shasta counties within a line beginning at the ~~junction~~ intersection of Highway 36 and ~~the~~ Juniper Lake Road in the town of Chester; north ~~along the~~ on Juniper Lake Road to the Lassen National Park boundary; north and west along the Lassen National Park boundary to Highway 89; north ~~along~~ on Highway 89 to U.S. Forest Service Road 22 near the Hat Creek Ranger Station; east ~~along~~ on U.S. Forest Service Road 22 to U.S. Forest Service Road 35N06; east and north ~~along~~ on U.S. Forest Service Road 35N06 to the State Game Refuge 1S boundary; northwest along the State Game Refuge 1S boundary to ~~the~~ Coyote Canyon-Dixie Valley Road; northwest ~~along the~~ on Coyote Canyon-Dixie Valley Road to ~~the~~ Dixie Valley-Boyd Hill Road; northwest ~~along the~~ on Dixie Valley-Boyd Hill Road to ~~the~~ Snag Hill-Hayden Hill Road; northeast and north ~~along the~~ on Snag Hill-Hayden Hill Road to Highway 139; southeast on Highway 139 to ~~the~~ Willow Creek-Hunsinger Flat Road; northeast and northwest ~~along the~~ on Willow Creek-Hunsinger Flat Road to ~~the~~ Adin-Madeline Road; southeast ~~along the~~ on Adin-Madeline Road to Highway 395 at the town of Madeline; south ~~along~~ on Highway 395 to ~~the~~ Madeline-Clarks Valley Road; east ~~along the~~ on Madeline-Clarks Valley Road to ~~the~~ Clarks Valley-Tuledad Road; east and southeast ~~along the~~ on Clarks Valley-Tuledad Road to the California-Nevada state line; south along the California-Nevada state line to the Lassen-Sierra county line; west along the Lassen-Sierra county line to the Lassen-Plumas county line; north and west along the Lassen-Plumas county line to Highway 36; west ~~along~~ on Highway 36 to ~~the~~ Juniper Lake Road~~,~~ to the point of beginning.

(2) Seasons:

(A) Period One of the general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days. Period Two of the general season shall open on the first Saturday in September and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(e) ~~Zone 5—Big Valley:~~ Zone 5 (Big Valley):

(1) Area: Those portions of Modoc, Lassen, Shasta, and Siskiyou counties within a line beginning at the intersection of Highways 299 and 89; north and northwest ~~along~~ on Highway 89 to ~~the~~ Bartle-Telephone Flat Road; northeast ~~along the~~ on Bartle-Telephone Flat Road to ~~the~~ Iodine Prairie-Long Bell Road; southeast ~~along the~~ on Iodine Prairie-Long Bell Road to ~~the~~ North Main Road at Long Bell Forest Service Station; northeast ~~along the~~ on North Main Road and ~~the~~ Mud Springs-Mud Lake Road to Modoc County Road 91; south ~~along~~ on Modoc County Road 91 to ~~the~~ Happy Camp-Cottonwood Flat Road; southeast ~~along the~~ on Happy Camp-Cottonwood Flat Road to ~~the~~ Cottonwood Flat-Canby Bridge Road; southeast ~~along the~~ on Cottonwood Flat-Canby Bridge Road to Highway 299; south ~~along~~ on Highway 299 to ~~the~~ Hunters Ridge-Sweagert Flat Road near Lower Rush Creek Recreation Site; east and south ~~along the~~ on Hunters Ridge-Sweagert Flat Road to ~~the~~ Sweagert Flat-Hunsinger Draw Road; south and west ~~along the~~ on Sweagert Flat-Hunsinger Draw Road to ~~the~~ Adin-Madeline Road; southeast ~~along the~~ on Adin-Madeline Road to ~~the~~ Hunsinger Flat-Willow Creek Road; southeast and southwest ~~along the~~ on Hunsinger Flat-Willow Creek Road to Highway 139; northwest ~~along~~ on Highway 139 to ~~the~~ Hayden Hill-Snag Hill Road; south and southwest ~~along the~~ on Hayden Hill-Snag Hill Road to ~~the~~ Boyd Hill-Dixie Valley Road; southeast ~~along the~~ on Boyd Hill-Dixie Valley Road to ~~the~~ Dixie Valley-Coyote Canyon Road; southeast ~~along the~~ on Dixie Valley-Coyote Canyon Road to the State Game Refuge 1S boundary; southeast along the State Game Refuge 1S boundary to U.S. Forest Service Road 35N06; south and west ~~along~~ on U.S. Forest Service Road 35N06 to U.S. Forest Service Road 22; west ~~along~~ on U.S. Forest Service Road 22 to Highway 89 near the Hat Creek Ranger Station; north ~~along~~ on Highway 89 to Highway 299~~,~~ to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(f) ~~Zone 6—Surprise Valley:~~ Zone 6 (Surprise Valley):

(1) Area: Those portions of Modoc and Lassen counties within a line beginning at the ~~intersection~~ junction of the crest of the Warner Mountains and the California-Oregon state line; east along the California-Oregon state line to the California-Nevada state line; south along the California-Nevada state line to ~~the~~ Tuledad-Clarks Valley Road; west and northwest ~~along the~~ on Tuledad-Clarks Valley Road to ~~the~~ Clarks Valley-Long Valley Road; north on ~~the~~ Clarks Valley-Long Valley Road to ~~the~~ South Warner Road; east ~~along the~~ on South Warner Road to the Summit Trail near Patterson Guard Station; north along the Summit Trail to the crest of the Warner Mountains at Pepperdine Camp; north along the crest of the Warner Mountains to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(g) Big Valley Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(e)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders wishing to hunt the Ash Creek Wildlife Area may contact Ash Creek Wildlife Area by telephone at (530) 294–5824, and shall attend an orientation meeting before hunting. Only persons possessing valid junior hunting licenses and apprentice hunt license tags may hunt during the pronghorn antelope apprentice hunt season in the Ash Creek Wildlife Area. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(h) Lassen Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(d)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting. The Honey Lake Wildlife Area shall not be open to antelope apprentice hunt tag holders.

(i) Surprise Valley Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(f)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(j) Likely Tables Pronghorn Antelope Apprentice Hunt

(1) Area: The tag shall be valid in the area described in subsection 363(c)(1).

(2) Seasons: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(k) ~~Fund-raising~~ Fundraising Hunt:

(1) Area: Those portions of Lassen, Modoc, Plumas, Shasta, and Siskiyou counties described as zones 1 through 6 in subsections 363(a) through (f).

(2) Season: The season for the ~~Fund-Raising~~ Fundraising Hunt shall open on the Saturday before the first Wednesday in August and continue for 51 consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(*l*) Conditions:

(1) Pronghorn antelope license tags do not give the tagholders the right of entry onto privately-owned lands.

(2) Buck pronghorn antelope are defined as pronghorn antelope with horns longer than the ears. Doe pronghorn antelope are defined as pronghorn antelope with horns shorter than the ears. Either-sex pronghorn antelope are defined as buck or doe pronghorn antelope.

(3) Shooting time shall be from one-half hour before sunrise to one-half hour after sunset.

(4) Method of take:

(A) The holder of any archery-only pronghorn antelope license tag may only take pronghorn antelope using archery equipment, as defined in Section 354 of these regulations.

(B) The holder of a general season, ~~fund-raising~~ fundraising hunt season, or junior hunt season license tag may take pronghorn antelope using legal firearms and archery equipment as described in sections 353 and 354 of these regulations.

(5) Any person taking any pronghorn antelope shall retain that portion of the head, which bears the horns during the open season and for 15 days thereafter, and shall produce it upon the demand of any officer authorized to enforce the provisions of these regulations.

(6) No person shall at any time capture or destroy any pronghorn antelope and detach or remove from the carcass only the head, hide or horns; nor shall any person at any time leave through carelessness or neglect any pronghorn antelope which is in ~~his~~ their possession or any portion of the flesh thereof usually eaten by humans, to go needlessly to waste.

(7) Prior to the acceptance or issuance of a pronghorn antelope license tag, all tagholders shall consent in writing to the terms and conditions set forth on the license tag.

(m) Pronghorn Antelope Tag Allocations Table.

~~Pronghorn Antelope Tag Allocations~~

~~Hunt Area~~		~~Archery-Only Season~~			~~General Season~~						
						~~Period 1~~				~~Period 2~~	

	~~Buck~~		~~Doe~~		~~Buck~~		~~Doe~~		~~Buck~~		~~Doe~~
~~Zone 1 – Mount Dome~~	~~0~~		~~0~~		~~2~~		~~0~~		~~0~~		~~0~~
~~Zone 2 – Clear Lake~~	~~1~~		~~0~~		~~15~~		~~0~~		~~0~~		~~0~~
~~Zone 3 – Likely Tables~~	~~15~~		~~0~~		~~25~~		~~0~~		~~25~~		~~0~~
~~Zone 4 – Lassen~~	~~5~~		~~0~~		~~35~~		~~0~~		~~35~~		~~0~~
~~Zone 5 – Big Valley~~	~~1~~		~~0~~		~~20~~		~~0~~		~~0~~		~~0~~
~~Zone 6 – Surprise Valley~~	~~1~~		~~0~~		~~10~~		~~0~~		~~0~~		~~0~~
~~Likely Tables Apprentice Hunt~~		~~N/A~~				~~5 Either Sex~~				~~0~~	
~~Lassen Apprentice Hunt~~		~~N/A~~				~~5 Either Sex~~				~~0~~	
~~Big Valley Apprentice Hunt~~		~~N/A~~				~~1 Either Sex~~				~~0~~	
~~Surprise Valley Apprentice Hunt~~		~~N/A~~				~~4 Either Sex~~				~~0~~	
~~Fund-Raising Hunt~~		~~N/A~~						~~2 Buck~~			

Hunt Area	Archery-Only Season Buck	Archery-Only Season Doe	General Season Period 1 Buck	General Season Period 1 Doe	General Season Period 1 Apprentice Either-Sex	General Season Period 2 Buck	General Season Period 2 Doe	Fundraising
Zone 1 - Mount Dome	0	0	0-5	0	N/A	0	0	0
Zone 2 - Clear Lake	1	0	5-15	0	N/A	0	0	0
Zone 3 - Likely Tables	15	0	15-25	0	5	10-25	0	0
Zone 4 - Lassen	5	0	25-50	0	5	25-50	0	0
Zone 5 - Big Valley	1	0	5-20	0	1	0	0	0
Zone 6 - Surprise Valley	1	0	10-15	0	4	0	0	0
Zones 1-6	0	0	0	0	0	0	0	2

NOTE: Authority cited: Sections 219, 265, 331 and 1050, Fish and Game Code.
Reference: Sections 331, 713 and 1050, Fish and Game Code.

Section 363, Title 14 CCR, is amended to read:

§ 363. Pronghorn Antelope.

The Lava Beds National Monument and Federal and State Game Refuges lying within ~~the~~ a given pronghorn hunt boundary are closed to pronghorn antelope hunting, except for the state's Hayden Hill (1S) and Blacks Mountain (1F) game refuges in Lassen County and the Clear Lake National Wildlife Refuge in Modoc County. Refer to subsection 363(b)(5) for special conditions for permission to enter and hunt pronghorn antelope in the Clear Lake National Wildlife Refuge.

(a) ~~Zone 1—Mount Dome:~~ Zone 1 (Mount Dome):

(1) Area: That portion of Siskiyou County within a line beginning at the junction of Interstate 5 and the California-Oregon state line; east along the California-Oregon state line to ~~the~~ Ainsworth Corners-Lava Beds National Monument Road; south ~~along~~ on ~~the~~ Ainsworth Corners-Lava Beds National Monument Road to ~~the~~ Mammoth Crater-Medicine Lake Road; southwest ~~along the~~ on Mammoth Crater-Medicine Lake Road to ~~the~~ Medicine Lake-Telephone Flat Road; east and south ~~along the~~ on Medicine Lake-Telephone Flat Road to ~~the~~ Telephone Flat-Bartle Road; southwest ~~along the~~ on Telephone Flat-Bartle Road to Highway 89; west ~~along~~ on Highway 89 to Interstate 5; north ~~along~~ on Interstate 5 to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(b) ~~Zone 2—Clear Lake:~~ Zone 2 (Clear Lake):

(1) Area: Those portions of Modoc and Siskiyou counties within a line beginning at the junction of the Lava Beds National Monument Road and the California-Oregon state line at Ainsworth Corners; east along the California-Oregon state line to ~~the~~ Crowder Flat Road; south ~~along the~~ on Crowder Flat Road to Modoc County Road 73; south ~~along~~ on Modoc County Road 73 to Modoc County Road 136; west ~~along~~ on Modoc County Road 136 to ~~the~~ Blue Mountain-Mowitz Road; west and south ~~along the~~ on Blue Mountain-Mowitz Road to ~~the~~ Deadhorse Flat-Badger Well Road; southwest ~~along the~~ on Deadhorse Flat-Badger Well Road to ~~the~~ Badger Well-Browns Well Road; south ~~along the~~ on Badger Well-Browns Well Road to ~~the~~ Sorholus Tank-Hackamore Road; southwest ~~along the~~ on Sorholus Tank-Hackamore Road to Highway 139; southeast ~~along~~ on Highway 139 to Modoc County Road 91; south ~~along~~ on Modoc County Road 91 to ~~the~~ Mud Lake-Mud Springs Road; west ~~along the~~ on Mud Lake-Mud Springs Road to ~~the~~ North Main Road; southwest ~~along the~~ on North Main Road to ~~the~~ Long Bell-Iodine Prairie Road at Long Bell Forest Service Station; northwest ~~along the~~ on Long Bell-Iodine Prairie Road to ~~the~~ Bartle-Telephone Flat Road; north ~~along the~~ on Bartle-Telephone Flat Road to ~~the~~ Telephone Flat-Medicine Lake Road; north and west ~~along the~~ on Telephone Flat-Medicine Lake Road to ~~the~~ Medicine Lake-Mammoth Crater Road; northeast ~~along the~~ on Medicine Lake-Mammoth Crater Road to ~~the~~ Lava Beds National

Monument-Ainsworth Corners Road; north ~~along the~~ on Lava Beds National Monument-Ainsworth Corners Road to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: The special regulations regarding the Peninsula "U" portion of the Clear Lake National Wildlife Refuge are summarized as follows:

(A) The area will be open on weekends and holidays only during the general season.

(B) Permission to enter this area must be obtained at the gate entrance located on the Clear Lake Road. Hunters for this area will be selected by public drawing. Persons selected for pronghorn antelope tags for Zone 2 (Clear Lake) may apply for this drawing by submitting an application upon receipt of their license tag to the ~~Department of Fish and Game~~ Department of Fish and Wildlife, 601 Locust Street, Redding, CA 96001. Applicants may apply as a party of two. Applications shall consist of the following: a standard U.S. Postal Service postcard with the applicant's tag number, name, address, city, zip code, area code, telephone number, and the notation "Application for Pronghorn Antelope Hunt Access Permit, Clear Lake Peninsula." Applications must reach the Redding office before the close of the business day on the first Friday in August. Successful applicants will be notified. A two-party application will not be split. The specific number of hunters will be determined each year by the Department. No more than five hunters will be allowed on the area at any one time unless a party of two is drawn for the fifth place. If the fifth place is the first member of a party, then no more than six hunters will be allowed on the area at any time.

(C) The gate entrance will be open from 6:00 a.m. to one hour after sunset.

(D) The fence near the gate entrance constitutes the south boundary of the area.

(E) The specific number of pronghorn antelope to be taken from this area is determined by the number of pronghorn antelope present. This area will be closed once this number is reached.

(c) ~~Zone 3—Likely Tables:~~ Zone 3 (Likely Tables):

(1) Area: Those portions of Modoc and Lassen counties within a line beginning at the junction of the Crowder Flat Road and the California-Oregon state line; east along the California-Oregon state line to the crest of the Warner Mountains; south along the crest of the Warner Mountains to the Summit Trail at Pepperdine Camp; south along the Summit Trail to the South Warner Road near Patterson Forest Service Station; west along the South Warner Road to ~~the~~ Long Valley-Clarks Valley Road; south ~~along the~~ on Long Valley-Clarks Valley Road to ~~the~~ Clarks Valley-Madeline Road; west ~~along the~~ on Clarks Valley-Madeline Road to Highway 395 at the town of Madeline; north ~~along~~ on Highway 395 to ~~the~~ Madeline-Adin Road; northwest ~~along the~~ on Madeline-Adin Road to ~~the~~ Hunsinger Draw-Sweagert Flat Road; east and north ~~along the~~ on Hunsinger Draw-Sweagert Flat Road to ~~the~~ Sweagert Flat-Hunters Ridge Road; north and west ~~along the~~ on Sweagert Flat-Hunters Ridge Road to Highway 299 near Lower Rush Creek Recreation Site; north ~~along~~ on Highway 299 to ~~the~~ Canby Bridge-Cottonwood Flat Road; northwest ~~along the~~ on Canby Bridge-Cottonwood Flat

Road to ~~the~~ Cottonwood Flat-Happy Camp Road; northwest ~~along the~~ on Cottonwood Flat-Happy Camp Road to Modoc County Road 91; north ~~along~~ on Modoc County Road 91 to Highway 139; north ~~along~~ on Highway 139 to ~~the~~ on Hackamore-Sorholus Tank Road; northeast ~~along the~~ on Hackamore-Sorholus Tank Road to ~~the~~ Browns Well-Badger Well Road; north ~~along the~~ on Browns Well-Badger Well Road to ~~the~~ Badger Well-Deadhorse Flat Road; northeast and east ~~along the~~ on Badger Well-Deadhorse Flat Road to ~~the~~ Mowitz-Blue Mountain Road; north and east ~~along the~~ on Mowitz-Blue Mountain Road to Modoc County Road 136; east ~~along~~ on Modoc County Road 136 to Modoc County Road 73; north ~~along~~ on Modoc County Road 73 to ~~the~~ Crowder Flat Road; north ~~along the~~ on Crowder Flat Road to the California-Oregon state line~~,~~ to the point of beginning.

(2) Seasons:

(A) Period One of the general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days. Period Two of the general season shall open on the first Saturday in September and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(d) ~~Zone 4—Lassen:~~ Zone 4 (Lassen):

(1) Area: Those portions of Lassen, Plumas and Shasta counties within a line beginning at the ~~junction~~ intersection of Highway 36 and ~~the~~ Juniper Lake Road in the town of Chester; north ~~along the~~ on Juniper Lake Road to the Lassen National Park boundary; north and west along the Lassen National Park boundary to Highway 89; north ~~along~~ on Highway 89 to U.S. Forest Service Road 22 near the Hat Creek Ranger Station; east ~~along~~ on U.S. Forest Service Road 22 to U.S. Forest Service Road 35N06; east and north ~~along~~ on U.S. Forest Service Road 35N06 to the State Game Refuge 1S boundary; northwest along the State Game Refuge 1S boundary to ~~the~~ Coyote Canyon-Dixie Valley Road; northwest ~~along the~~ on Coyote Canyon-Dixie Valley Road to ~~the~~ Dixie Valley-Boyd Hill Road; northwest ~~along the~~ on Dixie Valley-Boyd Hill Road to ~~the~~ Snag Hill-Hayden Hill Road; northeast and north ~~along the~~ on Snag Hill-Hayden Hill Road to Highway 139; southeast on Highway 139 to ~~the~~ Willow Creek-Hunsinger Flat Road; northeast and northwest ~~along the~~ on Willow Creek-Hunsinger Flat Road to ~~the~~ Adin-Madeline Road; southeast ~~along the~~ on Adin-Madeline Road to Highway 395 at the town of Madeline; south ~~along~~ on Highway 395 to ~~the~~ Madeline-Clarks Valley Road; east ~~along the~~ on Madeline-Clarks Valley Road to ~~the~~ Clarks Valley-Tuledad Road; east and southeast ~~along the~~ on Clarks Valley-Tuledad Road to the California-Nevada state line; south along the California-Nevada state line to the Lassen-Sierra county line; west along the Lassen-Sierra county line to the Lassen-Plumas county line; north and west along the Lassen-Plumas county line to Highway 36; west ~~along~~ on Highway 36 to ~~the~~ Juniper Lake Road~~,~~ to the point of beginning.

(2) Seasons:

(A) Period One of the general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days. Period Two of the general season shall open on the first Saturday in September and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(e) ~~Zone 5—Big Valley:~~ Zone 5 (Big Valley):

(1) Area: Those portions of Modoc, Lassen, Shasta, and Siskiyou counties within a line beginning at the intersection of Highways 299 and 89; north and northwest ~~along~~ on Highway 89 to ~~the~~ Bartle-Telephone Flat Road; northeast ~~along the~~ on Bartle-Telephone Flat Road to ~~the~~ Iodine Prairie-Long Bell Road; southeast ~~along the~~ on Iodine Prairie-Long Bell Road to ~~the~~ North Main Road at Long Bell Forest Service Station; northeast ~~along the~~ on North Main Road and ~~the~~ Mud Springs-Mud Lake Road to Modoc County Road 91; south ~~along~~ on Modoc County Road 91 to ~~the~~ Happy Camp-Cottonwood Flat Road; southeast ~~along the~~ on Happy Camp-Cottonwood Flat Road to ~~the~~ Cottonwood Flat-Canby Bridge Road; southeast ~~along the~~ on Cottonwood Flat-Canby Bridge Road to Highway 299; south ~~along~~ on Highway 299 to ~~the~~ Hunters Ridge-Sweagert Flat Road near Lower Rush Creek Recreation Site; east and south ~~along the~~ on Hunters Ridge-Sweagert Flat Road to ~~the~~ Sweagert Flat-Hunsinger Draw Road; south and west ~~along the~~ on Sweagert Flat-Hunsinger Draw Road to ~~the~~ Adin-Madeline Road; southeast ~~along the~~ on Adin-Madeline Road to ~~the~~ Hunsinger Flat-Willow Creek Road; southeast and southwest ~~along the~~ on Hunsinger Flat-Willow Creek Road to Highway 139; northwest ~~along~~ on Highway 139 to ~~the~~ Hayden Hill-Snag Hill Road; south and southwest ~~along the~~ on Hayden Hill-Snag Hill Road to ~~the~~ Boyd Hill-Dixie Valley Road; southeast ~~along the~~ on Boyd Hill-Dixie Valley Road to ~~the~~ Dixie Valley-Coyote Canyon Road; southeast ~~along the~~ on Dixie Valley-Coyote Canyon Road to the State Game Refuge 1S boundary; southeast along the State Game Refuge 1S boundary to U.S. Forest Service Road 35N06; south and west ~~along~~ on U.S. Forest Service Road 35N06 to U.S. Forest Service Road 22; west ~~along~~ on U.S. Forest Service Road 22 to Highway 89 near the Hat Creek Ranger Station; north ~~along~~ on Highway 89 to Highway 299~~,~~ to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the earliest general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(f) ~~Zone 6—Surprise Valley:~~ Zone 6 (Surprise Valley):

(1) Area: Those portions of Modoc and Lassen counties within a line beginning at the ~~intersection~~ junction of the crest of the Warner Mountains and the California-Oregon state line; east along the California-Oregon state line to the California-Nevada state line; south along the California-Nevada state line to ~~the~~ Tuledad-Clarks Valley Road; west and northwest ~~along the~~ on Tuledad-Clarks Valley Road to ~~the~~ Clarks Valley-Long Valley Road; north on ~~the~~ Clarks Valley-Long Valley Road to ~~the~~ South Warner Road; east ~~along the~~ on South Warner Road to the Summit Trail near Patterson Guard Station; north along the Summit Trail to the crest of the Warner Mountains at Pepperdine Camp; north along the crest of the Warner Mountains to the California-Oregon state line to the point of beginning.

(2) Seasons:

(A) The general season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(B) The archery only season shall open 14 days prior to the general season and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(g) Big Valley Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(e)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders wishing to hunt the Ash Creek Wildlife Area may contact Ash Creek Wildlife Area by telephone at (530) 294–5824, and shall attend an orientation meeting before hunting. Only persons possessing valid junior hunting licenses and apprentice hunt license tags may hunt during the pronghorn antelope apprentice hunt season in the Ash Creek Wildlife Area. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(h) Lassen Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(d)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting. The Honey Lake Wildlife Area shall not be open to antelope apprentice hunt tag holders.

(i) Surprise Valley Pronghorn Antelope Apprentice Hunt:

(1) Area: The tag shall be valid in the area described in subsection 363(f)(1).

(2) Season: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(j) Likely Tables Pronghorn Antelope Apprentice Hunt

(1) Area: The tag shall be valid in the area described in subsection 363(c)(1).

(2) Seasons: The season shall open on the Saturday following the third Wednesday in August and continue for nine consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(4) Special Conditions: Tagholders must possess valid junior hunting licenses and apprentice hunt license tags. Tagholders shall be accompanied by a nonhunting, licensed adult ~~chaperon~~ chaperone 18 years of age or older while hunting.

(k) ~~Fund-raising~~ Fundraising Hunt:

(1) Area: Those portions of Lassen, Modoc, Plumas, Shasta, and Siskiyou counties described as zones 1 through 6 in subsections 363(a) through (f).

(2) Season: The season for the ~~Fund-Raising~~ Fundraising Hunt shall open on the Saturday before the first Wednesday in August and continue for 51 consecutive days.

(3) Bag and Possession Limit: One pronghorn antelope in a license year.

(*l*) Conditions:

(1) Pronghorn antelope license tags do not give the tagholders the right of entry onto privately-owned lands.

(2) Buck pronghorn antelope are defined as pronghorn antelope with horns longer than the ears. Doe pronghorn antelope are defined as pronghorn antelope with horns shorter than the ears. Either-sex pronghorn antelope are defined as buck or doe pronghorn antelope.

(3) Shooting time shall be from one-half hour before sunrise to one-half hour after sunset.

(4) Method of take:

(A) The holder of any archery-only pronghorn antelope license tag may only take pronghorn antelope using archery equipment, as defined in Section 354 of these regulations.

(B) The holder of a general season, ~~fund-raising~~ fundraising hunt season, or junior hunt season license tag may take pronghorn antelope using legal firearms and archery equipment as described in sections 353 and 354 of these regulations.

(5) Any person taking any pronghorn antelope shall retain that portion of the head, which bears the horns during the open season and for 15 days thereafter, and shall produce it upon the demand of any officer authorized to enforce the provisions of these regulations.

(6) No person shall at any time capture or destroy any pronghorn antelope and detach or remove from the carcass only the head, hide or horns; nor shall any person at any time leave through carelessness or neglect any pronghorn antelope which is in ~~his~~ their possession or any portion of the flesh thereof usually eaten by humans, to go needlessly to waste.

(7) Prior to the acceptance or issuance of a pronghorn antelope license tag, all tagholders shall consent in writing to the terms and conditions set forth on the license tag.

(m) Pronghorn Antelope Tag Allocations Table.

~~Pronghorn Antelope Tag Allocations~~

~~Hunt Area~~		~~Archery-Only Season~~			~~General Season~~						
						~~Period 1~~				~~Period 2~~	

	~~Buck~~		~~Doe~~		~~Buck~~		~~Doe~~		~~Buck~~		~~Doe~~
~~Zone 1 – Mount Dome~~	~~0~~		~~0~~		~~2~~		~~0~~		~~0~~		~~0~~
~~Zone 2 – Clear Lake~~	~~1~~		~~0~~		~~15~~		~~0~~		~~0~~		~~0~~
~~Zone 3 – Likely Tables~~	~~15~~		~~0~~		~~25~~		~~0~~		~~25~~		~~0~~
~~Zone 4 – Lassen~~	~~5~~		~~0~~		~~35~~		~~0~~		~~35~~		~~0~~
~~Zone 5 – Big Valley~~	~~1~~		~~0~~		~~20~~		~~0~~		~~0~~		~~0~~
~~Zone 6 – Surprise Valley~~	~~1~~		~~0~~		~~10~~		~~0~~		~~0~~		~~0~~
~~Likely Tables Apprentice Hunt~~		~~N/A~~				~~5 Either Sex~~				~~0~~	
~~Lassen Apprentice Hunt~~		~~N/A~~				~~5 Either Sex~~				~~0~~	
~~Big Valley Apprentice Hunt~~		~~N/A~~				~~1 Either Sex~~				~~0~~	
~~Surprise Valley Apprentice Hunt~~		~~N/A~~				~~4 Either Sex~~				~~0~~	
~~Fund-Raising Hunt~~		~~N/A~~						~~2 Buck~~			

Hunt Area	Archery-Only Season Buck	Archery-Only Season Doe	General Season Period 1 Buck	General Season Period 1 Doe	General Season Period 1 Apprentice Either-Sex	General Season Period 2 Buck	General Season Period 2 Doe	Fundraising
Zone 1 - Mount Dome	0	0	0-5	0	N/A	0	0	0
Zone 2 - Clear Lake	1	0	5-15	0	N/A	0	0	0
Zone 3 - Likely Tables	~~15~~ 0-15	0	~~15-25~~ 0-25	0	5	~~10-25~~ 0-25	0	0
Zone 4 - Lassen	5	0	25-50	0	5	25-50	0	0
Zone 5 - Big Valley	1	0	5-20	0	1	0	0	0
Zone 6 - Surprise Valley	1	0	10-15	0	4	0	0	0
Zones 1-6	0	0	0	0	0	0	0	2

NOTE: Authority cited: Sections 219, 265, 331 and 1050, Fish and Game Code.
Reference: Sections 331, 713 and 1050, Fish and Game Code.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 11, 2024

Memorandum

Date: April 10, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Agenda Item for the April 17-18, 2024, Fish and Game Commission Meeting Re: Pronghorn Antelope Hunting – Pre-Adoption Memo of Revisions and Recommendations**

The Department of Fish and Wildlife (Department) has prepared this Memorandum to transmit its final recommended tag allocations for pronghorn antelope hunting.

The Department's field surveys indicated that this past winter presented harsh conditions for the Zone 3 pronghorn antelope population. As such, the Department requested the Commission circulate a continuation notice ahead of the planned April 18, 2024 Commission adoption hearing to update the proposed tag ranges for Zone 3: In the Pronghorn Antelope Tag Allocations table, where the proposed tag ranges for Zone 3 – Likely Tables are expanded from 15-25 to 0-25 and from 10-25 to 0-25 for General Season Period 1 Buck and General Season Period 2 Buck, respectively (see the table below outlining proposed changes to subsection 363(m), splitting General Season and Fundraising from Archery). A subsequent continuation notice revised the proposed tag allocation of 15 in Zone 3 - Likely Tables Archery Only Season (Buck) to a tag quota range of 0 to 15.

The Department recommends that each of these quotas for the General Season be adopted at 5 tags based on population numbers. The Department also recommends a tag quota of 5 in the Zone 3 – Likely Tables Archery Only Season (Buck).

There are no other amendments to the regulatory text based on the results of pronghorn population studies in the spring of 2024. No comments were received.

The Department recommends the Commission adopt the proposed changes as reflected in the continuation notice and in this Pre-Adoption Memo for pronghorn antelope hunting.

Hunt Area	2023-2024 General Season Period 1 Buck	2024-2025 Proposed Range General Season Period 1 Buck	2024-2025 Recommendation General Season Period 1 Buck	2023-2024 General Season Period 2 Buck	2024-2025 Proposed Range General Season Period 2 Buck	2024-2025 Recommendation General Season Period 2 Buck
Zone 1 – Mount Dome	2	0-5	2	0	0	
Zone 2 – Clear Lake	15	5-15	12	0	0	
Zone 3 – Likely Tables	25	~~15-25~~ [0-25][1] **5**[2]	5	25	~~10-25~~ [0-25][3] **5**[4]	5
Zone 4 – Lassen	35	25-50	35	35	25-50	35
Zone 5 – Big Valley	20	5-20	5	0	0	
Zone 6 – Surprise Valley	10	10-15	10	0	0	
Zones 1-6						

[1] Initial range of 15-25 was determined to be too high after pronghorn population analysis. The amended range of 0-25 was posted viaa continuation notice on April 5, 2024 for adoption at the April 18, 2024 Fish and Game Commission meeting.
[2] Department recommendation for this quota is 5 tags.
[3] Initial range of 10-25 was determined to be too high after pronghorn population analysis. The amended range of 0-25 was posted via a continuation notice on April 5, 2024 for Adoption at the April 18, 2024 Fish and Game Commission meeting.
[4] Department recommendation for this quota is 5 tags.

Hunt Area	2023-2024 Archery-Only Buck	2024-2025 Archery-Only Buck
Zone 1 – Mount Dome	0	0
Zone 2 – Clear Lake	1	1
Zone 3 – Likely Tables	~~15~~ [0-15] **5**[5]	5
Zone 4 - Lassen	5	5
Zone 5 - Big Valley	1	1
Zone 6 - Surprise Valley	1	1
Zones 1-6	0	0

If you have any questions on this item, please contact Scott Gardner, Wildlife Branch Chief, via phone at (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Scott Gardner, Branch Chief
Wildlife Branch
Department of Fish and Wildlife

Robert Pelzman, Captain
Law Enforcement Division
Department of Fish and Wildlife

Mario Klip, Game Conservation and Wildlife Connectivity Program Manager
Wildlife Branch
Department of Fish and Wildlife

Regina Vu, Regulations Specialist
Wildlife Branch
Department of Fish and Wildlife

[5] A reduction in the number of Archery Only Tags (Buck) for Zone 3 from 15 to 5 was determined to be necessary after pronghorn population analysis. The amended proposed quota of 5 was posted via a continuation notice on April 10, 2024 for Adoption at the April 18, 2024 Fish and Game Commission meeting.

Ona Alminas, Env. Program Manager
Regulations Unit
Department of Fish and Wildlife

Chelle Temple-King, Senior Regulatory Scientist
Regulations Unit
Department of Fish and Wildlife

David Thesell, Program Manager
Fish and Game Commission

David Haug, Analyst
Fish and Game Commission

Ari Cornman, Wildlife Advisor
Fish and Game Commission

ADDENDUM

TO THE

2004 FINAL ENVIRONMENTAL DOCUMENT

REGARDING PRONGHORN ANTELOPE HUNTING

prepared by the

STATE OF CALIFORNIA
NATURAL RESOURCES AGENCY
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on behalf of

CALIFORNIA FISH AND GAME COMMISSION

as

LEAD AGENCY UNDER THE
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

for the

REGULARY NOTICED RULEMAKING ACTION TO AMEND
SECTIONS 363 PRONGHORN ANTELOPE HUNTS
TITLE 14, CALIFORNIA CODE OF REGULATIONS
2024 HUNTING SEASON

(OAL Notice File No. **2024-0123-07**)

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this addendum pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing pronghorn antelope hunting in California (California Code of Regulations (CCR), Title 14, Section 363). F&G Code, Section 3950 designates pronghorn antelope as a game mammal in California. F&G Code Sections 203 and 331 authorize the Commission to fix the area or areas, seasons and hours, bag and possession limit, sex, and total number of pronghorn antelope that may be taken pursuant to its regulations. F&G Code Section 203.1 requires the Commission to consider populations, habitat, food supplies, the welfare of individual animals, and other pertinent facts when establishing hunting regulations for pronghorn antelope. The Commission establishes pronghorn antelope hunting tag quotas through regulations amended annually, as needed, based on current population estimates derived from annual surveys by CDFW.

The Commission serves as the CEQA lead agency when it promulgates and amends the pronghorn antelope hunting regulations. (Public Resources Code Section 21067; CEQA Guidelines Section 15367.)[1] The Commission established maximum tag quotas for all pronghorn antelope hunting zones in California in 2004 with, among other things, the certification of a Final Environmental Document under CEQA (2004 Pronghorn Antelope ED)(SCH No. 2003112078). The 2004 Pronghorn Antelope ED provides relevant and important informational value as the Commission as CEQA lead agency considers proposed amendments to the existing regulations for the 2024 pronghorn antelope hunting season in California. This addendum documents the Commission's consideration of related environmental effects.

Periodic adjustments of tag quotas in response to dynamic environmental and biological conditions are necessary to maintain sustainable populations of pronghorn antelope and hunt opportunities, as well as keeping with mandates and management recommendations. Analysis of these conditions was completed in March of 2024. Based on the analysis, the proposed tag quota for 2024 falls within the conservative harvest range identified in the 2004 Pronghorn Antelope ED.

[1] The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

EARLIER PROJECT APPROVAL

CEQA review of the proposed project was conducted in accordance with the Commission's certified regulatory program approved by the Secretary for the California Natural Resources Agency pursuant to Public Resources Code Section 21080.5 (See generally Title 14, CCR, Sections 781.5 and 15251(b)). CEQA requires all public agencies in the State to evaluate the environmental impacts of discretionary projects they propose to carry out or approve, including promulgating regulations, which may have a potential to significantly affect the environment.

In 2004, the Commission certified a Final Environmental Document Regarding Pronghorn Antelope Hunting (2004 Pronghorn Antelope ED) (SCH No. 2003112078) as the lead agency under CEQA as part of the Commission's review and adoption of the Pronghorn antelope Hunting regulations.

PROPOSED 2024 TAG ALLOCATIONS FOR THE MOUNT DOME HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Mount Dome General Season Period 1 Buck is 2. Currently, the public tag quota (general draw) for the Mount Dome General Season Period 1 Buck is 2 tags.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for Mount Dome General Season Period 1 Buck not to exceed a maximum of 60 tags. Therefore, there are no new significant or substantially more severe impacts caused by keeping the buck tags in the Mount Dome Hunt Zone at 2 tags.

PROPOSED 2024 TAG ALLOCATIONS FOR THE CLEAR LAKE HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Clear Lake General Season Period 1 Buck is 12. Currently, the public tag quota (general draw) for the Clear Lake General Season Period 1 Buck is 15 tags.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for the Clear Lake General Season Period 1 Buck not to exceed a maximum of 80 tags. Therefore, there are no new significant or substantially more severe impacts from amending the pronghorn antelope hunt regulations to modify buck tags in the Clear Lake General Season Period 1 Buck to 12 tags.

PROPOSED 2024 TAG ALLOCATIONS FOR THE LIKELY TABLES HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Likely Tables General Season Period 1 and Period 2 Buck is 5. Currently, the public tag quota (general draw) for the Likely Tables General Season Periods 1 and 2 Buck is 25 tags each.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for the Likely Tables General Season Period 1 Buck not to exceed a maximum of 150 tags and for the Likely Tables General Season Period 2 Buck not to exceed a maximum of 130 tags. Therefore, there are no new significant or substantially more severe impacts from amending the pronghorn antelope hunt regulations to modify buck tags in the Likely Tables General Season Periods 1 and 2 Buck to 5 tags and 5 tags, respectively.

PROPOSED 2024 TAG ALLOCATIONS FOR THE LASSEN HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Lassen General Season Period 1 and Period 2 Buck is 35. Currently, the public tag quota (general draw) for the Likely Tables General Season Periods 1 and 2 Buck is 35 tags each.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for the Lassen General Season Periods 1 and 2 Buck not to exceed a maximum of 150 tags each. Therefore, there are no new significant or substantially more severe impacts from amending the pronghorn antelope hunt regulations caused by keeping buck tags in the Lassen General Season Periods 1 and 2 Buck at 35 tags each.

PROPOSED 2024 TAG ALLOCATIONS FOR THE BIG VALLEY HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Big Valley General Season Period 1 Buck is 5. Currently, the public tag quota (general draw) for the Big Valley General Season Period 1 Buck is 20 tags.

The previous Archery tag quota was 15 bucks during the 2023-2024 season. The new proposed tag quota is 5. This reduction is proposed because the March 2024 survey showed a smaller population of Pronghorn than anticipated, likely connected to a severe winter that increased winter mortality.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for the Big Valley General Season Period 1 Buck not to exceed a maximum of 150 tags. Therefore, there are no new significant or substantially more severe impacts from amending the pronghorn antelope hunt regulations to modify buck tags in the Big Valley General Season Period 1 Buck to 5 tags and reducing the Archery tags from 15 to 5.

PROPOSED 2024 TAG ALLOCATIONS FOR THE SURPRISE VALLEY HUNT ZONE

The pronghorn antelope tag quotas described in the 2004 Pronghorn Antelope ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 pronghorn antelope hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. For 2024, the proposed tag allocation for the Surprise Valley General Season Period 1 Buck is 10-15. Currently, the public tag quota (general draw) for the Big Valley General Season Period 1 Buck is 10 tags.

The 2004 Pronghorn Antelope ED found no significant impacts for a range of pronghorn antelope tags for the Surprise Valley General Season Period 1 Buck not to exceed a maximum of 25 tags. Therefore, there are no new significant or substantially more severe impacts caused by keeping the pronghorn antelope hunt regulations to modify buck tags in the Surprise Valley General Season Period 1 Buck at 10 tags.

NO SUBSEQUENT ENVIRONMENTAL DOCUMENT IS REQUIRED

In general, CEQA applies whenever a public agency proposes to carry out or approve a discretionary project. (Public Resources Code Section 21080(a)). CEQA provides that, where a public agency proposes to modify a previously approved project for which a Final Environmental Document was prepared and certified:

> "The lead agency or a responsible agency shall prepare an ***addendum*** to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred." (Title 14, CCR, Section 15164)

- A Subsequent Environment Document (Section 15162) when there is substantial evidence that:
  - Substantial changes are proposed in the project, which will require major revisions to the previous environmental impact report (EIR) or environmental document (ED).
  - Substantial changes occur with respect to the circumstances under which the project is being undertaken, which will require major revisions to the previous EIR or environmental documentation.
  - New information, which was not known and could not have been known at the time the previous EIR or ED was certified as complete, becomes available.
- A Supplement to an Environment Document (Section 15163) when:
  - A subsequent ED is not required.
  - Only minor changes to the project are described.
  - Only that information to make the ED adequate is provided.
- An Addendum to the Certified ED (Section 15164) is proper when**:**
  - The changes or additions presented in this project are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent ED have occurred.
  - The Commission may properly prepare and may rely on an addendum in accordance with Section 15164 to fulfill its obligations under CEQA.

NO ADDITIONAL IMPACTS UNDER CEQA

The Commission has determined that amending the current pronghorn antelope hunting regulations based on annual survey results will not result in any new or significant or substantially more severe environmental impacts than previously analyzed and disclosed in the 2004 Pronghorn antelope ED for this project.

This project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. There are no impacts to the habitat of fish and wildlife species.

This approval action adjusts the previous year tag quotas based on more current population information, modifies existing hunt zone boundaries, and establishes three new hunt zones. No other aspect of the project is changed. No new significant or substantially more severe impacts under CEQA will occur due to this change.

AMENDMENT OF THE PRONGHORN ANTELOPE HUNT REGULATIONS

In conclusion, the Commission finds that amending the pronghorn antelope hunt regulations in Title 14, CCR Section 363, will not result in any new significant or substantially more severe environmental effects than previously analyzed and disclosed in the 2004 Pronghorn Antelope ED. The Commission also finds that subsequent or supplemental review beyond this Addendum is not warranted pursuant to Title 14, CCR Section 15164, in connection with this proposed action.

Melissa A. Miller-Henson ______________________ April 12, 2024

Melissa Miller-Henson, Executive Director Date

California Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Sections 364 and 364.1
Title 14, California Code of Regulations
Re: Elk Hunting

I. Date of Initial Statement of Reasons: October 1, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The Fish and Game Commission (Commission) periodically considers the recommendations of the Department of Fish and Wildlife (Department) in updating elk hunting regulations. Considerations include recommendations for adjusting tag quotas, setting hunt periods, modifying zone boundaries, authorizing methods of take, among others, to help achieve management goals and objectives for elk. Section 364 provides descriptions of hunt zone boundaries, season opening and closing dates, methods of take (e.g., general methods, archery only, apprentice), tag designations (buck, doe), tag quotas (total number of hunting tags to be made available), bag and possession limits, and special conditions for elk. To maintain appropriate harvest levels and hunting quality, tags must be adjusted periodically in response to dynamic environmental, biological, and social conditions.

The proposed changes focus on elk tag quotas under Section 364(r-z). The last time these regulations were subject to a major amendment was 2022-2023. The proposed amendments here represent the cumulation of the Department's internal discussion/data analysis. Periodic adjustments of tag quotas in response to dynamic environmental and biological conditions are necessary to maintain sustainable populations of elk and hunt opportunities, as well as keeping with mandates and management recommendations. Unfortunately, administrative procedures and the Fish and Game Code require the Commission to receive proposed changes to existing regulations prior to the completion of surveys and analyses, thus necessitating a range of numbers. Analyses are scheduled for completion by March 2024. The proposed changes are necessary to maintain sustainable hunt opportunities, consistency with management unit plan recommendations, and Fish and Game Code.

BACKGROUND

Current regulations in Section 364 specify elk tag quotas for each hunt zone and establish hunt zone boundaries in accordance with management goals and objectives described in the Department's Elk Conservation and Management Plan. Similarly, current regulations in Section 364.1 specify elk tag quotas for each hunt zone that may be distributed to the public to allow access to hunt elk on specific properties that enter the Shared Habitat Alliance for Recreational Enhancement (SHARE) program. A limited number of public elk hunting tags are offered annually via the Big Game Drawing and SHARE program drawing, and public demand for elk hunting tags (as indicated by elk tag draw applications) has annually exceeded tag availability for the last ten years. In addition to harvest opportunity, public elk hunting also provides data that enhances the Department's ability to monitor elk populations including spatial, age, genetic, and disease information. As described in the Department's Elk Conservation and Management Plan (2018), the Department's goal is to increase elk hunting opportunities where feasible and compatible with population objectives, in which case recommendations will be offered to the Commission.

CURRENT REGULATIONS

Individuals are awarded an elk hunting tag through the Department's Big Game Drawing or SHARE hunt program drawing. Harvest of an elk is authorized for an individual awarded a tag for a respective hunt zone or SHARE property and season. Tag quotas are established based on a variety of factors including population density and abundance, age and sex composition, elk distribution, and human-elk conflict levels, among other population objectives, factors, and considerations. The Department has identified several areas where increased public elk hunting opportunities under section 364 and section 364.1 are feasible and support achievement of population objectives.

Current laws governing 364 and 364.1 tag allocations for the identified areas are as follows:

- Grizzly Island General Methods Tule Elk Hunts: 364(u)(13)(A) through 364(u)(13)(M); 16 antlerless tags, 10 spike bull tags, 7 bull tags
- Siskiyou SHARE Roosevelt Elk Hunt: 364.1(i)(1); 2 bull tags, 2 antlerless tags
- Northwestern SHARE Roosevelt Elk Hunt: 364.1(i)(2); 34 bull tags, 34 antlerless tags
- Tehachapi SHARE Rocky Mountain Elk Hunt: 364.1(j)(2); 20 bull tags, 15 antlerless tags
- Mendocino SHARE Roosevelt/Tule Elk Hunt: 364.1(k)(1); 2 bull tags, 4 antlerless tags

PROPOSED REGULATIONS

The proposed regulations are in compliance with CDFW's Elk Conservation and Management Plan (CDFW 2018):

Grizzly Island Tule Elk Hunt Zone Section 364(u)(13)(A) through 364(u)(13)(M)

Amend subsections 364(u)(13)(J), 364(u)(13)(L), and 364(u)(13)(M) to increase bull harvest in Periods 10 (364(u)(13)(J)), 12 (364(u)(13)(L)), and 13 (364(u)(13)(M)).

Period 10: [4-5] bull; current 3

Period 12: [4-5] bull; current 3

Period 13: [2-4] bull: current 0

Grizzly Island Tule Elk Hunt Zone: Current (2023) public tag quota for the Grizzly Island Hunt Zone is 16 antlerless, 10 spike bull, and 7 bull tags. The observed bull (bb): cow (cc) ratio (86bb:100 cc) is above objective (50bb:100 cc). The Department recommends increased bull harvest with the addition of 4-8 bull tags across three hunt periods (Periods 10, 12, and 13). The intended results of this recommendation will provide more public hunt opportunity and help achieve the sex ratio objective.

Nonsubstantive Changes

Additional changes are made in subsections 364(a) through (d) for punctuation and capitalization.

Siskiyou SHARE Roosevelt Elk Section 364.1(i)(1).

Amend subsection 364.1(i)(1) to increase SHARE bull and antlerless harvest.

Siskiyou SHARE Roosevelt Elk Hunt Zone: current (2023) SHARE tags for the Siskiyou Hunt Zone is 2 bull and 2 antlerless tags. Elk populations in this hunt zone tend to concentrate on private property and human-elk conflict has exceeded tolerable levels in some areas. High elk density may also contribute to increased disease transmission.

The Department recommends adding 18 bull and 18 antlerless SHARE tags to result in a total of 40 (20 bull and 20 antlerless) SHARE tags. The intended results of this recommendation will provide more public hunt opportunity and reduce elk conflict.

Northwestern SHARE Roosevelt Elk Section 364.1(i)(2).

Amend subsection 364.1(i)(2) to increase SHARE bull and antlerless harvest.

Northwestern SHARE Roosevelt Elk Hunt Zone: current (2023) SHARE tags for the Northwestern Hunt Zone include 34 bull and 34 antlerless tags. Elk populations in this Hunt Zone tend to concentrate on private property and human-elk conflict has exceeded tolerable levels in some areas. High elk density may also contribute to increased disease transmission.

The Department recommends adding 6 bull and 26 antlerless SHARE tags to result in a total of 100 (40 bull and 60 antlerless) SHARE tags. The intended results of this recommendation will provide more public hunt opportunity, reduce disease transmission, and reduce elk conflict.

Tehachapi SHARE Rocky Mountain Elk Section 364.1(j)(2).

Amend subsection 364.1(j)(2) to increase SHARE bull and antlerless harvest.

Tehachapi SHARE Rocky Mountain Elk Hunt Zone: current (2023) SHARE tags for the Tehachapi Hunt Zone include 20 bull and 15 antlerless tags. Elk populations in this Hunt Zone tend to concentrate on private property and human-elk conflict has exceeded tolerable levels in some areas.

The Department recommends adding 20 bull and 45 antlerless SHARE tags to result in a total of 100 (40 bull and 60 antlerless) SHARE tags. The intended results of this recommendation will provide more public hunt opportunity and reduce elk conflict.

Mendocino SHARE Roosevelt/Tule Elk Section 364.1(k)(1).

Amend subsection 364.1(k)(1) to increase SHARE bull and antlerless harvest.

Mendocino SHARE Roosevelt/Tule Elk Hunt Zone: current (2023) SHARE tags for the Mendocino Hunt Zone include 2 bull and 4 antlerless tags. Elk populations in this Hunt Zone tend to concentrate on private property and human-elk conflict has exceeded tolerable levels in some areas. High elk density may also contribute to increased disease transmission.

The Department recommends adding 18 bull and 26 antlerless SHARE tags to result in a total of 50 (20 bull and 30 antlerless) SHARE tags. The intended results of this recommendation will provide more public hunt opportunity, reduce disease transmission, and reduce elk conflict.

(b) Goals and Benefits of the Regulation

The proposed regulations will contribute to the sustainable management of elk populations in California while providing additional hunting opportunity in certain zones. Population objectives are maintained and managed in part by periodically modifying the number of hunting tags distributed.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 203, 203.1, 265, 332, and 1050, Fish and Game Code

Reference: Sections 325, 332, 1050, 1570, 1571, 1573, and 1574, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change: None

(e) Identification of Reports or Documents Supporting Regulation Change

California Department of Fish and Wildlife. (2018). 2018 Elk Management Plan. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=162912&inline

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

- Wildlife Resources Committee, May 2023
- Wildlife Resources Committee, September 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

No alternatives were identified by or brought to the attention of Commission staff that would have the same desired regulatory effect.

(b) No Change Alternative

Without the proposed changes, the outstanding issues concerning the regulations currently governing 364 and 364.1 would remain unaddressed. Retaining the current number of tags for the hunts listed would not be responsive to changes in population status or levels of human-elk conflict.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed action adjusts tag quotas for existing hunts. Given the number of tags available and the area over which they are distributed, these proposals are economically neutral to business.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission does not anticipate impacts on the creation or elimination of jobs or businesses within the State; no significant impacts to the creation of new business, the elimination of existing businesses, or the expansion of businesses in California are anticipated. The Commission does not anticipate direct benefits to the general health and welfare of California residents or to worker safety but anticipates benefits to the environment.

(c) Cost Impacts on a Representative Private Person or Business

The Commission does not anticipate significant impacts on the representative private persons or businesses.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: Non new costs/savings or change to federal funding are anticipated for state agencies. However, the Department is projected to experience higher elk tag sales that may result in revenue increases (see STD399 and Addendum).

(e) Nondiscretionary Costs/Savings to Local Agencies: None

(f) Programs Mandated on Local Agencies or School Districts: None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None

(h) Effect on Housing Costs: None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

The Commission does not anticipate impacts on the creation or elimination of jobs within the state.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The Commission does not anticipate impacts on the creation of new business, the elimination of existing businesses within the state because the proposed regulations are not anticipated to create impacts that are substantial enough to stimulate demand for goods or services related to elk hunting.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The Commission does not anticipate impacts on the expansion of businesses currently doing business within the state because the proposed regulations are not anticipated to create impacts that are substantial enough to stimulate demand for goods or services related to elk hunting.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat, and humans, and can be a family tradition and a bonding activity.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate impacts on worker safety.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code section 1700, it is the policy of the state to encourage the conservation, maintenance, and utilization of fish and wildlife resources for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of populations of elk to ensure their continued existence and supporting recreational opportunity. Adoption of scientifically based elk seasons and tag quotas provides for the maintenance of elk populations to ensure those objectives are met. The fees that hunters pay for licenses and tags help fund wildlife conservation.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

Current regulations in Section 364 provide definitions, hunting zone descriptions, season opening and closing dates, tag quotas (total number of hunting tags to be made available), and bag and possession limits for elk hunting. Currently, elk tags are distributed through four issuance types governed by different sections under Title 14. Issuance types for elk tags include Section 364 General Public tags awarded via the Big Game Drawing, Section 364.1 Shared Habitat Alliance for Recreational Enhancement (SHARE) tags, Section 555 Cooperative Elk Hunting Area "Landowner" tags, and Section 601 Private Lands Wildlife Habitat Enhancement and Management Area (PLM) tags. A limited number of fundraising tags are also available for purchase, usually by auction, via non-governmental organizations that assist the Department with fundraising.

Harvest of an elk is authorized for an individual with a tag for a respective hunt zone and season or specific property, depending on the tag issuance type. Tag quotas are established based on a variety of factors including population density and abundance, age and sex composition, and distribution as well as environmental and social factors.

The proposed changes are as follows:

Amend 364(u) to modify hunt quotas for Grizzly Island Periods 10, 12, and 13.

Amend 364.1(i-k) to modify hunt quotas for Siskiyou, Northwestern, Tehachapi, and Mendocino SHARE elk hunts.

Periodic adjustments of tag quotas in response to dynamic environmental and biological conditions are necessary to maintain sustainable populations of elk and hunt opportunities, as well as keeping with mandates and management recommendations. Unfortunately, administrative procedures and the Fish and Game Code require the Fish and Game Commission to receive proposed changes to existing regulations prior to the completion of surveys and analyses, thus necessitating a range of numbers. Analyses are scheduled for completion by March 2024.

Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language have been made in sections 364 and 364.1.

Benefit of the Regulations:

The goals and benefits of the regulations are to help maintain sustainable populations of elk, maintain sustainable hunt opportunities, and achieve management recommendations in existing unit plans.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing elk hunting (California Fish and Game Code sections 332 and 3951. No other state agency has the authority to adopt regulations governing elk hunting. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of elk hunting regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

Proposed Regulatory Language

Section 364, Title 14 CCR, is amended to read:

§ 364. Elk Hunts, Seasons, and Number of Tags.

(a) Department Administered General Methods Roosevelt Elk Hunts:

(1) Siskiyou General Methods Roosevelt Elk Hunt:

(A) Area: In that portion of Siskiyou County within a line beginning at the junction of Interstate 5 and the California-Oregon state line; east along the California-Oregon state line to Hill Road at Ainsworth Corner; south on Hill Road to Lava Beds National Monument Road; south on Lava Beds National Monument Road to USDA Forest Service Road 49; south on USDA Forest Service Road 49 to USDA Forest Service Road 77; west on USDA Forest Service Road 77 to USDA Forest Service Road 15 (Harris Spring Road); south on USDA Forest Service Road 15 to USDA Forest Service Road 13 (Pilgrim Creek Road); southwest on USDA Forest Service Road 13 to Highway 89; northwest on Highway 89 to Interstate 5; north on Interstate 5 to the point of beginning.

(2) Northwestern Roosevelt Elk Hunt:

(A) Area: In those portions of Humboldt and Del Norte ~~Counties~~ counties within a line beginning at the intersection of Highway 299 and Highway 96; north on Highway 96 to the Del Norte-Siskiyou county line; north along the Del Norte-Siskiyou county line to the California-Oregon state line; west along the California-Oregon state line to the Pacific coastline; south along the Pacific coastline to the Humboldt-Mendocino county line; east along the Humboldt-Mendocino county line to the Humboldt-Trinity county line; north along the Humboldt-Trinity county line to Highway 299; west on Highway 299 to the point of beginning.

(3) Marble Mountains General Methods Roosevelt Elk Hunt:

(A) Area: In those portions of Humboldt, Tehama, Trinity, Shasta and Siskiyou Counties within a line beginning at the intersection of Interstate 5 and the California-Oregon state line; west along the California-Oregon state line to the Del Norte county line; south along the Del Norte county line to the junction of the Siskiyou-Humboldt county line; east along the Siskiyou-Humboldt county line to Highway 96; south on Highway 96 to Highway 299; south on Highway 299 to the Humboldt-Trinity county line; south along the Humboldt-Trinity county line to Highway 36; east on Highway 36 to Interstate 5; north on Interstate 5 to the point of beginning.

(b) Department Administered General Methods Rocky Mountain Elk Hunts:

(1) Northeastern General Methods Rocky Mountain Elk Hunt:

(A) Area: Those portions of Siskiyou, Modoc, Lassen, and Shasta ~~Counties~~ counties within a line beginning in Siskiyou County at the junction of the California-Oregon state line and Hill Road at Ainsworth Corner; east along the California-Oregon state line to the California-Nevada state line; south along the California-Nevada state line to Lassen County Road 506 ~~Tuledad~~ (Tuledad) Road; west on Lassen County Road 506 to Lassen County Road 512 (Red Rock Road); west on Lassen County Road 512 to Lassen County Road 510 (Clark’s Valley Road); west on Lassen County Road 510 to Highway 395 at Madeline; west on Lassen County Road

527 (Ash Valley Road) to Highway ~~139/299~~ 299/139 in Adin; south on Highway 299/139, then Highway 139 to Highway 36 in Susanville; west on Highway 36 to Interstate 5 in Red Bluff; north on Interstate 5 to Highway 89; southeast on Highway 89 to USDA Forest Service Road 13 (Pilgrim Creek Road); northeast on USDA Forest Service Road 13 to USDA Forest Service Road 15 (Harris Spring Road); north on USDA Forest Service Road 15 to USDA Forest Service Road 77; east on USDA Forest Service Road 77 to USDA Forest Service Road 49; north on USDA Forest Service Road 49 to Lava Beds National Monument Road; north on Lava Beds National Monument Road to Hill Road; north on Hill Road to the point of beginning.

(2) Tehachapi Rocky Mountain Elk Hunt:

(A) Area: In those portions of Kern and Los Angeles ~~Counties~~ counties within a line beginning at the intersection of Highways 99 and 65; north on Highway 65 to the Kern-Tulare county line; east along the Kern-Tulare county line to Highway 395; south on Highway 395 to Highway 14; southwest on Highway 14 to Highway 138; west on Highway 138 to Interstate 5; north on Interstate 5 to Highway 99; north on Highway 99 to the point of beginning.

(c) Department Administered General Methods Roosevelt/Tule Elk Hunt:

(1) Mendocino General Methods Roosevelt/Tule Elk Hunt:

(A) Area: In that portion of Mendocino County within a line beginning at the Pacific coastline and the Mendocino-Humboldt county line south of Shelter Cove; east along the Mendocino-Humboldt county line to the Mendocino-Trinity county line; south and east along the Mendocino-Trinity county line to the Mendocino-Tehama county line; south along the Mendocino-Glenn county line, then the Mendocino-Lake county line to Highway 20; north and west on Highway 20 to Highway 101 near Calpella; south on Highway 101 to Highway 253; southwest on Highway 253 to Highway 128; north on Highway 128 to Mountain View Road near the town of Boonville; west on Mountain View Road to Highway 1; south on Highway 1 to the junction of the Garcia River; west along the Garcia River to the Pacific coastline; north along the Pacific coastline to the point of beginning.

(d) Department Administered General Methods Tule Elk Hunts:

(1) Cache Creek General Methods Tule Elk Hunt:

(A) Area: In those portions of Lake, Colusa and Yolo ~~Counties~~ counties within a line beginning at the junction of Highway 20 and the Colusa-Lake county line (County Line Ridge); south along the Colusa-Lake county line to the Yolo county line; east along the Yolo ~~County~~ county line to Highway 16; south on Highway 16 to Reiff-Rayhouse Road; west on Reiff-Rayhouse Road to Morgan Valley Road; west on Morgan Valley Road to Highway 53; north on Highway 53 to Highway 20; west on Highway 20 to Forest Road 303; north and east on Forest Road 303 to Walker Ridge Road; south on Walker Ridge Road to Highway 20; east on Highway 20 to the point of beginning.

(2) La Panza General Methods Tule Elk Hunt:

(A) Area: In those portions of San Luis Obispo, Kern, and Santa Barbara ~~Counties~~ counties within a line beginning in San Luis Obispo County at the intersection of Highway 101 and Highway 46; south on Highway 101 to Highway 166 in San Luis Obispo County; east on

Highway 166 to Highway 33 at Maricopa in Kern County; north and west on Highway 33 to Highway 46 in Kern County; west on Highway 46 to the point of beginning.

(B) Special Conditions: All tagholders will be required to attend a mandatory orientation. Tagholders will be notified of the time and location of the orientation meeting upon receipt of their elk license tags.

(3) Central Coast General Methods Tule Elk Hunt:

(A) Area: In those portions of Monterey and San Luis Obispo ~~Counties~~ counties within a line beginning in Monterey County at the junction of Highway 1 and Elkhorn Slough; westward to the Pacific coastline at the Moss Landing Harbor mouth entrance; south along the Pacific coastline to the junction of the mouth of Santa Rosa Creek in San Luis Obispo County; south and east along Santa Rosa Creek to the bridge at Highway 1; south on Highway 1 to Highway 46; east on Highway 46 to Highway 101; north on Highway 101 to North Main Street in Salinas in Monterey County; south on North Main Street to Highway 183; north on Highway 183 to Highway 1; north on Highway 1 to the point of beginning, excluding the full extent of the Fort Hunter Liggett military installation.

(B) Special Conditions: All tagholders will be required to attend a mandatory orientation. Tagholders will be notified of the time and location of the orientation meeting upon receipt of their elk license tags.

(4) Gabilan General Methods Tule Elk Hunt:

(A) Area: In those portions of Monterey, San Benito, and Fresno ~~Counties~~ counties within a line beginning in Monterey County at the junction of the Pajaro River and the Pacific coastline; east along the Pajaro River to Highway 25; south on Highway 25 to San Felipe Road; south on San Felipe Road to San Benito Street; south on San Benito Street to Nash Road; east on Nash Road to Highway 25; south on Highway 25 to County Road J1 (Panoche Road) near the town of Paicines; southeast on County Road J1 to County Road J1 (Little Panoche Road); north on County Road J1 to Interstate 5 in Fresno County; south on Interstate 5 to Highway 33; south on Highway 33 to Highway 46; west on Highway 46 to Highway 101; north on Highway 101 to North Main Street in Salinas in Monterey County; south on North Main Street to Highway 183; north on Highway 183 to Highway 1; north on Highway 1 to the junction with Elkhorn Slough; westward to the Pacific coastline at the Moss Landing Harbor mouth entrance; north along the Pacific coastline to the point of beginning.

(B) Special Conditions: All tagholders will be required to attend a mandatory orientation. Tagholders will be notified of the time and location of the orientation meeting upon receipt of their elk license tags.

(5) Bishop General Methods Tule Elk Hunt:

(A) Area: In that portion of Inyo County within a line beginning at the intersection of Highway 395 and Highway 6 in the town of Bishop; north and east ~~along~~ on Highway 6 to Silver Canyon Road; east on Silver Canyon Road to Forest Service Road 4S01 (White Mountain Road); south on Forest Service Road 4S01 to Highway 168 at Westgard Pass; south and west on Highway 168 to Highway 395; north on Highway 395 to the point of beginning.

(6) Independence General Methods Tule Elk Hunt:

(A) Area: In that portion of Inyo County within a line beginning at the intersection of Highway 395 and Aberdeen Station Road; east on Aberdeen Station Road to its terminus at the southern boundary of Section 5, Township 11S, Range 35E; east along the southern boundary of sections 5, 4, 3, and 2, Township 11S, Range 35E to ~~the~~ Papoose Flat Road at Papoose Flat; south and east on Papoose Flat Road to Mazourka Canyon Road; south, then west on Mazourka Canyon Road to Highway 395; north on Highway 395 to the point of beginning.

. . . [No change to subsections (d)(7) through (d)(10)]. . .

(11) Whitney General Methods Tule Elk Hunt:

(A) Area: In that portion of Inyo County within a line beginning at the intersection of Highway 395 and Onion Valley Road; south on Highway 395 to Whitney Portal Road; west on Whitney Portal Road to the northern boundary of Section 36, Township 15S, Range 34E; west along the northern boundary of sections 36, 35, 34 and 33 Township 15S, Range 34 E to the Inyo-Tulare county line; north along the ~~the~~ Inyo-Tulare county line to the junction of Section 27 Township 13S, range 33E; east along the southern boundary of sections 27, 26 and 25 Township 13S, Range 33E; north along the eastern boundary of Section 25 Township 13S, Range 33E to Onion Valley Road; east on Onion Valley Road to the point of beginning.

. . . [No change to subsections (d)(12) through(d)(14)]

(15) East Park Reservoir General Methods Tule Elk Hunt:

(A) Area: In those portions of Glenn and Colusa ~~Counties~~ counties within a line beginning in Glenn County at the intersection of Interstate 5 and Highway 162 at Willows; west on Highway 162 (Highway 162 becomes Alder Springs Road) to the Glenn-Mendocino county line; south along the Glenn-Mendocino county line to the Glenn-Lake county line; east and then south along the Glenn-Lake county line to the Colusa-Lake county line; west, and then southeast along the Colusa-Lake county line to Goat Mountain Road; north and east on Goat Mountain Road to Lodoga-Stonyford Road; east on Lodoga-Stonyford to Sites-Lodoga Road at Lodoga; east on Sites-Lodoga Road to Maxwell-Sites Road at Sites; east on Maxwell-Sites Road to Interstate 5 at Maxwell; north on Interstate 5 to the point of beginning.

(B) Special Conditions:

1. All tagholders will be required to attend a mandatory orientation. Tagholders will be notified of the time and location of the orientation meeting after receipt of their elk license tags.

2. Access to private land may be restricted or require payment of an access fee.

3. A Colusa County ordinance prohibits firearms on land administered by the USDI Bureau of Reclamation in the vicinity of East Park Reservoir. A county variance currently allows for the use of muzzleloaders (as defined in Section 353) on Bureau of Reclamation land within the hunt zone. Hunters are responsible for checking with county authorities for any change in the variance.

(16) San Luis Reservoir General Methods Tule Elk Hunt:

(A) Area: In those portions of Merced, Fresno, San Benito, and Santa Clara ~~Counties~~ counties within a line beginning in Merced County at the intersection of Highway 152 and

Interstate 5 near the town of Santa Nella; west on Highway 152 to Highway 156 in Santa Clara County; southwest on Highway 156 to Highway 25 near the town of Hollister in San Benito County; south on Highway 25 to County Road J1 (Panoche Road) in the town of Paicines; south and east on County Road J1 to County Road J1 (Little Panoche Road); north and east on County Road J1 (Little Panoche Road) to Interstate 5 in Fresno County; north on Interstate 5 to the point of beginning.

(17) Bear Valley General Methods Tule Elk Hunt

(A) Area: In those portions of Colusa, Lake, and Yolo ~~Counties~~ counties within a line beginning in Colusa County at the intersection of Interstate 5 and Maxwell-Sites Road at Maxwell; west on Maxwell-Sites Road to Sites-Lodoga Road; west on Sites-Lodoga Road to Lodoga-Stonyford Road; west Road to Goat Mountain Road; west and south on Goat Mountain Road to the Colusa-Lake county line; south and west along the Colusa-Lake county line to Forest Route M5; south on Forest Route M5 to Forest Road 303; east on Forest Road 303 to Walker Ridge Road; south on Walker Ridge Road to Highway 20; east on Highway 20 to the Colusa-Lake county line (County Line Ridge); south along the Colusa-Lake county line to the Yolo county line; east along the Yolo county line to Highway 16; south on Highway 16 to Rayhouse Road; south and west on Rayhouse Road to the Yolo-Napa county line; east and south along the Yolo-Napa county line to Road 8053; east on Road 8053 to County Road 78A; east on County Road 78A to Highway 16; east on Highway 16 to Route E4 at Capay; north and east on Route E4 to Interstate 5; north on Interstate 5 to the point of beginning.

(18) Lake Pillsbury General Methods Tule Elk Hunt:

(A) Area: In that portion of Lake County within a line beginning at the Glenn-Lake-Mendocino county line; south and west along the Mendocino-Lake county line to Highway 20; southeast on Highway 20 to the Bartlett Springs Road; north and east on Bartlett Springs Road to Forest Route M5; northwest on Forest Route M5 to the Colusa-Lake county line; northwest and east along the Colusa-Lake county line to the junction of the Glenn county line; north and west ~~on~~ along the Lake-Glenn County Line to the point of beginning.

(19) Santa Clara General Methods Tule Elk Hunt:

(A) Area: In those portions of Merced, Santa Clara, and Stanislaus ~~Counties~~ counties within a line beginning at the junction of Interstate 5 and the San Joaquin-Stanislaus county line; southeast on Interstate 5 to Highway 152; west on Highway 152 to Highway 101 near the town of Gilroy; north on Highway 101 to Interstate 680 near San Jose; north on Interstate 680 to the Alameda-Santa Clara county line; east along the Alameda-Santa Clara county line to the junction of the San Joaquin-Stanislaus-Alameda-Santa Clara county lines; northeast along the San Joaquin-Stanislaus county line to the point of beginning.

(20) Alameda General Methods Tule Elk Hunt:

(A) Area: In those portions of Alameda and San Joaquin ~~Counties~~ counties within a line beginning at the junction of Interstate 5 and the San Joaquin-Stanislaus county line; southwest along the San Joaquin-Stanislaus county line to junction of the San Joaquin-Stanislaus-Alameda-Santa Clara county lines; west along the Alameda-Santa Clara county line to Interstate 680; north on Interstate 680 to Interstate 580; east and south on Interstate 580 to Interstate 5; south on Interstate 5 to the point of beginning.

. . . [No change to subsections (e) through (u)(13)(I)]. . .

(u) Department Administered General Methods Tule Elk Hunts

§	Hunt	1. Bull Tags	2. Antlerless Tags	3. Either-Sex Tags	4. Spike Tags	5. Season
(13)(J)	Grizzly Island Period 10	~~3~~ [4-5]	0	0	0	Shall open on the first Thursday following the opening of Period 9 and continue for four consecutive days.
(13)(K)	Grizzly Island Period 11	0	4	0	0	Shall open on the first Tuesday following the opening of Period 10 and continue for four consecutive days.
(13)(L)	Grizzly Island Period 12	~~3~~ [4-5]	0	0	0	Shall open on the first Thursday following the opening of Period 11 and continue for four consecutive days.
(13)(M)	Grizzly Island Period 13	~~0~~ [2-4]	4	0	0	Shall open on the first Tuesday following the opening of Period 12 and continue for four consecutive days.

. . . [No change to subsections (u)(14)(A) through (aa)]. . .

NOTE: Authority cited: Sections 200, 203, 203.1, 265, 332 and 1050, Fish and Game Code.
Reference: Sections 332, 1050, 1570, 1571, 1572, 1573 and 1574, Fish and Game Code.

Proposed Regulatory Language

Section 364.1, Title 14 CCR, is amended to read:

§ 364.1. Department Administered Shared Habitat Alliance for Recreational Enhancement (SHARE) Elk Hunts

(a) Season: The overall season shall open on August 15 and continue through January 31. Individual SHARE properties will be assigned seasons corresponding with management goals.

(b) Bag and Possession Limit: Each elk tag is valid only for one elk per season and only in the SHARE hunt area drawn, and persons shall only be eligible for one elk tag per season through section 364.1.

(c) Individual property boundaries will be identified in the SHARE application package.

(d) Method of Take: Only methods for taking elk as defined in Sections 353 and 354 may be used.

(e) Tagholder Responsibilities: See subsection 364(n).

(f) The use of dogs to take or attempt to take elk is prohibited.

(g) Applicants shall apply for a SHARE Access Permit, and pay a nonrefundable application fee as specified in Section 602, through the department's Automated License Data System terminals at any department license agent, department license sales office, or online.

(h) Upon receipt of winner notification, successful applicants shall submit the appropriate tag fee as specified in Section 702 through any department license sales office or online through the department's Automated License Data System.

(i) Department Administered SHARE Roosevelt Elk Hunts

§	*(A) Hunts*	*1.Bull Tags*	*2.Antlerless Tags*	*3.Either-Sex Tags*	*4.Spike Tags*	*(B) Area*
(1)	Siskiyou	~~2~~ <u>20</u>	~~2~~ <u>20</u>	0	0	The tag shall be valid in the area described in subsection 364(a)(1)(A).
(2)	Northwestern	~~34~~ <u>40</u>	~~34~~ <u>60</u>	0	0	The tag shall be valid in the area described in subsection 364(a)(2)(A).

§	*(A) Hunts*	*1.Bull Tags*	*2.Antlerless Tags*	*3.Either-Sex Tags*	*4.Spike Tags*	*(B) Area*
(3)	Marble Mountain	1	2	0	0	The tag shall be valid in the area described in subsection 364(a)(3)(A).

(j) Department Administered General Methods SHARE Rocky Mountain Elk Hunts

§	*(A) Hunts*	*1.Bull Tags*	*2.Antlerless Tags*	*3.Either-Sex Tags*	*4.Spike Tags*	*(B) Area*
(1)	Northeastern	2	0	2	0	The tag shall be valid in the area described in subsection 364(b)(1)(A).
(2)	Tehachapi	~~20~~ 40	~~15~~ 60	0	0	The tag shall be valid in the area described in subsection 364(b)(2)(A).

(k) Department Administered SHARE Roosevelt/Tule Elk Hunts

§	*(A) Hunts*	*1.Bull Tags*	*2.Antlerless Tags*	*3.Either-Sex Tags*	*4.Spike Tags*	*(B) Area*
(1)	Mendocino	~~2~~ 20	~~4~~ 30	0	0	The tag shall be valid in the area described in subsection 364(c)(1)(A).

. . . [No change to subsection (l)] . . .

NOTE: Authority cited: Sections 332 and 1050, Fish and Game Code.
Reference: Sections 332, 1050 and 1574, Fish and Game Code.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 11, 2024

Memorandum

Date: April 10, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

**Subject: Agenda Item for the April 17-18, 2024, Fish and Game Commission Meeting
Re: Elk Hunting – Pre- Adoption Memo**

The Department of Fish and Wildlife (Department) has prepared this Memorandum to transmit its final recommendations on the proposed amendments to Sections 364 and 364.1, Title 14, California Code of Regulations, regarding proposing changes to elk hunt zone boundaries, seasons, and tag allocations.

The Department recommends the Commission adopt the proposed rulemaking for elk hunting with the following bag limits. The Department is not recommending changes to the proposed regulatory language in the original public notice, and all tag allocation recommendations fall within the proposed tag range included in the notice.

364(u) Department Administered General Methods Tule Elk Hunts

§	Hunt	1. Bull Tags	2. Antlerless Tags	3. Either-Sex Tags	4. Spike Tags	5. Season
(13)(J)	Grizzly Island Period 10	[4-5] 4	0	0	0	Shall open on the first Thursday following the opening of Period 9 and continue for four consecutive days.
(13)(L)	Grizzly Island Period 12	[4-5] 4	0	0	0	Shall open on the first Thursday following the opening of

§	Hunt	1. Bull Tags	2. Antlerless Tags	3. Either-Sex Tags	4. Spike Tags	5. Season
						Period 11 and continue for four consecutive days.
(13)(M)	Grizzly Island Period 13	[2-4] 3	4	0	0	Shall open on the first Tuesday following the opening of Period 12 and continue for four consecutive days.

If you have any questions on this item, please contact Scott Gardner, Wildlife Branch Chief, via phone at (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Scott Gardner, Branch Chief
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David Haug, Analyst
Fish and Game Commission

Ari Cornman, Wildlife Advisor
Fish and Game Commission

ADDENDUM
to the 2019 SUPPLEMENTAL ENVIRONMENTAL DOCUMENT
TO THE
2010 FINAL ENVIRONMENTAL DOCUMENT
REGARDING ELK HUNTING

prepared by the

STATE OF CALIFORNIA

NATURAL RESOURCES AGENCY

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on behalf of

CALIFORNIA FISH AND GAME COMMISSION

as

LEAD AGENCY UNDER THE

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

for the

REGULARLY NOTICED RULEMAKING ACTION TO AMEND

SECTIONS 364 ELK, 364.1 SHARE ELK, and 555 COOPERATIVE ELK HUNTS, AND ADDING SUBSECTION 555.1 CONFLICT ZONE COOPERATIVE ELK HUNTS

TITLE 14, CALIFORNIA CODE OF REGULATIONS

2024 HUNTING SEASON

(OAL Notice File No. **2024-0123-07**)

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) has prepared this addendum pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., to inform consideration by the California Fish and Game Commission (Commission) of proposed amendments to existing regulations governing elk hunting in California (California Code of Regulations (CCR), Title 14, Section Sections 364, 364.1., 555, 555.1). F&G Code Section 3950 designates elk as a game mammal in California. F&G Code Sections 203 and 332, authorize the Commission to fix the area or areas, seasons and hours, bag and possession limit, sex, and total number of elk that may be taken pursuant to its regulations. F&G Code Section 203.1 requires the Commission to consider populations, habitat, food supplies, the welfare of individual animals, and other pertinent facts when establishing hunting regulations for elk. The Commission establishes elk hunting tag quotas through regulations amended annually, as needed, based on current population estimates derived from annual surveys by CDFW.

The Commission serves as the CEQA lead agency when it promulgates and amends the elk hunting regulations. (Public Resources Code, Section 21067; CEQA Guidelines Section 15367.)[1] The Commission established maximum tag quotas for all elk hunting zones in California in 2010 with, among other things, the certification of a Final Environmental Document under CEQA (2010 Elk ED) (SCH No. 200912083). The Commission amended the existing regulations in 2019 by, among other things, certifying a Final Supplemental Environmental Document under CEQA (2019 Elk SED) (SCH No. 2018112037). The 2010 Elk ED and the 2019 Elk SED provide relevant and important informational value as the Commission as CEQA lead agency considers proposed amendments to the existing regulations for the 2024 elk hunting season in California. This addendum documents the Commission's consideration of related environmental effects.

EARLIER PROJECT APPROVAL

CEQA review of the proposed project was conducted in accordance with the Commission's certified regulatory program approved by the Secretary for the California Natural Resources Agency pursuant to Public Resources Code Section 21080.5 (See generally Title 14, CCR Sections 781.5 and 15251(b)). CEQA requires all public agencies in the State to evaluate the environmental impacts of discretionary projects they propose to carry out or approve, including promulgating regulations, which may have a potential to significantly affect the environment.

[1] The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

In 2010, the Commission certified a Final Environmental Document Regarding Elk Hunting (2010 Elk ED) (SCH No. 200912083) as the lead agency under CEQA as part of the Commission's review and adoption of the Elk Hunting regulations.

In 2019 the Commission amended the Elk Hunting regulations and certified a Final Supplemental Environmental Document Regarding Elk Hunting (2019 Elk SED) (SCH No. 2018112037) which focused on the potential for any new significant or substantially more severe environmental impacts from an increase in the tag quota range in the Northwestern Elk Zone (NW Zone). The Commission considered the proposed project increase of 20 tags and three alternatives. The Commission as lead agency certified the SED and determined adoption of the amended regulations as proposed would not result in any new significant or substantially more severe environmental effects than previously identified by the Commission in 2010. The Commission approved the increase of 20 tags for the 2019-20 elk hunting regulations. In 2023, the Commission amended the Elk Hunting tag quotas in the Siskiyou and Northwestern Hunt Zones, adding 10 and 22 tags, respectively; modified the boundaries of the Bear Valley, Cache Creek, and La Panza Hunt Zone; and created the Gabilan, Central Coast, and Tehachapi Hunt Zones, adding 70 elk tags across these new zones. The Commission approved the tag allocations, boundary modifications, and new Hunt Zones for the 2023-24 elk hunting regulations.

PROPOSED 2024 TAG ALLOCATIONS FOR THE GRIZZLY ISLAND HUNT ZONE

The elk tag quotas described in the 2010 Elk ED are the basis for the number of tags currently allocated to all zones in regulation. Amendments of tag quotas for the 2024 elk hunting season by the Commission are based on survey data collected by the Department in its annual survey efforts. The survey was completed in March of 2024. For 2024, the proposed tag allocation for the Grizzly Island Zone Periods 10, 12, and 13 bull hunts is 4, 4, and 3, respectively. Currently, the public tag quota (general draw) for the Grizzly Island Zone Periods 10, 12, and 13 bull hunts is 3, 3, and 0, respectively.

The 2010 Elk ED found no significant impacts for a range of bull elk tags for the Grizzly Island Zone from 0-36 across 13 hunt periods. Therefore, there are no new significant or substantially more severe impacts from amending the elk hunt regulations to increase the bull tags in the Grizzly Island Zone Periods 10, 12, and 13 by 1, 1, and 3 tags, respectively.

PROPOSED 2024 SHARE TAG ALLOCATIONS FOR THE SISKIYOU, NORTHWESTERN, TEHACHAPI, AND MENDOCINO HUNT ZONES

The 2024 Proposed Regulations includes adding 18 bull and 18 antlerless SHARE tags to the Siskiyou Hunt Zone, adding 6 bull and 26 antlerless SHARE tags to the Northwestern Hunt Zone, adding 20 bull and 15 antlerless SHARE tags to the Tehachapi Hunt Zone, and adding 18 bull and 26 antlerless SHARE tags to the Mendocino Hunt Zone.

To maintain sustainable populations of elk and meet natural resources management goals, the Commission establishes and closes hunt zones, allocates tags, and sets hunting season dates. SHARE hunts in all four zones are designed to keep elk abundance at a sustainable level based on the environmental, biological, and social conditions of the elk. Therefore, amending the elk hunt regulations to add SHARE tags will not cause any new significant or substantially severe impacts than previously considered by the Commission.

PROPOSED 2024 COOPERATIVE ELK HUNT TAG ALLOCATIONS FOR THE SISKIYOU, NORTHWESTERN, TEHACHAPI, AND MENDOCINO HUNT ZONES

The 2024 Proposed Regulations includes modifying the mechanism by which Cooperative Elk Hunt (“Landowner”) antlerless tags are distributed in the Siskiyou Hunt Zone, Northwestern Hunt Zone, Tehachapi Hunt Zone, and the Mendocino Hunt Zone. Specifically, Landowner antlerless tags will be distributed at a 1:1 ratio relative to the sum of the annual general + SHARE antlerless tags allocated.

To maintain sustainable populations of elk and meet natural resources management goals, the Commission establishes and closes hunt zones, allocates tags, and sets hunting season dates. Cooperative Landowner hunts in these four zones are designed to keep elk abundance at a sustainable level based on the environmental, biological, and social conditions of the elk. Therefore, amending the elk hunt regulations to modify Landowner antlerless tag distribution will not cause any new significant or substantially severe impacts than previously considered by the Commission.

NO SUBSEQUENT ENVIRONMENTAL DOCUMENT IS REQUIRED

In general, CEQA applies whenever a public agency proposes to carry out or approve a discretionary project. (Public Resources Code, Section 21080(a)). CEQA provides that, where a public agency proposes to modify a previously approved project for which a Final Environmental Document was prepared and certified:

"The lead agency or a responsible agency shall prepare an ***addendum*** to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred." (Title 14, CCR Section 15164)

- A Subsequent Environment Document (Section 15162) when there is substantial evidence that:
  - Substantial changes are proposed in the project, which will require major revisions to the previous environmental impact report (EIR) or environmental document (ED).
  - Substantial changes occur with respect to the circumstances under which the project is being undertaken, which will require major revisions to the previous EIR or environmental documentation.
  - New information, which was not known and could not have been known at the time the previous EIR or ED was certified as complete, becomes available.
- A Supplement to an Environment Document (Section 15163) when:
  - A subsequent ED is not required.
  - Only minor changes to the project are described.
  - Only that information to make the ED adequate is provided.
- An Addendum to the Certified ED (Section 15164) is proper when**:**
  - The changes or additions presented in this project are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent ED have occurred.
  - The Commission may properly prepare and may rely on an addendum in accordance with Section 15164 to fulfill its obligations under CEQA.

NO ADDITIONAL IMPACTS UNDER CEQA

The Commission has determined that amending the current elk hunting regulations based on annual survey results will not result in any new or significant or substantially more severe environmental impacts than previously analyzed and disclosed in the 2010 Elk ED and 2019 Elk SED for this project.

This project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. There are no impacts to the habitat of fish and wildlife species.

This approval action adjusts the previous year tag quotas based on more current population information, modifies existing hunt zone boundaries, and establishes three new hunt zones. No other aspect of the project is changed. No new significant or substantially more severe impacts under CEQA will occur due to this change.

AMENDMENT OF THE ELK HUNT REGULATIONS

In conclusion, the Commission finds that amending the elk hunt regulations in Title 14, CCR Section 364, Section 364.1, Section 555, and Section 555.1, will not result in any new significant or substantially more severe environmental effects than previously analyzed and disclosed in the 2010 Elk ED and the 2019 Elk SED. The Commission also finds that subsequent or supplemental review beyond this Addendum is not warranted pursuant to Title 14, CCR Section 15164, in connection with this proposed action.

Melissa A. Miller-Henson ______________________ April 12, 2024 ______________

Melissa Miller-Henson, Executive Director Date

California Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Section 554
Title 14, California Code of Regulations
Re: Cooperative Deer Hunting Areas

I. Date of Initial Statement of Reasons: October 1, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

BACKGROUND

The California Department of Fish and Wildlife (Department) has identified regulated hunting as a preferred tool to both manage deer populations and provide public recreation opportunities. The Fish and Game Commission (Commission) periodically considers the recommendations of the Department in establishing deer hunting regulations. Considerations included recommendations for adjusting tag quotas, setting hunt periods, modifying zone boundaries, and authorizing methods of take, among others, to help achieve management goals and objectives. Currently, deer tags are distributed through several issuance types governed by different sections under Title 14. Issuance types for deer tags include Section 360 and Section 361 for General and Archery hunting, respectively. Section 708.1 distinguishes between Premium, Restricted, and Unrestricted tags, and Section 708.14 specifies premium deer hunt tags distributed by drawing. First and second deer tags are explained in Section 708.3. Section 554 describes Cooperative Deer Hunting Area “Landowner” tags, and Section 601 Private Lands Wildlife Habitat Enhancement and Management Area (PLM) tags. Finally, Section 709.1 details the Hunter Education Instructor Incentive Program.

CURRENT REGULATIONS

The Cooperative Deer Hunting Area (deer "landowner (LO) tags") program was initially established as a public access program, to encourage protection and enhancement of deer habitat. With the creation of the Shared Habitat Alliance for Recreational Enhancement ("SHARE") public access program in 2010, it became a landowner tag program. Current regulations for Cooperative Deer Hunting Areas (Section 554) are:

> Landowners who own a minimum of 640 acres in a draw zone may apply for up to two deer tags. Landowners must apply for tags by the first Friday in August and must identify the customer(s) that the tags will be issued to and pay the appropriate fees with their application. For approved applications, the regions sell the tags to the identified customers in the Automated License Data System (ALDS).
>
> There may not be more than two cooperative deer hunting area applicants for a given parcel of land. Section 554 states, "the applicant for a cooperative deer hunting area permit shall be an owner of said land," but does not define the relationship of the second applicant.
>
> Currently, LO tags are not limited by zone and tags are issued in addition to public tag quotas resulting in some zones issuing a greater proportion of LO to public tags. Tag issuance needs to be reduced in these zones.
>
> The current regulation restricted applicants to using a 'one-deer' tag application – this ensured applicants could not get another premium or restricted tag at the time the Department had 'one-deer' tags. This is an outdated reference, as there is no longer a 'one-deer' application. The Department now uses first and second deer tags. Customers are prevented from getting more than one premium and restricted hunt through ALDS controls.
>
> The authority cited is outdated due to the repeal and subsequent reimplementation of this program after the SHARE program was established.

PROPOSED REGULATORY CHANGES

The Department has identified the necessity to modify regulations within Section 554 Cooperative Deer Hunting Areas to clarify the intent of the Cooperative Deer Hunting Area program.

Amend Section 554

The new subsections within subsection 554(b) are as follows:

(b) Application Process.
- (1) Definitions.
- (2) Eligibility Requirements.
- (3) Application Materials.
- (4) Application Form.
- (5) Review and Approval.

Necessity: Subsection (b) needs to be reorganized to accommodate an expanded application section and to clearly communicate the intent of the regulations. This includes updating the name of the Department, mentioning an application form, and where it can be found by interested parties (Department's website, as well as regional offices).

The following regional office addresses require updates:

Region 3: 2825 Cordelia Rd, Suite 100 Fairfield 94594 (707) 428-2002
Region 5: 3883 Ruffin Road, San Diego 92123 (858) 467-4201
Region 6: 3602 Inland Empire Blvd., Ste C-220, Ontario 91764 (909) 484-0167

Subsection 554(b)(1): Provide a definition for immediate family member to clarify eligibility for LO tags. Currently there is no definition.

Subsection 554(b)(2): Clarify that a landowner application can be for up to two deer tags that can be designated to the landowner or an immediate family member of the landowner. Add "as defined by Fish and Game Code Section 67" to clarify landowner eligibility as it related to a person.

Subsection 554(b)(2): Reduce the number of available tags to one per application in zones X3a, X5a, and X5b.

From 2021-2023, LO tags were issued on average over 20% of the public quota in Zone X3a, 28% of the public quota in X5a, and 34% of the public quota in X5b. For reference, the average percent public quota for all other zones during that time was 3%. The number of tags issued in zones X3a, X5b, and X5a need to be reduced to align landowner tag allocations in these zones with allocations in the other zones.

Subsection 554(b)(2) and (b)(5): Update "one deer tag" language. Clarify that individuals shall not be eligible for a cooperative deer hunting tag if they hold a deer tag in the same license year for a premium or restricted hunt as defined in 708.1.

Section 554 originally prevented customers from obtaining a public drawing premium tag and a landowner tag by requiring a "one deer application. The "one deer tag" is an outdated reference. The department now utilizes "first" and "second" deer tags, which ALDS uses to prevent customers from acquiring more than one premium and restricted hunt, regardless of the purchase order.

Subsection 554(b)(3): Add application materials.

This subsection is necessary for application materials to be added; these include the application, proof of ownership, proof of property size, and applicable fees. The Unsuccessful Deer Tag Letter can be used as proof of payment.

Subsection 554(b)(4): Add application form.

This subsection is necessary to list the information required within an application form that will be provided by the department. The requested information serves to provide the Department with necessary contact information, including name of first and second applicant, as well as the ability to cross reference to Department data systems (such as GO ID number and Driver's License number).

Subsection 554(b)(5): Review and approval.

Subsection 554(c): update the reference for the valid deer season listed on the tag to subsections 360(a) and (b) of these regulations for improved enforceability.

Subsection 554 Authority and Reference:

> The Cooperative Deer Hunting Area program was originally under the authority and reference of FGC sections 1570-1572. In 2004, FGC sections 1570-1572 were repealed and replaced with statutes establishing the SHARE program. The following year, Cooperative Hunting Areas were re-established for elk and deer hunting in FGC as Section 1575, but the authority and reference in Section 554 was not updated. Further, the fees referenced in Section 702 require a cross reference to Fish and Game Code Section 713 for annual adjustment pursuant to the Implicit Price Deflator. Accordingly, the authority and reference in Section 554 needs to be updated to reflect the change in FGC sections.

(b) Goals and Benefits of the Regulation

The goal and benefits of these regulations serve to update administration of the landowner tags through the Cooperative Deer Hunting Area program by updating the application instructions, correcting outdated terms within the regulation, and reducing the number of tags issued in zones of concern (X3a, X5a, and X5b).

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Section 554:

Authority: 1575, Fish and Game Code
Reference: 713 and 1575, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change

None.

(e) Identification of Reports or Documents Supporting Regulation Change

None.

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

Wildlife Resources Committee, May 2023
Wildlife Resources Committee, September 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

As an alternative to the one tag only rule for zones X3a, X5a, and X5b, a percentage (proposed 5-20 percent of the number of public license tags for the corresponding public hunt) could be used for the quota of deer landowner tags.

(b) No Change Alternative

Without the proposed changes, the outstanding issues concerning the regulations currently governing landowner tags would remain unaddressed.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. Considering the relatively small number of deer landowner tags over the entire state, this proposal is economically neutral to business.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment.

The Commission anticipates no impact on the creation or elimination of jobs within the state, no impact on the creation of new business, the elimination of existing businesses or the expansion of businesses in California as minor variations in hunting regulations are, by themselves, unlikely to provide a substantial economic stimulus to the state.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with this proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State:

None

(e) Nondiscretionary Costs/Savings to Local Agencies:

None

(f) Programs Mandated on Local Agencies or School Districts:

None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code:

None

(h) Effect on Housing Costs:

None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

This regulatory action is not anticipated to induce the creation or elimination of jobs within the state.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The proposed regulation is not anticipated to prompt the creation of new businesses or the elimination of existing businesses within the state.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The proposed regulation changes are unlikely to impact expansion of businesses currently doing business in the state.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat, and humans, and can be a family tradition and a bonding activity.

(d) Benefits of the Regulation to Worker Safety

The proposed regulation will not affect worker safety.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code section 1700, it is the policy of the state to encourage the conservation, maintenance, and utilization of fish and wildlife resources for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of populations of deer to ensure their continued existence and supporting recreational opportunity. Adoption of scientifically based deer seasons and tag quotas provides for the maintenance of deer populations to ensure those objectives are met. The fees that hunters pay for licenses and tags help fund wildlife conservation.

(g) Other Benefits of the Regulation

Corrected over-issuance of tags in zones where this problem was identified, updated language and information that will facilitate the landowner application process.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The Cooperative Deer Hunting Area (deer “landowner (LO) tags”) program that is administered by the California Department of Fish and Wildlife (Department) was initially established as a public access program to encourage protection and enhancement of deer habitat. With the creation of the Shared Habitat Alliance for Recreational Enhancement (“SHARE”) public access program in 2010, it shifted to a landowner tag program. Current regulations for Cooperative Deer Hunting Areas (Section 554) require that landowners who own a minimum of 640 acres in a draw zone may apply for up to two deer tags. Landowners must apply for tags and identify the customer(s) that the tags will be issued to and pay the appropriate fees with their application. For approved applications, the regions sell the tags to the identified customers in the Automated License Data System (ALDS). There are several instances of outdated and confusing language within the regulation that need to be updated and clarified.

Currently, LO tags are not limited by zone and tags are issued in addition to public tag quotas resulting in some zones issuing a greater proportion of LO to public tags. Tag issuance needs to be reduced in these zones.

The proposed changes are as follows:

Amend Section 554(b)

Update regional office addresses and provide clarity to the application process.

(b) Application Process.
(1) Definitions.
(2) Eligibility Requirements.
(3) Application Materials.
(4) Application Form.
(5) Review and Approval.

Add Section 554(b)(1): Provide a definition for immediate family member.

Add Section 554(b)(2): Clarify that a landowner application can be for up to two deer tags that can be designated to the landowner or an immediate family member of the landowner.

Add Section 554(b)(2): Reduce the number of available tags to one per application in zones X3a, X5a, and X5b.

Add Section 554(b)(2) and (b)(5): Update “one deer tag” language. Clarify that individuals shall not be eligible for a cooperative deer hunting tag if they hold a deer tag in the same license year for a premium or restricted hunt as defined in 708.1.

Section 554(b)(3): Add application materials.

Application materials need to be added; includes the application, proof of ownership, proof of property size, and applicable fees. Unsuccessful Deer Tag Letter can be used as proof of payment.

Section 554(b)(4): **Add application form.**

Need to list the information required within the application.

Add Section 554(b)(5): Review and approval process.

Benefit of the Regulations:

The goal and benefits of these regulations serve to update administration of the landowner tags through the Cooperative Deer Hunting Area program by updating the application instructions, correcting outdated terms within the regulation, and reducing the number of tags issued in zones of concern (X3a, X5a, and X5b).

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing landowner tags (California Fish and Game Code Section 1575). No other state agency has the authority to adopt regulations governing landowner tags. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of landowner tag regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

Proposed Regulatory Language

Section 554, Title 14 CCR, is amended to read:

§ 554. Cooperative Deer Hunting Areas.

To encourage the protection and enhancement of critical deer habitat, to provide added protection to landowners from depredations of trespassers and to provide greater access for the public to hunt on privately owned or controlled lands, the department may establish cooperative hunting areas and issue permits for the take of deer as specified subject to the following conditions:

(a) Definition and Scope. A cooperative deer hunting area is an area of private land located within critical deer habitat as determined by the department in deer quota zones (see Section 360) which require public drawings. The cooperative hunting area shall encompass not less than a total of 5,000 acres, except that such area may consist of neighboring lands not less than 640 acres in size under the control of one or more owners.

(b) Application Process.

~~Application forms~~ Applications designated on a form issued by the department are available from the Department's website at https://wildlife.ca.gov/Hunting/Deer, ~~headquarters~~headquarters, and regional offices: ~~The applicant for a cooperative deer hunting area permit shall be an owner of said land. The completed application form and a completed one deer tag application for the appropriate deer zone shall be submitted to one of the following offices of the Department of Fish and Game~~

Region 1, 601 Locust Street, Redding 96001 (530) 225–2300

Region 2, 1701 Nimbus Road, Rancho Cordova 95670 (916) 358–2900

~~Region 3, 7329 Silverado Trail, Box 47, Yountville 94599 (707) 944– 5500~~ Region 3, 2825 Cordelia Rd., Suite 100, Fairfield 94594 (707) 428-2002

Region 4, 1234 East Shaw Avenue, Fresno 93710 (559) 243–4005

~~Region 5, 4949 View Ridge Avenue, San Diego 92123 (858) 467–4201~~ Region 5, 3883 Ruffin Rd., San Diego 92123 (858) 467-4201

~~Region 6, 4775 Bird Farm Road, Chino Hills 91709 (909) 597–9823~~ Region 6, 3602 Inland Empire Blvd., Ste. C-220, Ontario 91764 (909) 484-0167

~~The completed applications must be received prior to the first Friday in August. No individual may submit more than one cooperative deer hunting area application per deer season nor may there be more than two cooperative deer hunting area applicants for a given parcel of land.~~

(1) Definitions.

(A) 'Immediate family' is defined as 'the spouse of such person, any child or stepchild of such person or of the spouse of such person, any spouse of any such child or stepchild, any grandchild or step-grandchild of such person or of the spouse of such person, any spouse of such grandchild or step-grandchild, any sibling of such person sharing ownership in the property, and any spouse of any such sibling.' Immediate family need not live in the household or reside on the property to qualify.

(2) Eligibility Requirements.

(A) A person (as defined by Fish and Game Code Section 67) owning at least 640 acres within a cooperative deer hunting area shall be eligible to apply for a cooperative deer hunting area permit. Applicants shall designate up to two individuals eligible to receive deer tags by the date below, except for applicants in zones X3a, X5a, and X5b; applicants may apply for one deer tag in those zones. Such individuals shall be at least 12 years of age, possess a valid California hunting license, and be either the landowner or immediate family of the landowner. Individuals shall not be eligible for a cooperative deer hunting tag if they hold a deer tag in the same license year for a premium or restricted hunt as defined in 708.1 of these regulations.

(B) No individual may submit more than one cooperative deer hunting area application per deer season nor may there be more than two cooperative deer hunting area applicants for a given parcel of land.

(3) Application Materials.

The following application materials must be submitted to the department's regional office nearest the proposed cooperative deer hunting area and must be received prior to the first Friday in August.

(A) Completed application form pursuant to subsection (b)(4)

(B) Applicable fees for first deer tag resident, second deer tag resident, or non-resident, or previous year's Unsuccessful Deer Tag Letter per applicant, pursuant to subsection 702(c) of these regulations.

(C) Proof of property ownership (copy of deed)

(D) Proof of property size (property map)

(4) Application Form. Application forms are available pursuant to subsection (b).

(A) For both First and Second Applicant:

Applicant's name, relationship to owner, mailing address, home phone number, day phone number, driver's license number, GO ID number, printed name, applicant signature, and acknowledgement of compliance with provisions.

(B) Deer hunting zone in which qualifying lands are located.

(5) Review and Approval.

The department shall review the cooperative deer hunting application, verify the content thereof, and certify that the lands consist of critical deer habitat prior to the issuance of a cooperative deer hunting area permit and deer tag. Only those applications that are filled out completely will be accepted. ~~Incomplete applications will be returned within 15 days of receipt by the department.~~ There shall be no fee for a cooperative hunting area permit.

(c) A deer tag issued pursuant to the provisions of this section is valid only during the open deer season for the deer zone specified ~~on the tag~~in subsections 360(a) and 360(b) and may only be used on the lands specified in the landowner's application.

(d) All provisions of the Fish and Game Code relating to the take of birds and mammals shall be a condition of all permits and tags issued pursuant to this section.

(e) Any permit or tag issued pursuant to Section 554 may be cancelled or suspended at any time by the commission for cause after notice and opportunity to be heard, or without a hearing upon conviction of a violation of this regulation by a court of competent jurisdiction.

NOTE: Authority cited: Section ~~1572~~ 1575, Fish and Game Code.
Reference: Sections ~~1570–1572~~ 713 and 1575, Fish and Game Code.

DEPARTMENT OF FISH AND WILDLIFE
2024 APPLICATION FOR COOPERATIVE DEER HUNTING AREA PERMIT
DFW 1409 (Rev. 10/23)
FEES* Resident fee of $38.88 (first deer tag), $48.41 (second deer tag), or a Nonresident fee of $345.00 per applicant
Nonreporting fee of $20.60
***If applicable, the previous year's non-reporting fee must be included, or application will be rejected**

INSTRUCTIONS: Submit the following items to the Department of Fish and Wildlife (CDFW) regional office in the area where your property is located (see list on the back of this application): 1) application form; 2) submit the fee (above) per applicant for applicable Deer Tag by check or money order or each applicant's Unsuccessful Deer Tag Letter; 3) proof of ownership (i.e., copy of deed); and, 4) proof of property size (property map). **Individuals shall not be eligible for a cooperative deer hunting tag if they hold a deer tag in the same license year for a premium or restricted hunt as defined in Section 708.1, nor may there be more than two (2) applicants for a given parcel of land. See Title 14 regulations on reverse side.**

Unused deer tags will not be accepted as an exchange for a Cooperative deer tag.

COMPLETED APPLICATION MUST BE RECEIVED PRIOR TO THE FIRST FRIDAY IN AUGUST

FIRST APPLICANT (MUST BE LANDOWNER OR IMMEDIATE FAMILY)

NAME	RELATIONSHIP TO OWNER
MAILING ADDRESS (STREET, RURAL ROUTE, CITY, COUNTY STATE, ZIP)	
HOME PHONE NUMBER	DAY PHONE NUMBER (if different)
DMV/STATE ID NUMBER	GO ID NUMBER (FROM ALDS ISSUED LICENSE)

SECOND APPLICANT (MUST BE LANDOWNER OR IMMEDIATE FAMILY)

NAME	RELATIONSHIP TO LANDOWNER
MAILING ADDRESS (STREET, RURAL ROUTE, CITY, COUNTY STATE, ZIP)	
HOME PHONE NUMBER	DAY PHONE NUMBER (if different)
DMV/STATE ID NUMBER	GO ID NUMBER (FROM ALDS ISSUED LICENSE)

DEER HUNTING ZONE IN WHICH QUALIFYING LANDS ARE LOCATED:

Pursuant to the provisions of Section 554, Title 14, California Code of Regulations, as the owner(s)/fee title holder(s) of not less than 640 acres of critical deer habitat within a deer quota hunting zone requiring a drawing, I (we) hereby make application for a cooperative deer hunting area permit. I (we) hereby certify that this is the only application that I (we) have filed for the current year and that the information provided above is true and correct. I have read and understand the provisions of Section 554, Title 14, California Code of Regulations, and agree to abide by those provisions.

PRINTED NAME AND SIGNATURE(S) OF LANDOWNERS(S) *X*	*X*	DATE
PRINTED NAME AND SIGNATURE *X*	*X*	DATE

DEPARTMENT OF FISH AND WILDLIFE APPROVAL

The CDFW shall review the Application for Cooperative Deer Hunting Area Permit, verify the content thereof, and certify that the lands consist of critical deer habitat prior to the issuance of a Cooperative Deer Hunting Area Permit and deer tag.

REGIONAL MANAGER'S SIGNATURE	REGION	DATE

SECTION 554, TITLE 14, California Code of Regulations

554. Cooperative Deer Hunting Areas.

To encourage the protection and enhancement of critical deer habitat, to provide added protection to landowners from depredations of trespassers and to provide greater access for the public to hunt on privately owned or controlled lands, the department may establish cooperative hunting areas and issue permits for the take of deer as specified subject to the following conditions:

(a) Definition and Scope. A cooperative deer hunting area is an area of private land located within critical deer habitat as determined by the department in deer quota zones (see Section 360) which require public drawings. The cooperative hunting area shall encompass not less than a total of 5,000 acres, except that such area may consist of neighboring lands not less than 640 acres in size under the control of one or more owners.

(b) Application Process.

Applications designated on a form issued by the department are available from the Department's website at https://wildlife.ca.gov/Hunting/Deer, headquarters, and regional offices:

Region 1, 601 Locust Street, Redding 96001 (530) 225-2300
Region 2, 1701 Nimbus Road, Rancho Cordova 95670 (916) 358-2900
Region 3, 2825 Cordelia Rd., Suite 100, Fairfield 94594 (707) 428-2002
Region 4, 1234 East Shaw Avenue, Fresno 93710 (559) 243-4005
Region 5, 3883 Ruffin Rd., San Diego 92123 (858) 467-4201
Region 6, 3602 Inland Empire Blvd., Ste. C-220, Ontario 91764 (909) 484-0167

(1) Definitions.

(A) 'Immediate family' is defined as 'the spouse of such person, any child or stepchild of such person or of the spouse of such person, any spouse of any such child or stepchild, any grandchild or step-grandchild of such person or of the spouse of such person, any spouse of such grandchild or step-grandchild, any sibling of such person sharing ownership in the property, and any spouse of any such sibling.' Immediate family need not live in the household or reside on the property to qualify.

(2) Eligibility Requirements.

(A) A person (as defined by Fish and Game Code Section 67) owning at least 640 acres within a cooperative deer hunting area shall be eligible to apply for a cooperative deer hunting area permit. Applicants shall designate up to two individuals eligible to receive deer tags by the date below, except for applicants in zones X3a, X5a, and X5b; applicants may apply for one deer tag in those zones. Such individuals shall be at least 12 years of age, possess a valid California hunting license, and be either the landowner or immediate family of the landowner. Individuals shall not be eligible for a cooperative deer hunting tag if they hold a deer tag in the same license year for a premium or restricted hunt as defined in 708.1 of these regulations.

(B) No individual may submit more than one cooperative deer hunting area application per deer season nor may there be more than two cooperative deer hunting area applicants for a given parcel of land.

(3) Application Materials.

The following application materials must be submitted to the department's regional office nearest the proposed cooperative deer hunting area and must be received prior to the first Friday in August.

(A) Completed application form pursuant to subsection (b)(4)
(B) Applicable fees for first deer tag resident, second deer tag resident, or non-resident, or previous year's Unsuccessful Deer Tag Letter per applicant, pursuant to subsection 702(c) of these regulations.
(C) Proof of property ownership (copy of deed)
(D) Proof of property size (property map)

(4) Application Form. Application forms are available pursuant to subsection (b).

(A) For both First and Second Applicant:
Applicant's name, relationship to owner, mailing address, home phone number, day phone number, driver's license number, GO ID number, printed name, signature, and acknowledgement of compliance with provisions.
(B) Deer hunting zone in which qualifying lands are located.

(5) Review and Approval.

The department shall review the cooperative deer hunting application, verify the content thereof, and certify that the lands consist of critical deer habitat prior to the issuance of a cooperative deer hunting area permit and deer tag. Only those applications that are filled out completely will be accepted. There shall be no fee for a cooperative hunting area permit.

(c) A deer tag issued pursuant to the provisions of this section is valid only during the open deer season for the deer zone specified in subsections 360(a) and 360(b) and may only be used on the lands specified in the landowner's application.

(d) All provisions of the Fish and Game Code relating to the take of birds and mammals shall be a condition of all permits and tags issued pursuant to this section.

(e) Any permit or tag issued pursuant to Section 554 may be cancelled or suspended at any time by the commission for cause after notice and opportunity to be heard, or without a hearing upon conviction of a violation of this regulation by a court of competent jurisdiction.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 713 and 1575, Fish and Game Code.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 11, 2024

Memorandum

Date: April 10, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Agenda Item for the April 17-18, 2024, Fish and Game Commission Meeting Re: Cooperative Deer Hunts – Pre- Adoption Memo**

The Department of Fish and Wildlife (Department) has prepared this Memorandum to summarize and provide responses to public comments received by the Fish and Game Commission (Commission) on the proposed amendments to Section 554, Title 14, California Code of Regulations, regarding proposed changes to cooperative deer hunting areas application process and tag allocations. The Department is not recommending any further amendments to the regulatory text because there were no public comments received regarding this proposal.

The Department recommends the Commission adopt the proposed rulemaking for cooperative deer hunts.

If you have any questions on this item, please contact Scott Gardner, Wildlife Branch Chief, via phone at (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Scott Gardner, Branch Chief
Wildlife Branch
Department of Fish and Wildlife

Robert Pelzman, Captain
Law Enforcement Division
Department of Fish and Wildlife

Mario Klip, Game Conservation and Wildlife Connectivity Program Manager
Wildlife Branch
Department of Fish and Wildlife

Brian Leo, Deer Coordinator
Wildlife Branch
Department of Fish and Wildlife

Regina Vu, Regulations Specialist
Wildlife Branch
Department of Fish and Wildlife

Ona Alminas, Program Manager
Regulations Unit
Department of Fish and Wildlife

Chelle Temple-King, Senior Regulatory Analyst
Regulations Unit
Department of Fish and Wildlife

David Thesell, Program Manager
Fish and Game Commission

David Haug, Analyst
Fish and Game Commission

Ari Cornman, Wildlife Advisor
Fish and Game Commission

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Section 555 and add Section 555.1
Title 14, California Code of Regulations
Re: Cooperative Elk Hunting Areas

I. Date of Initial Statement of Reasons: October 1, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

BACKGROUND

The California Department of Fish and Wildlife (Department) has identified regulated hunting as a preferred tool to both manage elk populations and provide public recreation opportunities. The Fish and Game Commission (Commission) periodically considers the recommendations of the Department in establishing elk hunting regulations. Considerations included recommendations for adjusting tag quotas, setting hunt periods, modifying zone boundaries, and authorizing methods of take, among others, to help achieve management goals and objectives. Currently, elk tags are distributed through four issuance types governed by different sections under Title 14. Issuance types for elk tags include Section 364 General Public tags awarded via the Big Game Drawing, Section 364.1 Shared Habitat Alliance for Recreational Enhancement (SHARE) tags, Section 555 Cooperative Elk Hunting Area “Landowner” tags, and Section 601 Private Lands Wildlife Habitat Enhancement and Management Area (PLM) tags.

Regulated harvest is an effective management tool to help reduce human-elk conflict to tolerable levels. The Department aims to provide public hunting opportunity to the greatest extent possible, however, in some cases, elk almost exclusively occupy privately owned property causing significant conflict issues yet may be unavailable for harvest to a majority of general public tagholders. While hunters awarded an elk tag via the Big Game Drawing are authorized to harvest an elk, it does not authorize access to private property. Some properties are also not conducive to host public hunters through the SHARE program, yet still experience elk conflict. Tags issued under the PLM program are transferable but are often associated with a cost that precludes most hunters from participating. Furthermore, PLM properties enter into agreement with CDFW to manage habitat for the benefit of elk and other wildlife and is not a useful program to reduce unwanted elk activity. The efficacy of regulated harvest as a management tool in these areas may therefore be reduced due to land access constraints imposed on the general public, among other factors.

The Department has identified an opportunity to modify regulations within an existing framework, Section 555 Cooperative Elk Hunting Areas, to help reduce conflict and provide increased hunting opportunities for qualifying landowners. Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones.

CURRENT REGULATIONS

Regulations for Cooperative Elk Hunting Areas (elk “landowner (LO) tags”) are described in Section 555.The purpose of this program is to encourage protection and enhancement of elk habitat and provide eligible landowners with an opportunity for limited elk hunting on their lands. To be eligible for application, a person must own at least 640 acres of contiguous parcels within a cooperative elk hunting area that is open to the public, elk hunt zones as defined in Section 364, that shall be a minimum size of 5,000 acres. The number of LO tags issued annually shall not exceed 20% of the number of public license tags for the corresponding public hunt for the same tag designation type (i.e., antlerless, spike bull, bull, or either-sex).

Applicants must complete an application form to be received by the Department by the first business day following July 1. If the number of accepted applications exceeds the number of license tags available, the Department determines successful applicants and a list of alternates by conducting a random drawing from the pool of qualified applicants as soon as possible after the application deadline. Successful applicants who are awarded a tag are notified as soon as possible after completion of the drawing. Successful applicants can use the tag themselves, or transfer the tag to another individual. Applicants must submit the name, address, and valid California hunting license number of the designated elk license tag recipients to the Department by the first business day following August 1.

PROPOSED REGULATORY CHANGES

Amend Section 555

Subsection 555(a)

- Clarify distinction between 5,000 acres and 640 acres criteria
- Add sentence to clarify formula for allocating annual tag distribution relative to general methods public tags (sum of general methods public elk tags + SHARE elk tags issued annually)

- A cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting at least 5,000 acres (Fish and Game Code Section 1575) in size (elk hunt zones as identified in section 364). A cooperative elk hunting area must be composed of contiguous parcels of at least 640 acres within a hunting area that is open to the public.
- Amend this section to add: Public license tags shall equate to the sum of the general methods elk license tags under Section 364 and the SHARE elk license tags under Section 364.1 for the corresponding hunt and for the same designation issued annually.

Subsection 555(b)

- (b)(1): Move the location in the regulation, and update the following regional office addresses:

  Region 3: 2825 Cordelia Rd, Suite 100 Fairfield 94594 (707) 428-2002
  Region 5: 3883 Ruffin Road, San Diego 92123 (858) 467-4201
  Region 6: 3602 Inland Empire Blvd., Ste C-220, Ontario 91764 (909) 484-0167

  Clarify eligibility requirements regarding landownership as reiterated above for 555(a).
- Add (b)(2): This subsection is necessary for application materials to be clarified; these include the application form referenced in subsequent language, proof of ownership, proof of property size, and applicable fees.
- Add (b)(3): This subsection is necessary to list the information required within an application form that will be provided by the department. The requested information serves to provide the Department with necessary contact information, including name of first and second applicant, as well as the ability to cross reference to Department data systems (Driver's License number).
- (b)(4): Update the review and approval process, clarifying how lands will be verified.
- (b)(5): update a cross-reference to subsection 702 for elk license fees.

The Reference section under "Note" is updated as the fees referenced in Section 702 require a cross reference to Fish and Game Code Section 713 for annual adjustment pursuant to the Implicit Price Deflator.

Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language have been made in Section 555.

Add Subsection 555.1

- Describe and classify four "conflict zones"
- Reduce qualifying landowner criteria within identified conflict zones from 640 acres to 60 acres
- Increase antlerless tag distribution relative to public tags (general methods public elk tags + SHARE elk tags issued annually) from 20% to up to 100%
- Extend the hunt season through November 30th annually

Add: Subsection 555.1(a)

Begin this subsection with: Definition and Scope. In areas where landowners experience chronic, elevated levels of human-elk conflict as determined by the Department, landowner tags shall be issued in a modified fashion distinct from Section 555(a) to help reduce unwanted human-elk conflict. Minimum size of a conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size. Within the conflict zones open to public elk hunting as described in Subsection 555.1(b), the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with Section 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

Add: Subsection 555.1(b)

Begin this subsection with: For the purposes of these regulations, a conflict zone cooperative elk hunting area is an area of private land as described in Subsection 555.1(a) located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(1)(A), 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A).

Add: Subsection 555.1(c)

Begin this subsection with: An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30th annually. All other provisions described under Section 555, including 555(b) shall apply to this subsection.

(b) Goals and Benefits of the Regulation

The goal and benefits of these regulations serve to update administration of the landowner tags through the Cooperative Elk Hunting Area program by updating the application instructions, correcting outdated references and provide clarification to eligibility within the regulation, and provide clarification for conflict zones to allow flexibility for active management.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Section 555

Authority: 1575, Fish and Game Code
Reference: 67, 713 and 1575, Fish and Game Code

Section 555.1

Authority: 1575, Fish and Game Code
Reference: 67 and 1575, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change

None.

(e) Identification of Reports or Documents Supporting Regulation Change

None.

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

Wildlife Resources Committee, May 2023

Wildlife Resources Committee, September 2023

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

Various issuance percentages relative to the tag designation type may be used to increase hunting opportunity. For example, under the proposed 555.1 bull tags could be issued at 50% of the public tags for the corresponding public hunt, 100% for antlerless, 50% for spike bull, and 50% for either-sex, or some variation thereof.

(b) No Change Alternative

Without the proposed changes, elk conflict will continue and may increase in some areas, and result in increased requests for elk depredation permits to alleviate conflict; disease, including treponeme associated hoof disease (TAHD), may continue to spread resulting in significant animal welfare issues; the Department will miss opportunity to gain additional age and genetic data, among other information, from harvested elk to assist in population monitoring, lessening the Department's ability to better understand and manage the affected populations.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. Considering the relatively small number of deer landowner tags over the entire state, this proposal is economically neutral to business.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment.

The Commission anticipates no impact on the creation or elimination of jobs within the state, no impact on the creation of new business, the elimination of existing businesses or the expansion of businesses in California as minor variations in hunting regulations are, by themselves, unlikely to provide a substantial economic stimulus to the state.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with this proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State:

None

(e) Nondiscretionary Costs/Savings to Local Agencies:

None

(f) Programs Mandated on Local Agencies or School Districts:

None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code:

None

(h) Effect on Housing Costs:

None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State

This regulatory action is not anticipated to create any adverse impacts to businesses or the state economy.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

The proposed regulation is not anticipated to prompt the creation of new businesses or the elimination of existing businesses within the state.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

The proposed regulation changes are unlikely to impact expansion of businesses currently doing business in the state.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

Hunting is an outdoor activity that can provide several health and welfare benefits to California residents. Hunters and their families benefit from fresh game to eat, and from the benefits of outdoor recreation, including exercise. People who hunt have a special connection with the outdoors and an awareness of the relationships between wildlife, habitat, and humans, and can be a family tradition and a bonding activity.

(e) Benefits of the Regulation to Worker Safety

The Commission does not anticipate impacts on worker safety.

(f) Benefits of the Regulation to the State's Environment

As set forth in Fish and Game Code section 1700, it is the policy of the state to encourage the conservation, maintenance, and utilization of fish and wildlife resources for the benefit of all the citizens of the state. The objectives of this policy include, but are not limited to, the maintenance of populations of elk to ensure their continued existence and supporting recreational opportunity. Adoption of scientifically based elk seasons and tag quotas provides for the maintenance of elk populations to ensure those objectives are met. The fees that hunters pay for licenses and tags help fund wildlife conservation.

(g) Other Benefits of the Regulation

Increased equity of opportunity in premium zones, updated language and information that will facilitate the landowner application process.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The California Department of Fish and Wildlife (Department) has identified regulated hunting as a preferred tool to both manage elk populations and provide public recreation opportunities. The Fish and Game Commission (Commission) periodically considers the recommendations of the Department in establishing elk hunting regulations. Currently, elk tags are distributed through four issuance types governed by different sections under Title 14. Issuance types for elk tags include Section 364 General Public tags awarded via the Big Game Drawing, Section 364.1 Shared Habitat Alliance for Recreational Enhancement (SHARE) tags, Section 555 Cooperative Elk Hunting Area "Landowner" tags, and Section 601 Private Lands Wildlife Habitat Enhancement and Management Area (PLM) tags.

Regulated harvest is an effective management tool to help reduce human-elk conflict to tolerable levels. The Department aims to provide public hunting opportunity to the greatest extent possible, however, in some cases, elk almost exclusively occupy privately owned property causing significant conflict issues yet may be unavailable for harvest to a majority of general public tagholders. The efficacy of regulated harvest as a management tool in these areas may therefore be reduced due to land access constraints imposed on the general public, among other factors.

The Department has identified an opportunity to modify regulations within an existing framework, Section 555 Cooperative Elk Hunting Areas, to help reduce conflict and provide increased hunting opportunities for qualifying landowners. Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones.

The proposed changes are as follows:

Amend Section 555(a)

- Clarify distinction between 5,000 acres and 640 acres criteria
- Add sentence to clarify formula for allocating annual tag distribution relative to general methods public tags (sum of general methods public elk tags + SHARE elk tags issued annually)
- A clarification that a cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting at least 5,000 acres (Fish and Game Code Section 1575) in size (elk hunt zones as identified in section 364). A cooperative elk hunting area must be composed of contiguous parcels of at least 640 acres within a hunting area that is open to the public.
- Public license tags shall equate to the sum of the general methods elk license tags under Section 364 and the SHARE elk license tags under Section 364.1 for the corresponding hunt and for the same designation issued annually.

Amend subsection 555(b)

- (b)(1): Move the location in the regulation, and update the following regional office addresses:

  Region 3: 2825 Cordelia Rd, Suite 100 Fairfield 94594 (707) 428-2002
  Region 5: 3883 Ruffin Road, San Diego 92123 (858) 467-4201
  Region 6: 3602 Inland Empire Blvd., Ste C-220, Ontario 91764 (909) 484-0167

  Clarify eligibility requirements regarding landownership as reiterated above for 555(a).
- Add (b)(2): This subsection is necessary for application materials to be clarified; these include the application form referenced in subsequent language, proof of ownership, proof of property size, and applicable fees.
- Add (b)(3): This subsection is necessary to list the information required within an application form that will be provided by the department. The requested information serves to provide the Department with necessary contact information, including name of first and second applicant, as well as the ability to cross reference to Department data systems (Driver's License number).
- (b)(4): Update the review and approval process, clarifying how lands will be verified.
- (b)(5): update a cross-reference to subsection 702 for elk license fees.

  The Reference section under "Note" is updated as the fees referenced in Section 702 require a cross reference to Fish and Game Code Section 713 for annual adjustment pursuant to the Implicit Price Deflator.

  Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language have been made in Section 555.

Add Section 555.1

- Describe and classify four "conflict zones"
- Reduce qualifying landowner criteria within identified conflict zones from 640 acres to 60 acres
- Increase antlerless tag distribution relative to public tags (general methods public elk tags + SHARE elk tags issued annually) from 20% to up to 100%
- Extend the hunt season through November 30th annually

Benefit of the Regulations:

Elk conflict exceeds tolerable levels in some areas. Elk almost exclusively occupy privately owned property in some hunt zones, causing significant conflict issues yet may be unavailable for harvest to a majority of general public tagholders. The efficacy of regulated harvest as a management tool in these areas may therefore be reduced due to land access constraints imposed on the general public, among other factors. Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones. Modifying regulations within an existing framework, Section 555 Cooperative Elk Hunting Areas, will provide increased hunting opportunities for qualifying landowners and serve to help reduce human-elk conflict.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing landowner tags (California Fish and Game Code Section 1575). No other state agency has the authority to adopt regulations governing landowner tags. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of landowner tag regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

Proposed Regulatory Language

Section 555, Title 14 CCR, is amended to read:

§ 555. Cooperative Elk Hunting Areas.

To encourage protection and enhancement of elk habitat and provide eligible landowners an opportunity for limited elk hunting on their lands, the department may establish cooperative elk hunting areas and issue license tags to allow the take of elk as specified in Section 364, and subject to the following conditions:

(a) Definition and Scope. A cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk ~~hunting (as identified in Section 364). Minimum size of a cooperative elk hunting area shall be 5,000 acres, except that contiguous parcels of at least 640 acres in size may be combined to comprise a cooperative elk hunting area.~~ <u>hunting. The cooperative hunting area shall encompass not less than a total of 5,000 acres, except that such area may consist of neighboring lands not less than 640 acres in size under the control of one or more owners.</u>

Within an area open to public elk hunting, the number of cooperative elk hunting license tags issued shall not exceed 20 percent of the number of <u>general methods</u> public license tags for the corresponding public hunt and shall be of the same designation (i.e., antlerless, spike bull, bull or either-sex) as the public license tags. <u>Public license tags shall equate to the sum of the general methods elk license tags under Section 364 and the Shared Habitat Alliance for Recreational Enhancement (SHARE) elk license tags under Section 364.1 for the corresponding hunt and for the same designation issued annually.</u>

(b) Application Process. ~~Application forms~~ <u>Applications, designated on a form issued by the department,</u> are available from the department's headquarters and regional ~~offices.~~ offices<u>:</u>

<u>Region 1, 601 Locust Street, Redding 96001 (530) 225-2300</u>

<u>Region 2, 1701 Nimbus Road, Rancho Cordova 95670 (916) 358-2900</u>

<u>Region 3, 2825 Cordelia Rd., Suite 100, Fairfield 94594 (707) 428-2002</u>

<u>Region 4, 1234 East Shaw Avenue, Fresno 93710 (559) 243-4005</u>

<u>Region 5, 3883 Ruffin Rd., San Diego 92123 (858) 467-4201</u>

<u>Region 6, 3602 Inland Empire Blvd., Ste. C-220, Ontario 91764 (909) 484-0167</u>

<u>(1) Eligibility Requirements.</u>

A person (as defined by Fish and Game Code Section 67) owning at least 640 acres within a cooperative elk hunting area shall be eligible to apply for a cooperative elk hunting area permit. <u>The applicant for a cooperative elk hunting area permit shall be an owner of said land and they</u> ~~Applicants~~ shall designate one individual eligible to receive one elk license tag by the date indicated under subsection (~~3~~<u>5</u>) below. Such individuals shall be at least 12 years of age and possess a valid California hunting license. A person may annually submit a cooperative elk hunting area application where they own sufficient habitat as described in subsection (a) above, for each public hunt area in which their property occurs.

~~(1) Applications shall be submitted to the department's regional office nearest the proposed cooperative elk hunting area. Department of Fish and Game regional offices are located as follows:~~

~~Northern California and North Coast Region, 601 Locust Street, Redding 96001 (530) 225–2300~~

~~Sacramento Valley and Central Sierra Region, 1701 Nimbus Road, Rancho Cordova 95670 (916) 358–2900~~

~~Central Coast Region, 7329 Silverado Trail, Box 47, Yountville 94599 (707) 944–5500~~

~~San Joaquin Valley and Southern Sierra Region, 1234 East Shaw Avenue, Fresno 93710 (559) 243–4005~~

~~South Coast Region, 4949 View Crest Avenue, San Diego 92123 (858) 467–4201~~

~~Eastern Sierra and Inland Deserts Region, 4775 Bird Farm Road, Chino Hills 91709 (909) 597–9823~~

(2) Application Materials.

The following application materials must be submitted to the department's regional office nearest the proposed cooperative elk hunting area by the first business day following July 1.

(A) Completed application form pursuant to subsection (b)(3)

(B) Applicable fees for resident or non-resident elk tags, pursuant to Fish and Game Code Section 332, subdivision (c) and adjusted annually pursuant to Fish and Game Code Section 713.

(C) Proof of property ownership (copy of deed)

(D) Proof of property size (property map)

(3) Application Form. Application forms are available pursuant to subsection (b).

(A) Applicant: applicant's name, title (if applicable), mailing address, business name (if applicable), driver's license number, telephone number, applicant signature, and acknowledgement of compliance with provisions.

(B) Property: location of qualifying lands (county, section, township, and range), and name of elk zone where qualifying land is located.

(C) First through third preference tag: bull, antlerless, or either-sex, and hunt code.

(4) Review and Approval

~~(2) Completed applications must be received by the first business day following July 1.~~ Only those applications that are filled out completely will be accepted. The department shall review the cooperative elk hunting application, verify the content thereof, and certify that the lands consist of important elk habitat prior to the issuance of a cooperative elk hunting permit and elk tag. ~~The Department will evaluate applications to determine if the specified parcels are~~

~~of sufficient size within the boundary of a public elk hunt area, and contain important elk habitat. Rejected applications and those that are incomplete will be returned within 15 days of receipt by the department.~~ If the number of accepted applications exceeds the license tags available, the department will determine successful applicants and a list of alternates by conducting a random drawing from the pool of qualified applicants as soon as possible after the application deadline. For any license year that the demand for cooperative elk hunting license tags within an area open to public hunting (as identified in Section 364) exceeds the number of tags available, tags will be first issued to applicants that did not receive a tag the previous year. If the quota is not filled, tags will be issued to the remaining applicants by random drawing. ~~(3)~~ Successful applicants will be notified by the department as soon as possible after the application deadline.

(5) Designated Recipients. Applicants shall submit the name, address, and valid California hunting license number of designated elk license tag recipients and payment of elk license tag fees by check, money order, or credit card authorization in the amount specified by subsection 702(~~b~~c)(1)~~(L)(M),~~ to the department's regional office nearest the proposed cooperative elk hunting area, by the first business day following August 1.

(c) An elk license tag issued pursuant to the provisions of this section is valid only during the general elk season in which the cooperative elk hunting area occurs and shall only be used on land specified in the landowner's application. License tags are not transferable.

(d) All provisions of the Fish and Game Code and Title 14, CCR, relating to the take of birds and mammals shall be conditions of all license tags issued pursuant to this section.

(e) Any permit issued pursuant to Section 555 may be canceled or suspended at any time by the commission for cause after notice and opportunity to be heard, or without a hearing upon conviction of a violation of this regulation by a court of competent jurisdiction.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67, 713 and 1575, Fish and Game Code.

Proposed Regulatory Language

Section 555.1, Title 14 CCR, is added as follows:

§ 555.1. Conflict Zone Cooperative Elk Hunting Areas.

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(1)(A), 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

State of California – Department of Fish and Wildlife
2024 APPLICATION FOR COOPERATIVE ELK HUNTING AREA TAG
DFW 1449 (Rev. 10/23)
FEE*: RESIDENT—$528.75 | RESIDENT JUNIOR TAG — $24.21 | NONRESIDENT—$1,619.75

***FEE REQUIRED ONLY IF APPLICANT IS DRAWN. FEE MUST BE RECEIVED BY THE FIRST BUSINESS DAY AFTER AUGUST 1.**

COMPLETED APPLICATION MUST BE RECEIVED BY THE FIRST BUSINESS DAY AFTER JULY 1

If the number of accepted applications for a hunting area exceeds the tags available, the Department will determine successful applicants and a list of alternates by conducting a random drawing from the pool of qualified applicants as soon as possible after the application deadline. Qualified applicants will consist of applicants that were not issued the same tag in the previous year. Please contact your CDFW regional office for more information.

INSTRUCTIONS: Complete this application and mail with the following items to the Department of Fish and Wildlife (Department) regional office for the area where your property is located: 1) proof of ownership (such as copy of deed); and 2) Proof of property size (plat map from county assessor). See regulations on the back of this form.

TYPE OR PRINT CLEARLY

DMV STATE ID NUMBER			
APPLICANT'S FIRST NAME	M.I.	LAST NAME	TITLE (If any)
MAILING ADDRESS			
CITY	STATE	ZIP CODE	TELEPHONE
BUSINESS NAME/TITLE (If any)			
LOCATION OF QUALIFYING LANDS (COUNTY, SECTION, TOWNSHIP AND RANGE)			

USE INFORMATION AND HUNT CODES FROM THE CALIFORNIA BIG GAME HUNTING DIGEST TO COMPLETE THE FOLLOWING

NAME OF ELK HUNT ZONE WHERE QUALIFYING LAND IS LOCATED:

1ST PREFERENCE TAG (CIRCLE ONE):

BULL ANTLERLESS EITHER-SEX HUNT CODE ____________

2ND PREFERENCE TAG (CIRCLE ONE):

BULL ANTLERLESS EITHER-SEX HUNT CODE ____________

3RD PREFERENCE TAG (CIRCLE ONE):

BULL ANTLERLESS EITHER-SEX HUNT CODE ____________

Pursuant to the provisions of Section 555, Title 14, California Code of Regulations, as the owner(s)/fee title holder(s) of not less than 640 acres of critical elk habitat within an elk tag quota hunting zone requiring a drawing, I hereby make application for a Cooperative Elk Hunting Area Permit. I hereby certify that this is the only application that I have filed for the current year and that the information provided above is true and correct. I have read and understand the provisions of Section 555, Title 14, California Code of Regulations, and agree to abide by those provisions.

SIGNATURE OF APPLICANT ***X***	DATE

With accordance to California Civil Code §1633.5(b), I acknowledge that by providing my electronic signature for this form, I agree that my electronic signature is legal binding equivalent to a handwriting signature. I hereby confirm that my electronic signature represents my execution or authentication of this form, and my intent to be bound by it.

DEPARTMENT OF FISH AND WILDLIFE APPROVAL
The CDFW has verified the contents of this application and confirmed that lands specified above are located within the boundaries of a public elk hunting area.

REGIONAL MANAGER'S SIGNATURE	REGION	DATE
ELK TAG INVENTORY NUMBER	ISSUED BY	DATE
NAME OF DESIGNATED TAG HOLDER	GO ID NUMBER (From ALDS Issued License)	

SECTION 555 and 555.1, TITLE 14, California Code of Regulations

§Section 555. Cooperative Elk Hunting Areas

To encourage protection and enhancement of elk habitat and provide eligible landowners an opportunity for limited elk hunting on their lands, the department may establish cooperative elk hunting areas and issue license tags to allow the take of elk as specified in Section 364, and subject to the following conditions:

(a) Definition and Scope. A cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting. The cooperative hunting area shall encompass not less than a total of 5,000 acres, except that such area may consist of neighboring lands not less than 640 acres in size under the control of one or more owners.

Within an area open to public elk hunting, the number of cooperative elk hunting license tags issued shall not exceed 20 percent of the number of general methods public license tags for the corresponding public hunt and shall be of the same designation (i.e., antlerless, spike bull, bull or either-sex) as the public license tags. Public license tags shall equate to the sum of the general methods elk license tags under section 364 and the Shared Habitat Alliance for Recreational Enhancement (SHARE) elk license tags under section 364.1 for the corresponding hunt and for the same designation issued annually.

(b) Application Process.

Applications, designated on a form issued by the department, are available from the department's headquarters and regional offices:

Region 1, 601 Locust Street, Redding 96001 (530) 225-2300
Region 2, 1701 Nimbus Road, Rancho Cordova 95670 (916) 358-2900
Region 3, 2825 Cordelia Rd., Suite 100, Fairfield 94594 (707) 428-2002
Region 4, 1234 East Shaw Avenue, Fresno 93710 (559) 243-4005
Region 5, 3883 Ruffin Rd., San Diego 92123 (858) 467-4201
Region 6, 3602 Inland Empire Blvd., Ste. C-220, Ontario 91764 (909) 484-0167

(1) Eligibility Requirements.

A person (as defined by Fish and Game Code Section 67) owning at least 640 acres within a cooperative elk hunting area shall be eligible to apply for a cooperative elk hunting area permit. The applicant for a cooperative elk hunting area permit shall be an owner of said land and they shall designate one individual eligible to receive one elk license tag by the date indicated under subsection (6) below. Such individuals shall be at least 12 years of age and possess a valid California hunting license. A person may annually submit a cooperative elk hunting area application where they own sufficient habitat as described in subsection (a) above, for each public hunt area in which their property occurs.

(2) Application Materials.

The following application materials must be submitted to the department's regional office nearest the proposed cooperative elk hunting area by the first business day following July 1.

(A) Completed application form pursuant to subsection (b)(3)
(B) Applicable fees for resident or non-resident elk tags, pursuant to Fish and Game Code Section 332 (c) and adjusted annually pursuant to Fish and Game Code Section 713.
(C) Proof of property ownership (copy of deed)
(D) Proof of property size (property map)

(3) Application Form. Application forms are available pursuant to subsection (b).

(A) Applicant: applicant's name, title, mailing address, business name (if applicable), driver's license number, signature, and acknowledgement of compliance with provisions.

(B) Property: location of qualifying lands (county, section, township, and range), and name of elk zone where qualifying land is located.

(C) First through third preference tag: bull, antlerless, or either-sex, and hunt code

(5) Review and Approval

Only those applications that are filled out completely will be accepted. The department shall review the cooperative elk hunting application, verify the content thereof, and certify that the lands consist of important elk habitat prior to the issuance of a cooperative elk hunting permit and elk tag.

If the number of accepted applications exceeds the license tags available, the department will determine successful applicants and a list of alternates by conducting a random drawing from the pool of qualified applicants as soon as possible after the application deadline. For any license year that the demand for cooperative elk hunting license tags within an area open to public hunting (as identified in 364) exceeds the number of tags available, tags will be first issued to applicants that did not receive a tag the previous year. If the quota is not filled, tags will be issued to the remaining applicants by random drawing. Successful applicants will be notified by the department as soon as possible after the application deadline.

(6) Designated Recipients. Applicants shall submit the name, address, and valid California hunting license number of designated elk license tag recipients and payment of elk license tag fees by check, money order, or credit card authorization in the amount specified by subsection 702(c)(1) to the department's regional office nearest the proposed cooperative elk hunting area, by the first business day following August 1.

(c) An elk license tag issued pursuant to the provisions of this section is valid only during the general elk season in which the cooperative elk hunting area occurs and shall only be used on land specified in the landowner's application. License tags are not transferable.

(d) All provisions of the Fish and Game Code and Title 14, CCR, relating to the take of birds and mammals shall be conditions of all license tags issued pursuant to this section.

(e) Any permit issued pursuant to Section 555 may be canceled or suspended at any time by the commission for cause after notice and opportunity to be heard, or without a hearing upon conviction of a violation of this regulation by a court of competent jurisdiction.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67, 713 and 1575, Fish and Game Code.

§ 555.1. Conflict Zone Cooperative Elk Hunting Areas.

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(1)(A), 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

Proposed Regulatory Language

Section 555.1, Title 14 CCR, is added as follows:

§ 555.1. Conflict Zone Cooperative Elk Hunting Areas.

Option 1:

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(1)(A), 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

Option 2:

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

State of California
Fish and Game Commission
Pre-Adoption Statement of Reasons for Regulatory Action

Amend Section 555 and add Section 555.1
Title 14, California Code of Regulations
Re: Cooperative Elk Hunting

I. Dates of Statements of Reasons

(a) Initial Statement of Reasons Date: October 1, 2023

(b) Pre-Adoption Statement of Reasons Date: March 20, 2024

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing

Date: December 13, 2023 Location: San Diego

(b) Discussion Hearing

Date: February 15, 2024 Location: Sacramento

(c) Adoption Hearing

Date: April 18, 2024 Location: San Jose

III. Description of Modification of Originally Proposed Language of Initial Statement of Reasons (ISOR)

An Option 2 has been added to remove the Siskiyou hunt zone from the classification of "conflict zones," in Section 555.1 for consideration by the Fish and Game Commission (Commission) at its April 18, 2024 meeting. A continuation notice with the addition of Option 2 was publicly noticed on April 5, 2024 and is available on the Commission's website.

IV. Reasons for Modification of Originally Proposed Language of ISOR:

The originally proposed language has been modified in response to public comment (see attachment).

V. Summary of Primary Considerations Raised in Opposition and in Support

Siskiyou County Fish and Game Commission, dated February 7, 2024
Comment Summary:

1. Siskiyou County Fish and Game Commission (SGFGC) does not support the Department's classification of the Siskiyou EMU [Elk Management Unit] as a "conflict zone" and object to it being designated as a conflict zone. SCFGC proposes that the Siskiyou EMU continues to be managed under the current 555 program rules and regulations.
2. The SCFGC is supportive of the SHARE program and would like to see it grow beyond the two existing private landowners currently enrolled within the Siskiyou EMU. The SCFGC has concerns about the size of SHARE properties and supports a minimum acreage of 640 acres unless there are special circumstances. The SCFGC recommends allowing adjacent

properties to combine acreage to increase the size of the property enrolled in the program and does not recommend reducing the minimum acreage.

3. The SCFGC requests a meeting with the Department to review elk population data that allows for the current proposed increase in elk hunting tags, and, if the data support the proposed review, requests that tags are more evenly distributed to General Public Hunts, the SHARE program, and the Cooperative Hunting Area program.

See attachment for complete comment. (SGFGC comment letter)

Response: An Option 2 has been added to the proposed regulatory text to remove the Siskiyou hunt zone from the classification of “hunt zones,” in Section 555.1.

Updated Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The California Department of Fish and Wildlife (Department) has identified regulated hunting as a preferred tool to both manage elk populations and provide public recreation opportunities. The Fish and Game Commission (Commission) periodically considers the recommendations of the Department in establishing elk hunting regulations. Currently, elk tags are distributed through four issuance types governed by different sections under Title 14. Issuance types for elk tags include Section 364 General Public tags awarded via the Big Game Drawing, Section 364.1 Shared Habitat Alliance for Recreational Enhancement (SHARE) tags, Section 555 Cooperative Elk Hunting Area "Landowner" tags, and Section 601 Private Lands Wildlife Habitat Enhancement and Management Area (PLM) tags.

Regulated harvest is an effective management tool to help reduce human-elk conflict to tolerable levels. The Department aims to provide public hunting opportunity to the greatest extent possible, however, in some cases, elk almost exclusively occupy privately owned property causing significant conflict issues yet may be unavailable for harvest to a majority of general public tagholders. The efficacy of regulated harvest as a management tool in these areas may therefore be reduced due to land access constraints imposed on the general public, among other factors.

The Department has identified an opportunity to modify regulations within an existing framework, Section 555 Cooperative Elk Hunting Areas, to help reduce conflict and provide increased hunting opportunities for qualifying landowners. Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones.

The proposed changes are as follows:

Amend Section 555(a)

- Clarify distinction between 5,000 acres and 640 acres criteria
- Add sentence to clarify formula for allocating annual tag distribution relative to general methods public tags (sum of general methods public elk tags + SHARE elk tags issued annually)
- A clarification that a cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting at least 5,000 acres (Fish and Game Code Section 1575) in size (elk hunt zones as identified in section 364). A cooperative elk hunting area must be composed of contiguous parcels of at least 640 acres within a hunting area that is open to the public.
- Public license tags shall equate to the sum of the general methods elk license tags under Section 364 and the SHARE elk license tags under Section 364.1 for the corresponding hunt and for the same designation issued annually.

Amend subsection 555(b)

- (b)(1): Move the location in the regulation, and update the following regional office addresses:

Region 3: 2825 Cordelia Rd, Suite 100 Fairfield 94594 (707) 428-2002
Region 5: 3883 Ruffin Road, San Diego 92123 (858) 467-4201
Region 6: 3602 Inland Empire Blvd., Ste C-220, Ontario 91764 (909) 484-0167

- Clarify eligibility requirements regarding landownership as reiterated above for 555(a).
- Add (b)(2): This subsection is necessary for application materials to be clarified; these include the application form referenced in subsequent language, proof of ownership, proof of property size, and applicable fees.
- Add (b)(3): This subsection is necessary to list the information required within an application form that will be provided by the department. The requested information serves to provide the Department with necessary contact information, including name of first and second applicant, as well as the ability to cross reference to Department data systems (Driver's License number).
- (b)(4): Update the review and approval process, clarifying how lands will be verified.
- (b)(5): update a cross-reference to subsection 702 for elk license fees.
- The Reference section under "Note" is updated as the fees referenced in Section 702 require a cross reference to Fish and Game Code Section 713 for annual adjustment pursuant to the Implicit Price Deflator.
- Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language have been made in Section 555.

Add Section 555.1

- Describe and classify four "conflict zones"
- Reduce qualifying landowner criteria within identified conflict zones from 640 acres to 60 acres
- Increase antlerless tag distribution relative to public tags (general methods public elk tags + SHARE elk tags issued annually) from 20% to up to 100%
- Extend the hunt season through November 30th annually

Benefit of the Regulations:

Elk conflict exceeds tolerable levels in some areas. Elk almost exclusively occupy privately owned property in some hunt zones, causing significant conflict issues yet may be unavailable for harvest to a majority of general public tagholders. The efficacy of regulated harvest as a management tool in these areas may therefore be reduced due to land access constraints imposed on the general public, among other factors. Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones. Modifying regulations within an existing framework, Section 555 Cooperative Elk Hunting Areas, will provide increased hunting opportunities for qualifying landowners and serve to help reduce human-elk conflict.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing landowner tags (California Fish and Game Code Section 1575). No other state agency has the authority to adopt regulations governing landowner tags. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of landowner tag regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

UPDATE

Section 555.1: added an alternative option to 555.1(a) that removes the Siskiyou hunt zone from the definition of conflict zone. 555.1(a) Option 2 is edited to read: "Definition and Scope: A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size."

Revised Proposed Regulatory Language

Section 555.1, Title 14 CCR, is added as follows:

§ 555.1. Conflict Zone Cooperative Elk Hunting Areas.

Option 1:

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(1)(A), 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

Option 2:

(a) Definition and Scope. A conflict zone cooperative elk hunting area is an area of private land located within the boundary of an area open to public elk hunting as identified in subsections 364(a)(2)(A), 364(b)(2)(A), and 364(c)(1)(A), in which landowners experience chronic, elevated levels of human-elk conflict, as determined by the department. The conflict zone cooperative elk hunting area shall be contiguous parcels of at least 60 acres in size.

(b) Within the conflict zones open to public elk hunting, the number of conflict zone cooperative elk hunting license general methods antlerless tags issued shall be up to 100 percent of the number of public license general methods antlerless tags issued annually for the corresponding public hunt (i.e., a 1 to 1 public license antlerless tag to landowner antlerless tag ratio). The corresponding public hunt is comprised of the annual sum of general methods license tags issued across sections 364 and 364.1. Within a conflict zone cooperative elk hunting area, the remaining tag designations (i.e., spike bull, bull, or either-sex) shall be issued consistent with subsection 555(a). Any elk zones described in Section 364 excluded from this subsection shall conform to all criteria described in Section 555.

(c) An elk license tag issued pursuant to the provisions of this subsection is valid commensurate with the first day of the general methods elk season in which the conflict zone cooperative elk hunting area occurs, as described under Section 364, through November 30 annually. All provisions described under Section 555, including 555(b) shall apply to this subsection.

NOTE: Authority cited: Section 1575, Fish and Game Code.
Reference: Sections 67 and 1575, Fish and Game Code.

State of California
Fish and Game Commission
Initial Statement of Reasons for Regulatory Action

Amend Sections 708.14
Title 14, California Code of Regulations
Re: Big Game License Tag Drawing System

I. Date of Initial Statement of Reasons: November 15, 2023

II. Dates and Locations of Scheduled Hearings

(a) Notice Hearing:

Date: December 13, 2023 Location: San Diego, CA

(b) Discussion Hearing:

Date: February 15, 2024 Location: Sacramento, CA

(c) Adoption Hearing:

Date: April 18, 2024 Location: San Jose, CA

III. Description of Regulatory Action

(a) Statement of Specific Purpose of Regulatory Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

BACKGROUND

The Fish and Game Commission (Commission) periodically considers recommendations from the Department of Fish and Wildlife (Department) in establishing big game mammal hunting regulations. Specifically, the Department manages deer, bighorn sheep, pronghorn antelope and elk resources in California. Deer hunting tags, elk hunting tags, bighorn sheep hunting tags, and pronghorn antelope hunting tags are required to hunt these species in California.

CURRENT REGULATIONS

Regulations describing hunting zones and seasons for deer are described in sections 360 and 361, bighorn sheep in Section 362, pronghorn antelope in Section 363, and elk in Section 364. The Department distributes hunting tags for deer, elk, bighorn sheep, and pronghorn antelope annually via a big game drawing for a specific area and season. Some deer tags for certain hunt zones include both an early archery-only season and a subsequent “general” season by firearm and archery.

Public demand for certain deer tags and all bighorn sheep, pronghorn antelope, and elk hunting tags exceeds the available opportunities; therefore, a modified preference point system (subsection 708.14(a)) provides preference to hunters who have applied for, but not drawn, tags in past drawings. Before the start of the hunting license year (which runs from

July 1 through June 30), a hunter may apply through the Automated License Data System (ALDS) between April 15 and June 2 for a deer, bighorn sheep, pronghorn antelope, or elk hunting tag. If the hunter is not drawn, the hunter receives a preference point which gives that hunter preference in future drawings for that game species. A portion of the tags for each species are issued randomly to allow some opportunity for new hunters or hunters that do not have enough preference points to draw through the preference point portion of the drawing.

Many big game hunts require years of accumulated preference points to even have the opportunity. Others require the maximum number of preference points, and are "once in a lifetime" draws. For deer, hunters may make up to three hunt choices. Applicants can indicate their preferred first tag choice, which is considered along with the number of accumulated preference points. All remaining unsuccessful applications are then sorted by second tag choice, in random number order (starting with the lowest random number to the highest random number). A second round of drawings is then conducted for any zones and hunts with tags remaining without consideration of accumulated points.

Deer tags are classified pursuant to subsection 708.1(a)(2)(A) by three types:

- Premium, which include those tags where the tag quota filled on or before the first business day after July 1 in the immediately preceding license year;
- Restricted, which include all non-Premium tags where the tag quota filled on or before on or before the first business day after August 1 in the immediately preceding license year; and
- Unrestricted, which include those tags where the tag quota did not fill on or before the first business day after August 1 in the immediately preceding license year.

Existing regulations in subsections 708.14(j) and 708.14(k) outline the process for returning a big game tag if a hunter was unable to hunt under their first choice. That process requires the hunter to submit to the Department a written request to retain their existing preference point total and earn one preference point for that year. Request for refunds for bighorn sheep, pronghorn, and elk tag fees also exists under subsection 708.14(k). The Department may consider the request if the tag is returned to the Department's License and Revenue Branch before the season starts for which the tag is valid. Tags are offered to the first alternate, and so on. If a hunt area is inaccessible for sixty-six percent (66%) or more of a hunt season due to a public land closure caused by wildfire, customers may return their tags for preference points reinstatement and, if applicable, tag refund.

This regulatory proposal would affect hunters who were drawn for deer hunts in zones defined in Title 14 Section 708.1 and described as Premium Deer Hunt Tags, bighorn sheep hunts in zones defined in Title 14, Section 362, pronghorn antelope hunts in zones defined in Title 14, Section 363, and elk hunts in zones defined in Title 14, Section 364.

PROPOSED REGULATORY CHANGES

The proposed changes focus on preference point reinstatement for members of a party and for apprentice hunters. The last time these regulations were subject to major amendment was April 18, 2022. The proposed amendments here represent the results of the

Department's internal discussions, input from Petition 2021-17, and public comment. The proposed changes are necessary to make hunting opportunities more equitable.

1. The party preference point rule needs to be changed regarding how tags may be returned. Propose that individual party members may return tags only if their points are less than or equal to the party points average. For party members who have more points than the party's point average, all members of the party must return their tags for point reinstatement.
2. Require a completed harvest report for postseason tag returns. Change wording to explicitly state that the entire tag needs to be returned (including carcass portion) – otherwise the carcass portion could be used illegitimately.
3. Apprentice hunters must return all premium first-choice tags to be eligible for preference points reinstatement since they can apply twice in the lottery and both tags carry full point value.
4. Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language has been made in this section.

Amend Subsection 708.14(j): Process for requesting preference point reinstatements and tag refunds for deer.

For the phrase "unfilled tag", amend to "entire unfilled tag (including carcass portion)"

Subsection 708.14(j)(1) - For the phrase "unfilled tag", amend to "entire unfilled tag (including carcass portion)"

The party preference point rule currently has a loophole that allows hunters with few preference points to repeatedly leverage the preference points of other hunters who have many preference points, because the hunters with many preference points can return their tag for point reinstatement year after year. At the end of the paragraph, add: "If returning tags as member of a party, individual party members may return tags only if their points are less than or equal to the party's point average. For party members who have more points than the party's point average to have their points reinstated, all members of the party must return their tags for point reinstatement." This clarification is necessary because hunters with few preference points can unduly benefit from hunters with many preference points to repeatedly get drawn for premium hunts by leveraging the party preference point system as currently written.

Subsection 708.14(j)(2)(A) - Remove entirely as it is obsolete as the timing of the 2021 hunting license year has already passed.

Subsection 708.14(j)(2)(B) - is now re-numbered as subsection 708.14(j)(2)

Amend Subsection 708.14(k): Process for requesting preference point reinstatements and tag refunds for elk, antelope, or bighorn sheep tag in the big game drawing.

For the phrase "unfilled tag", amend to "entire unfilled tag (including carcass portion)" - This change is necessary to eliminate the possibility for illegitimate use of the carcass portion of the tag.

Subsection 708.14(k)(1) - For the phrase "unfilled tag", amend to "entire unfilled tag (including carcass portion)" - This change is necessary to eliminate the possibility for illegitimate use of the carcass portion of the tag.

Subsection 708.14(k)(2)(A) - Remove entirely as it is obsolete as the timing of the 2021 hunting license year has already passed.

Subsection 708.14(k)(2)(B) - is now re-numbered as subsection 708.14(k)(2)

Add Subsection 708.14(l): Preference point reinstatement for apprentice hunters.

Subsection 708.14(l): Add "Apprentice hunters must return all premium first-choice tags to be eligible for preference points reinstatement. All returned tags must meet eligibility requirements for point reinstatement. Tagholders must submit written request along with entire unfilled tags (including carcass portion) for preference point reinstatement." This change is necessary because under current regulations, junior license hunters may apply and be drawn for multiple premium tags. The addition of the apprentice tag rule is to prevent abuse of gaining preference points while simultaneously keeping a premium tag.

Non substantive changes

Non substantive changes are made throughout Section 708.14 to correct for spelling, punctuation, and gender neutrality.

(b) Goals and Benefits of the Regulation

The goal of the proposed regulation is to remove a loophole in the tag return rules, thus improving equity of hunting opportunity. All other changes further improve equity of hunter opportunity and/or facilitate administration.

(c) Authority and Reference Sections from Fish and Game Code for Regulation

Authority: Sections 200, 203, 219, 265, 270, 275, 331, 332, 1050, 1572, 4302 and 10502, Fish and Game Code.

Reference: Sections 110, 200, 201, 203, 203.1, 219, 255, 265, 270, 275, 331, 332, 713, 1050, 1570, 1571, 1572, 3950, 3951, 4302, 4330, 4331, 4332, 4333, 4336, 4340, 4341, 4902, 10500 and 10502, Fish and Game Code

(d) Specific Technology or Equipment Required by Regulatory Change

None

(e) Identification of Reports or Documents Supporting Regulation Change

None

(f) Public Discussions of Proposed Regulations Prior to Notice Publication

- The Wildlife Resources Committee discussed the proposed regulations at its January 13, 2022, January 11, 2023, and September 19, 2023 meetings.

IV. Description of Reasonable Alternatives to Regulatory Action

(a) Alternatives to Regulation Change

The no-change alternative was considered and rejected because it would not attain project objectives of providing for equitable hunting opportunities.

(b) No Change Alternative

Without the proposed changes, the outstanding issues concerning the regulations currently governing preference points would remain unaddressed.

V. Mitigation Measures Required by Regulatory Action

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states. The proposed amendments are economically neutral to business.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

The Commission anticipates no impact on the creation or elimination of jobs within the state, no impact on the creation of new business, the elimination of existing businesses or the expansion of businesses in California as minor variations in hunting regulations are, by themselves, unlikely to provide a substantial economic stimulus to the state.

(c) Cost Impacts on a Representative Private Person or Business

The Commission is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with this proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State:

None

(e) Nondiscretionary Costs/Savings to Local Agencies:

None

(f) Programs Mandated on Local Agencies or School Districts:

None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code:

None

(h) Effect on Housing Costs:

None

VII. Economic Impact Assessment

(a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State:

No impacts to the creation or elimination of jobs are anticipated from this regulatory amendment.

(b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State

No impacts to the creation of new businesses or the elimination of existing businesses within the State are anticipated from this regulatory amendment.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State

No impacts to the expansion of businesses currently doing business within the State are anticipated.

(d) Benefits of the Regulation to the Health and Welfare of California Residents

The Commission does not anticipate impacts on the health and welfare of California residents.

(e) Benefits of the Regulation to Worker Safety

No impacts to worker safety are anticipated.

(f) Benefits of the Regulation to the State's Environment

The proposed changes should have no environmental effect.

(g) Other Benefits of the Regulation

Increased equity of hunting opportunities.

Informative Digest/Policy Statement Overview

Unless otherwise specified, all section references in this document are to Title 14 of the California Code of Regulations (CCR).

The California Department of Fish and Wildlife (Department) manages deer, bighorn sheep, pronghorn antelope, and elk resources in California. Deer hunting tags, bighorn sheep hunting tags, pronghorn antelope hunting tags, and elk hunting tags are required to hunt these species in California. The Department distributes hunting tags for certain deer, bighorn sheep, pronghorn antelope, and elk annually via the big game drawing. Public demand for deer, bighorn sheep, pronghorn antelope, and elk hunting tags exceeds the available opportunities; therefore, a modified preference point system (Section 708.14) provides preference to hunters who have applied for, but not received, tags in past drawings. Each year a hunter applies for a deer, bighorn sheep, pronghorn antelope, or elk hunting tag and is not drawn, that hunter receives a preference point which gives that hunter preference in future drawings for that species. A portion of the tag quota for deer, bighorn sheep, pronghorn antelope, and elk tags are allocated by preference point drawing each year. A portion of tags are issued randomly to allow some opportunity for new hunters and hunters that do not have enough preference points to draw through the preference point portion of the drawing.

Proposed changes to subsection 708.14(j) would remedy a loophole issue in that hunters with few preference points can unduly benefit from hunters with many preference points to repeatedly get drawn for premium hunts by leveraging the party preference point system as currently written.

Under current regulations, junior license hunters may apply and be drawn for multiple premium tags. The addition of the apprentice tag rule is to prevent abuse of gaining preference points while simultaneously keeping a premium tag.

Currently the regulation language does not explicitly state that the entire tag including the carcass portion must be returned for point reinstatement. We propose to make this explicit. Finally, it is proposed that apprentice hunters must return both drawing tags in order to receive preference point reinstatement since they are allowed to enter the drawing twice.

The proposed changes are as follows:

1. The party preference point rule needs to be changed regarding how tags may be returned. Propose that for pre-season tag returns, individual party members may return tags only if their points are less than or equal to the party points average. For party members who have more points than the party’s point average, all members of the party must return their tags for point reinstatement.
2. Require a completed harvest report for postseason tag returns. Change wording to explicitly state that the entire tag needs to be returned (including carcass section) – otherwise the carcass section could be used illegitimately.
3. Apprentice hunters must return all premium first-choice tags to be eligible for preference points reinstatement since they can apply twice in the lottery and both tags carry full point value.
4. Non-substantive editing and renumbering to improve the clarity and consistency of the regulatory language has been made in this section.

Benefit of the Regulations:

The proposed regulation changes will make hunting opportunities more equitable and close loopholes that allow leveraging of the system.

Consistency and Compatibility with Existing Regulations:

The proposed regulations are neither inconsistent nor incompatible with existing state regulations. Section 20, Article IV, of the state Constitution specifies that the Legislature may delegate to the Commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. The Legislature has delegated to the Commission the power to adopt regulations governing big game hunting (California Fish and Game Code Section 200). No other state agency has the authority to adopt regulations governing big game hunting. The Commission has reviewed its own regulations and finds that the proposed regulations are neither inconsistent nor incompatible with existing state regulations. The Commission has searched the CCR for any regulations regarding the adoption of big game hunting regulations; therefore, the Commission has concluded that the proposed regulations are neither inconsistent nor incompatible with existing state regulations.

§ 708.14. Big Game License Tag Drawing System.

(a) General Conditions

(1) Except as otherwise provided, the department shall award license tags for premium deer, bighorn sheep, elk and pronghorn antelope hunts, as described in sections 360(b) and (c), 361, 362, 364 and 363, using a Modified-Preference Point drawing system.

(2) Except as otherwise provided, the Modified-Preference Point drawing system shall award proportions of hunt tag quotas, as specified for each species, using the following drawing methods:

(A) Preference Point Drawings. Tags are awarded based on the following order of priority: an applicant's hunt choice (first choice only for deer), accumulated point totals by species (highest to lowest), and computer-generated random number (lowest to highest).

(B) Draw-By-Choice Drawings. Tags are awarded according to an applicant's hunt choice and computer-generated random number (lowest to highest), without consideration of accumulated points.

(3) Except as otherwise provided, applicants unsuccessful in receiving a tag for premium deer (based on first choice selection), bighorn sheep, elk or pronghorn antelope hunts shall earn one (1) preference point for use in future Big Game Drawings.

(4) To earn and accumulate a point for any species, a person shall comply with all application requirements for that species as specified in sections 708.1, 708.9, 708.10 and 708.11 including the following conditions:

(A) Applicants for premium deer license tags, pronghorn antelope license tags, or elk license tags shall be at least 12 years of age on or before July 1 of the license year for which they are applying.

(B) Applicants for Nelson ~~big horn~~ bighorn sheep license tags shall be at least 16 years of age on or before July 1 of the license year for which they are applying.

(C) Applicants shall possess a valid annual California hunting license valid for the hunting season requested.

(D) Applications for bighorn sheep, pronghorn antelope and elk hunts shall include the appropriate nonrefundable processing fees as specified in Section 702.

(E) ~~Any applicant~~ Applicants shall apply for a premium deer license tag, bighorn sheep license tag, pronghorn antelope license tag and elk license tag through the department's Automated License Data System terminals at any department license agent or department license sales office by June 2 each year.

(F) Each applicant who submits a premium license tag, as noted in (E) above, through the department's Automated License Data System terminals at department license agents and department license sales offices shall receive a "big game drawing receipt" printed from the terminal. The receipt shall contain the customer's name and permanent identification number, proof of entry into the big game drawing for the license year, hunt choices for each species, accumulated preference points for each species, and Party Identification Number.

(G) Except for apprentice deer hunt applicants, applicants shall not submit more than one drawing application for each species during the same license year.

(b) Party Applications, Residency

(1) No more than six persons shall apply together as a party for premium deer license tags. Applicants for premium deer license tags may be residents or nonresidents.

(2) No more than two residents shall apply together as a party for elk license tags. Nonresidents shall not apply as a party for elk license tags.

(3) No more than two residents shall apply together as a party for pronghorn antelope license tags. Nonresidents shall not apply as a party for pronghorn antelope license tags.

(4) Applicants shall not apply as a party for bighorn sheep license tags.

(5) Each year upon application, each applicant shall specify if the applicant is applying as an individual, a party leader or joining an existing party.

(6) Applicants applying as an individual or as a party leader shall be assigned a Party Identification Number from the department's Automated License Data System terminal at the time of application each year. Applicants shall be assigned a Party Identification Number for each species.

(7) To apply as a party, the party leader shall apply first and provide ~~his/her~~ their assigned Party Identification Number to the other party members.

(8) Applicants joining an existing party shall provide the Party Identification Number of the party leader when ~~he/she applies~~ they apply to join the party.

(9) Applicants joining a party shall be assigned the same tag choices in the same order of preference as the party leader.

(10) All party members shall be awarded tags according to the choices selected by the party leader.

(c) No applicant shall earn more than one (1) preference point per species, per drawing, for use in future drawings. Preference points are accumulated by species and shall not be transferred to another species or another person. Preference points are not zone or hunt specific.

(d) Except as otherwise provided, successful applicants receiving tags for their first choice premium deer, bighorn sheep, elk or pronghorn antelope hunts shall lose all preference points for that species.

(e) For party applications, the department shall use the average preference point value of all party members (total preference points for the party divided by number of party members) as the basis for consideration in the drawing for that species. Point averages shall not be rounded.

(f) Except as otherwise provided, persons who do not wish to apply for an antelope, elk, bighorn sheep or premium deer tags, may earn one (1) preference point for any or all of these species, by submitting the appropriate application(s), as specified in sections 708.1, 708.9, 708.10 and 708.11, and selecting the point code number for that species, as defined by the department, as the hunt choice (first choice only for deer) through the department's Automated License Data System terminals at any department license agent or department license sales office. Persons applying for a preference point in this manner shall be subject to the same application requirements as regular drawing applicants as specified in subsection 708.14.

(g) The department shall maintain records of preference points earned by individual applicants based on the identification number assigned to each customer by the department's Automated License Data System. The customer's identification number, Get Outdoors ID (GO ID), will be printed on each drawing receipt issued by the Automated License Data System. Applicants shall notify the department's License and Revenue Branch in Sacramento, in writing, of any changes or corrections regarding name, mailing address, or date of birth.

(h) Persons not applying for premium deer, bighorn sheep, elk, or pronghorn antelope hunts through the department's Big Game Drawings for five (5) consecutive years shall have their preference points for that species reduced to zero (0). For the purposes of this subsection, persons whose applications are disqualified from drawing shall be considered the same as persons not applying. Applying for preference points as described in (f) above, will keep an applicant's file active.

(i) Any person may appeal incomplete, late and ineligible applications or applications submitted without the appropriate processing fee that were not included in the department's big game drawing and the hunter did not earn a preference point. The appeal shall be in writing and describe the basis for the appeal. The appeal shall be received by the department's License and Revenue Branch in Sacramento, or if mailed, postmarked on or before May 31 of the following year. The department, upon consideration of the appeal, may grant the appeal and award one preference point to the appellant. If the department grants the appeal for a preference point, the appellant shall pay all the applicable fees. The department shall not award a preference point unless the appellant pays all the applicable fees.

(j) Any applicant who was drawn for the applicant's first deer tag choice in the big game drawing (becoming a tag holder) and cannot hunt for any reason may return their entire unfilled tag (including carcass portion) and submit a written request to retain their accumulated preference point total and earn one preference point for deer for that license year. If the request is granted, the tag holder shall retain the preference point total the tag holder accumulated prior to the big game drawing and earn one preference point for deer for that license year. The department shall not refund the fees paid for a resident deer tag. To be eligible for preference point reinstatement, tag holders must meet one of the criteria below:

(1) Before a season starts. The tag holder must return the entire unfilled tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to the earliest date the tag is valid for hunting. For tags that are valid for both an archery season, and a general season pursuant to sections 360 and 361 of these regulations, the written request must be postmarked prior to the opening date of the earliest season. The department may refund the difference between the fee paid for a nonresident deer tag and a resident deer tag for any nonresident. Party members may return their deer tags only if their points are less than or equal to the

party's point average. For party members who have more points than the party's point average to have their points reinstated, all members of the party must return their tags for point reinstatement.

(2) After a season starts.

~~(A) For the 2021 hunting license year, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of a hunt season (pursuant to sections 360 and 361 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement. For tags that are valid for both an archery season and a general season, only the general season shall be considered for the calculation of the percentage of hunt season lost. The tag holder must return their unfilled deer tag with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to May 1, 2022. Requests postmarked on or after May 1, 2022 shall not be considered.~~

~~(B)~~Commencing with the 2022 hunting license year beginning July 1, 2022, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of a hunt season (pursuant to sections 360 and 361 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement. For tags that are valid for both an archery season and a general season, only the general season shall be considered for the calculation of the percentage of hunt season lost. The tag holder must return their entire unfilled deer tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244– 2090, postmarked on or prior to February 28 of the current license year. Requests postmarked after this date shall not be considered.

(k) Any applicant who was awarded an elk, antelope, or bighorn sheep tag in the big game drawing (becoming a tag holder) and cannot hunt for any reason may return their entire unfilled tag (including carcass portion) and submit a written request to retain their accumulated preference point total, earn one preference point for elk, antelope or bighorn sheep for that license year, and seek refund of the tag fee. The tag holder shall pay the nonrefundable processing fee specified in Section 702 with the request. If the request is granted, the tag holder shall retain the preference point total the tag holder accumulated prior to the big game drawing and earn one preference point for elk, antelope, or bighorn sheep. The department may refund the tag fee. To be eligible for preference point reinstatement and/or tag refund, tag holders must meet one of the criteria below:

(1) Before a season starts. The tag holder must return ~~the~~ their entire unfilled tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to the opening date of the season for which the tag is valid.

(2) After a season starts.

~~(A) For the 2021 hunting license year, a tag holder whose hunt area was inaccessible for sixty-six percent (66%) or more of the hunt season (pursuant to sections 362, 363 and 364 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement and/or tag refund. The tag~~

~~holder must return their unfilled tag with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to May 1, 2022. Requests postmarked on or after May 1, 2022 shall not be considered.~~

~~(B)~~Commencing with the 2022 hunting license year beginning July 1, 2022, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of the hunt season (pursuant to sections 362, 363, and 364 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement and/or tag refund. The tag holder must return their entire unfilled tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked on or prior to February 28 of the current license year. Requests postmarked after this date shall not be considered.

(l): Apprentice hunters must return all premium first-choice tags to be eligible for preference points reinstatement. All returned tags must meet eligibility requirements for point reinstatement. Tagholders must submit written request along with entire unfilled tags (including carcass portion) for preference point reinstatement.

NOTE: Authority cited: Sections 200, 203, 219, 265, 270, 275, 331, 332, 1050, 1572, 4302 and 10502, Fish and Game Code.
Reference: Sections 110, 200, 201, 203, 203.1, 219, 255, 265, 270, 275, 331, 332, 713, 1050, 1570, 1571, 1572, 3950, 3951, 4302, 4330, 4331, 4332, 4333, 4336, 4340, 4341, 4902, 10500 and 10502, Fish and Game Code.

§ 708.14. Big Game License Tag Drawing System.

(a) General Conditions

(1) Except as otherwise provided, the department shall award license tags for premium deer, bighorn sheep, elk and pronghorn antelope hunts, as described in sections 360(b) and (c), 361, 362, 364 and 363, using a Modified-Preference Point drawing system.

(2) Except as otherwise provided, the Modified-Preference Point drawing system shall award proportions of hunt tag quotas, as specified for each species, using the following drawing methods:

(A) Preference Point Drawings. Tags are awarded based on the following order of priority: an applicant's hunt choice (first choice only for deer), accumulated point totals by species (highest to lowest), and computer-generated random number (lowest to highest).

(B) Draw-By-Choice Drawings. Tags are awarded according to an applicant's hunt choice and computer-generated random number (lowest to highest), without consideration of accumulated points.

(3) Except as otherwise provided, applicants unsuccessful in receiving a tag for premium deer (based on first choice selection), bighorn sheep, elk or pronghorn antelope hunts shall earn one (1) preference point for use in future Big Game Drawings.

(4) To earn and accumulate a point for any species, a person shall comply with all application requirements for that species as specified in sections 708.1, 708.9, 708.10 and 708.11 including the following conditions:

(A) Applicants for premium deer license tags, pronghorn antelope license tags, or elk license tags shall be at least 12 years of age on or before July 1 of the license year for which they are applying.

(B) Applicants for Nelson ~~big horn~~ bighorn sheep license tags shall be at least 16 years of age on or before July 1 of the license year for which they are applying.

(C) Applicants shall possess a valid annual California hunting license valid for the hunting season requested.

(D) Applications for bighorn sheep, pronghorn antelope and elk hunts shall include the appropriate nonrefundable processing fees as specified in Section 702.

(E) ~~Any applicant~~ Applicants shall apply for a premium deer license tag, bighorn sheep license tag, pronghorn antelope license tag and elk license tag through the department's Automated License Data System terminals at any department license agent or department license sales office by June 2 each year.

(F) Each applicant who submits a premium license tag, as noted in (E) above, through the department's Automated License Data System terminals at department license agents and department license sales offices shall receive a "big game drawing receipt" printed from the terminal. The receipt shall contain the customer's name and permanent identification number, proof of entry into the big game drawing for the license year, hunt choices for each species, accumulated preference points for each species, and Party Identification Number.

(G) Except for apprentice deer hunt applicants, applicants shall not submit more than one drawing application for each species during the same license year.

(b) Party Applications, Residency

(1) No more than six persons shall apply together as a party for premium deer license tags. Applicants for premium deer license tags may be residents or nonresidents.

(2) No more than two residents shall apply together as a party for elk license tags. Nonresidents shall not apply as a party for elk license tags.

(3) No more than two residents shall apply together as a party for pronghorn antelope license tags. Nonresidents shall not apply as a party for pronghorn antelope license tags.

(4) Applicants shall not apply as a party for bighorn sheep license tags.

(5) Each year upon application, each applicant shall specify if the applicant is applying as an individual, a party leader or joining an existing party.

(6) Applicants applying as an individual or as a party leader shall be assigned a Party Identification Number from the department's Automated License Data System terminal at the time of application each year. Applicants shall be assigned a Party Identification Number for each species.

(7) To apply as a party, the party leader shall apply first and provide ~~his/her~~ their assigned Party Identification Number to the other party members.

(8) Applicants joining an existing party shall provide the Party Identification Number of the party leader when ~~he/she applies~~ they apply to join the party.

(9) Applicants joining a party shall be assigned the same tag choices in the same order of preference as the party leader.

(10) All party members shall be awarded tags according to the choices selected by the party leader.

(c) No applicant shall earn more than one (1) preference point per species, per drawing, for use in future drawings. Preference points are accumulated by species and shall not be transferred to another species or another person. Preference points are not zone or hunt specific.

(d) Except as otherwise provided, successful applicants receiving tags for their first choice premium deer, bighorn sheep, elk or pronghorn antelope hunts shall lose all preference points for that species.

(e) For party applications, the department shall use the average preference point value of all party members (total preference points for the party divided by number of party members) as the basis for consideration in the drawing for that species. Point averages shall not be rounded.

(f) Except as otherwise provided, persons who do not wish to apply for an antelope, elk, bighorn sheep or premium deer tags, may earn one (1) preference point for any or all of these species, by submitting the appropriate application(s), as specified in sections 708.1, 708.9, 708.10 and 708.11, and selecting the point code number for that species, as defined by the department, as the hunt choice (first choice only for deer) through the department's Automated License Data System terminals at any department license agent or department license sales office. Persons applying for a preference point in this manner shall be subject to the same application requirements as regular drawing applicants as specified in subsection 708.14.

(g) The department shall maintain records of preference points earned by individual applicants based on the identification number assigned to each customer by the department's Automated License Data System. The customer's identification number, Get Outdoors ID (GO ID), will be printed on each drawing receipt issued by the Automated License Data System. Applicants shall notify the department's License and Revenue Branch in Sacramento, in writing, of any changes or corrections regarding name, mailing address, or date of birth.

(h) Persons not applying for premium deer, bighorn sheep, elk, or pronghorn antelope hunts through the department's Big Game Drawings for five (5) consecutive years shall have their preference points for that species reduced to zero (0). For the purposes of this subsection, persons whose applications are disqualified from drawing shall be considered the same as persons not applying. Applying for preference points as described in (f) above, will keep an applicant's file active.

(i) Any person may appeal incomplete, late and ineligible applications or applications submitted without the appropriate processing fee that were not included in the department's big game drawing and the hunter did not earn a preference point. The appeal shall be in writing and describe the basis for the appeal. The appeal shall be received by the department's License and Revenue Branch in Sacramento, or if mailed, postmarked on or before May 31 of the following year. The department, upon consideration of the appeal, may grant the appeal and award one preference point to the appellant. If the department grants the appeal for a preference point, the appellant shall pay all the applicable fees. The department shall not award a preference point unless the appellant pays all the applicable fees.

(j) Any applicant who was drawn for the applicant's first deer tag choice in the big game drawing (becoming a tag holder) and cannot hunt for any reason may return their <u>entire</u> unfilled tag <u>(including carcass portion)</u> and submit a written request to retain their accumulated preference point total and earn one preference point for deer for that license year. If the request is granted, the tag holder shall retain the preference point total the tag holder accumulated prior to the big game drawing and earn one preference point for deer for that license year. The department shall not refund the fees paid for a resident deer tag. To be eligible for preference point reinstatement, tag holders must meet one of the criteria below:

(1) Before a season starts. The tag holder must return the <u>entire</u> unfilled tag <u>(including carcass portion)</u> with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to the earliest date the tag is valid for hunting. For tags that are valid for both an archery season, and a general season pursuant to sections 360 and 361 of these regulations, the written request must be postmarked prior to the opening date of the earliest season. The department may refund the difference between the fee paid for a nonresident deer tag and a resident deer tag for any nonresident. <u>Party members may return their deer tags only if their points are less than or equal to the</u>

party's point average. For party members who have more points than the party's point average to have their points reinstated, all members of the party must return their tags for point reinstatement.

(2) After a season starts.

~~(A) For the 2021 hunting license year, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of a hunt season (pursuant to sections 360 and 361 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement. For tags that are valid for both an archery season and a general season, only the general season shall be considered for the calculation of the percentage of hunt season lost. The tag holder must return their unfilled deer tag with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to May 1, 2022. Requests postmarked on or after May 1, 2022 shall not be considered.~~

~~(B)~~Commencing with the 2022 hunting license year beginning July 1, 2022, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of a hunt season (pursuant to sections 360 and 361 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement. For tags that are valid for both an archery season and a general season, only the general season shall be considered for the calculation of the percentage of hunt season lost. The tag holder must return their entire unfilled deer tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244– 2090, postmarked on or prior to February 28 of the current license year. Requests postmarked after this date shall not be considered.

(k) Any applicant who was awarded an elk, antelope, or bighorn sheep tag in the big game drawing (becoming a tag holder) and cannot hunt for any reason may return their entire unfilled tag (including carcass portion) and submit a written request to retain their accumulated preference point total, earn one preference point for elk, antelope or bighorn sheep for that license year, and seek refund of the tag fee. The tag holder shall pay the nonrefundable processing fee specified in Section 702 with the request. If the request is granted, the tag holder shall retain the preference point total the tag holder accumulated prior to the big game drawing and earn one preference point for elk, antelope, or bighorn sheep. The department may refund the tag fee. To be eligible for preference point reinstatement and/or tag refund, tag holders must meet one of the criteria below:

(1) Before a season starts. The tag holder must return ~~the~~ their entire unfilled tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to the opening date of the season for which the tag is valid.

(2) After a season starts.

~~(A) For the 2021 hunting license year, a tag holder whose hunt area was inaccessible for sixty-six percent (66%) or more of the hunt season (pursuant to sections 362, 363 and 364 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement and/or tag refund. The tag~~

~~holder must return their unfilled tag with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked prior to May 1, 2022. Requests postmarked on or after May 1, 2022 shall not be considered.~~

~~(B)~~Commencing with the 2022 hunting license year beginning July 1, 2022, a tag holder whose hunt zone was inaccessible for sixty-six percent (66%) or more of the hunt season (pursuant to sections 362, 363, and 364 of these regulations) due to a public land closure caused by wildfire may return their unfilled tag with their written request for preference point reinstatement and/or tag refund. The tag holder must return their entire unfilled tag (including carcass portion) with their written request to the department's License and Revenue Branch, P.O. Box 944209, Sacramento, CA 94244–2090, postmarked on or prior to February 28 of the current license year. Requests postmarked after this date shall not be considered.

(l): Apprentice hunters must return all premium first-choice tags to be eligible for preference points reinstatement. All returned tags must meet eligibility requirements for point reinstatement. Tagholders must submit written request along with entire unfilled tags (including carcass portion) for preference point reinstatement.

NOTE: Authority cited: Sections 200, 203, 219, 265, 270, 275, 331, 332, 1050, 1572, 4302 and 10502, Fish and Game Code.
Reference: Sections 110, 200, 201, 203, 203.1, 219, 255, 265, 270, 275, 331, 332, 713, 1050, 1570, 1571, 1572, 3950, 3951, 4302, 4330, 4331, 4332, 4333, 4336, 4340, 4341, 4902, 10500 and 10502, Fish and Game Code.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 11, 2024

Memorandum

Date: April 10, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Agenda Item for the April 17-18, 2024, Fish and Game Commission Meeting
Re: Preference Points Reinstatement – Pre- Adoption Memo

The Department of Fish and Wildlife (Department) has prepared this Memorandum to summarize and provide responses to public comments received by the Fish and Game Commission (Commission) on the proposed amendments to Section 708.14, Title 14, California Code of Regulations, regarding proposing changes to the process by which preference points are reinstated. The Department is not recommending any further amendments to the regulatory text because there were no public comments received regarding this proposal.

The Department recommends the Commission adopt the proposed rulemaking for preference points reinstatement.

If you have any questions on this item, please contact Scott Gardner, Wildlife Branch Chief, via phone at (916) 801-6257.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division
Department of Fish and Wildlife

Scott Gardner, Branch Chief
Wildlife Branch
Department of Fish and Wildlife

Robert Pelzman, Captain
Department of Fish and Wildlife
Law Enforcement Division

Mario Klip, Game Conservation and Wildlife
Connectivity Program Manager
Wildlife Branch
Department of Fish and Wildlife

Brian Leo, Deer Coordinator
Wildlife Branch
Department of Fish and Wildlife

Regina Vu, Regulations Specialist
Wildlife Branch
Department of Fish and Wildlife

Ona Alminas, Program Manager
Regulations Unit
Department of Fish and Wildlife

Chelle Temple-King, Senior Regulatory Scientist
Regulations Unit
Department of Fish and Wildlife

David Thesell, Program Manager
Fish and Game Commission

David Haug, Analyst
Fish and Game Commission

Ari Cornman, Wildlife Advisor
Fish and Game Commission

MAMMAL HUNTING

2024 Regulations Proposals

Presentation Overview

- Regulations proposals:
  - Bighorn sheep - 362
  - Pronghorn - 363
  - Elk – 364, 555
- Regulations without changes or public comment:
  - Deer – 554
  - Preference points – 708.14

DESERT BIGHORN SHEEP

Regulations Proposal

Section 362 Bighorn Tag Quota Adjustments

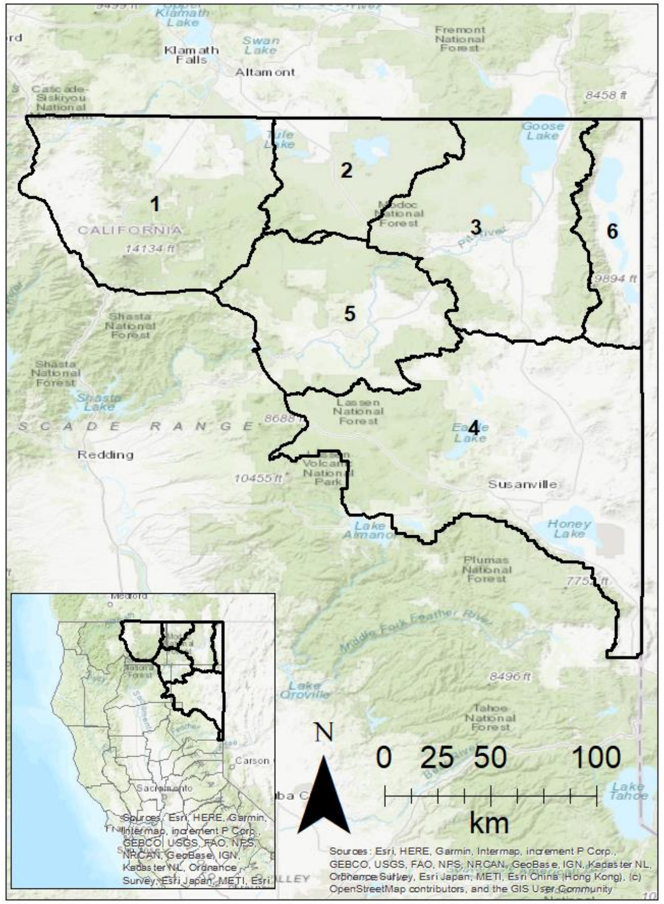
Nelson Bighorn Sheep Hunt Zones	23/24 Tag Allocation	Proposed for 24/25
Zone 1 – Marble/Clipper Mountains	1	1
Zone 2 – Kelso Peak/Old Dad Mountains	1	2
Zone 3 – Clark/Kingston Mountain Ranges	4	3
Zone 4 – Orocopia Mountains	1	1
Zone 5 – San Gorgonio Wilderness	0	0
Zone 6 – Sheep Hole Mountains	0	1
Zone 7 – White Mountains	6	4
Zone 8 – South Bristol Mountains	2	1
Zone 9 – Cady Mountains	2	2
Zone 10 – Newberry, Rodman, Ord Mountains	6	6
Open Zone Fundraising Tag	1	1
Marble/Clipper/South Bristol Fundraising Tag	1	0
Cady Mountains Fundraising Tag	1	1
Total:	26	23

PRONGHORN

Regulations Proposals

Section 363 Pronghorn Tag Quota Adjustments

- Poor productivity and recent harsh winter conditions
- Declines in hunter harvest success and age-at-harvest in Likely Tables (Zone 3) and Big Valley (Zone 5) over last 5 years
- Recent winter surveys indicated lower populations in all zones, most pronounced in Zone 3 and 5
- Ranges needed to be adjusted, we re-noticed quota ranges on 04/05/2024 for 15 days in advance of FGC meeting
  - Period 1 Buck initial range of 15-25 amended to 0-25
  - Period 2 Buck initial range of 10-25 amended to 0-25
- Recommend reducing tags in Zones 2, 3, and 5



Section 363 Pronghorn Tag Quota Adjustments

Hunt Code	Hunt Zone	Description	2023 (approved)	2024 (proposed)	Net change
710	Zone 1 - Mount Dome	General - Buck	2	2	0
720	Zone 2 - Clear Lake	General - Buck	15	12	-3
728	Zone 2 - Clear Lake	Archery - Buck	1	1	0
730	Zone 3 - Likely Tables	General - Buck - Period 1	25	5	-20
732	Zone 3 - Likely Tables	General - Buck - Period 2	25	5	-20
738	Zone 3 - Likely Tables	Archery - Buck	15	5	-10
734	Zone 3 - Likely Tables	Apprentice - Either-sex	5	5	0
740	Zone 4 - Lassen	General - Buck - Period 1	35	35	0
742	Zone 4 - Lassen	General - Buck - Period 2	35	35	0
745	Zone 4 - Lassen	Archery - Buck	5	5	0
790	Zone 4 - Lassen	Apprentice - Either-sex	5	5	0
750	Zone 5 - Big Valley	General - Buck	20	5	-15
755	Zone 5 - Big Valley	Archery - Buck	1	1	0
780	Zone 5 - Big Valley	Apprentice - Either-sex	1	1	0
760	Zone 6 - Surprise Valley	General - Buck	10	10	0
765	Zone 6 - Surprise Valley	Archery - Buck	1	1	0
766	Zone 6 - Surprise Valley	Apprentice - Either-sex	4	4	0
		Total	205	129	-68


ELK

Regulations Proposals

Topics

- General Public Big Game Draw (Grizzly Island Wildlife Area)
- Cooperative Elk Hunting Area Landowner (LO)
- Shared Habitat Alliance for Recreational Enhancement (SHARE)

Section 364 Elk Tag Quota Adjustments

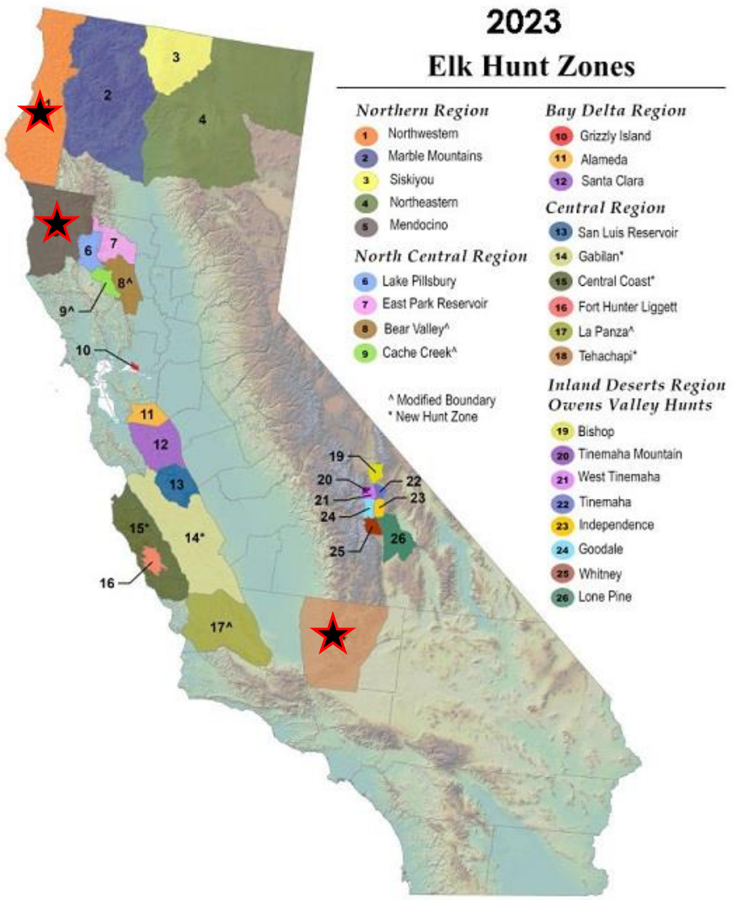
- Grizzly Island Wildlife Area (GIWA)/Tule Elk Hunt Zone

GIWA	2023 (approved)			2024 (proposed)			Potential net change		
Hunt Period	Antlerless	Spike bull	Bull	Antlerless	Spike bull	Bull	Antlerless	Spike bull	Bull
1	4	0	0	4	0	0	0	0	0
2	0	4	0	0	4	0	0	0	0
8	0	6	0	0	6	0	0	0	0
9	4	0	0	4	0	0	0	0	0
10	0	0	3	0	0	4	0	0	+1
11	4	0	0	4	0	0	0	0	0
12	0	0	3	0	0	4	0	0	+1
13	4	0	0	4	0	3	0	0	+3
FRT	0	0	1	0	0	1	0	0	0
Total	16	10	7	16	10	12	0	0	+5

Section 555 Cooperative Elk Area Landowner Tags

- Several elk hunt zones with chronic, elevated human-elk conflict where elk almost exclusively occupy private property include:
  - Northwestern
  - Mendocino
  - Tehachapi

- Original proposal included Siskiyou (Zone 3)
  - Department and Commission received letter in February from Siskiyou County Board of Supervisors, the letter recommended that Zone 3 not be designated as a conflict zone. Upon meeting with County, Department supports removing Siskiyou from proposed conflict zones.



★ Proposed "Conflict Zone"

Section 364 Elk Tag Quota Adjustments

Increased SHARE opportunities in select areas to help alleviate conflict

Hunts	2023 Bull Tags (approved)	2023 Antlerless Tags (Approved)	2024 Bull Tags (Proposed)	2024 Antlerless Tags (Proposed)	Net Change
Roosevelt Elk Hunts					
Siskiyou	2	2	20	20	+36
Northwestern	34	34	40	60	+32
Marble Mountain	1	2	1	2	0
Rocky Mountain Elk Hunts					
Northeastern*	2	0	2	0	0
Tehachapi	20	15	40	60	+65
Roosevelt Elk/Tule Elk Hunts					
Mendocino	2	4	20	30	+44

*Not shown -- 2 either-sex tags approved 2023, and proposed 2024

BLACK-TAILED AND MULE DEER

Regulations Proposals

Preference Points and Cooperative Deer Hunting Areas

- Section 708.14 – Preference points
- Section 554 – Cooperative deer hunting areas
- WRC supported Departmental recommendations given at the Sept 2023 WRC Meeting
- Discussed intent to amend – Dec 2023
  - No public comment at Feb 2024 discussion meeting

Questions | Contact

Mario Klip, Environmental Program Manager

Mario.Klip@wildlife.ca.gov

Regina Vu, Wildlife Regulations Coordinator

Regina.Vu@wildlife.ca.gov

Brian Leo, Deer Program Coordinator

Brian.Leo@wildlife.ca.gov

Big Game Program, Wildlife Branch

BigGame@wildlife.ca.gov

FGC meeting, Feb. 15, 2024: 364 (and 364.1)

Phoebe Lenhart [redacted]

Fri 02/09/2024 12:01 PM

To:FGC <FGC@fgc.ca.gov>

[redacted]

RE: Feb. 15, 2024: Agenda item #21, Mammal hunting 364 (and 364.1)

FGC Commisisoners
CA Fish and Game Commission
(fgc@fgc.ca.gov)

Dear Commissioners,

This email is sent to your attention to object to the Department of Fish and Wildlife's (DFW) revised proposal for hunting tags in the Northwestern zone for the Roosevelt elk in the SHARE program. In the first draft, it appeared that the DFW's hunting quotas were somewhat based on research. However, the DFW's revised proposal to increase the SHARE hunting quotas for bulls, from 34 to 40 bulls; as well as, for anterless elk, from 34 to 60 anterless elk does not seem to be based on any "scientific data". Instead, it looks to me that the DFW guessed! As you may realize, this is unacceptable.

The DFW states that there is an "intolerable" level of Roosevelt elk and human conflict. I would like to remind the FGC that the DFW's definition of the SHARE properties are that they are private properties that are open to the public hunting. Please keep in mind, that the DFW makes tremendous profits from the SHARE hunts.

I object to any hunting quotas submitted by the DFW to the FGC without being supported by actual herd locations and the population of elk in each herd. I think that the DFW has a responsibility to the public by providing the actual Roosevelt elk population for the general hunt and SHARE hunt quotas. According to my research, of the herds of Roosevelt elk in Del Norte County (DNC) ; there is only one herd in DNC that has over 100 members.

In addition, the Roosevelt elk are literally in a life and death survival situation with the treponemes associated hoof disease (TAHD) which is spreading. In the hunting quotas that the DFW presents, the DFW does not present to the FGC the number of deaths (euthanasia) that the DFW is responsible for in Del Norte County. I believe that the lack of any mention of TAHD deaths is a lack of transparency by the DFW to the public. The public in Del Norte County are very concerned about the population and health of the Roosevelt elk.Your consideration will be appreciated.

Sincerely, Phoebe Lenhart [redacted]

Siskiyou County Fish and Game Commission

857 N Main Street, Yreka, CA 96097 530-604-3600

Mike Ford – Chair
George Steen – Secretary
Jess Harris - Alternate

Paul Chapman – Vice-Chair
Darrel Harris – Member
Steve Pigoni - Alternate

John Dawson –Treasurer
Harold Duchi - Alternate

Received at Commission
2/12/24

February 7, 2024

Melissa Miller-Henson Executive Director
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Comments Re: California Department of Fish and Wildlife Submission of documents for the December 2023 Fish and Game Commission: Regulatory Action to Amend sections 362, 363, 364, 364.1, 554, 555, and 708.14, and add 555.1 Title 14, California Code of Regulations RE: Mammal hunting, November 28, 2023

The Siskiyou County Fish and Game Commission (SCFGC) would like to make the following recommendations to the California Department of Fish and Wildlife (Department) proposals as described above. All of our recommendations apply specifically to the Siskiyou Elk Management Unit (EMU).

Regarding the proposal to "Add Subsection 555.1, Describe and classify four "conflict zones"

555.1 – "Within Conflict Areas" the Department has identified opportunities to modify the rules and regulations within the current 555 program under 555.1 to help reduce elk conflict and provide increased hunting opportunities for qualifying landowners. "Chronic, elevated human-elk conflict, elk occupation of predominantly private property, and limited public hunting access has been documented by the Department in the Siskiyou, Northwestern, Mendocino, and Tehachapi Elk Hunt Zones." We do NOT support the Department's classification of the Siskiyou EMU as a "conflict zone" (or any of the subsections) and would object to it being designated as a conflict zone. We propose that the Siskiyou EMU continued to be managed under the current 555 program rules and regulations.

Regarding the proposal to Alter Public Hunting (364), Sections 364 and 364.1

Amendment to Siskiyou SHARE Roosevelt Elk Section 364.1 (i)(1) – The SCFGC is supportive of the SHARE program and would like to see it grow beyond the 2 existing private landowners currently enrolled in the SHARE program within the Siskiyou Elk Management Unit.

Section 364.1 (a) – The SCFGC is supportive of giving SHARE participants/the Department options to set the specific seasons on SHARE hunts within the August 15 through January 31 timelines in order to meet the Department's management objectives. We question if the proposed regulation should read (a) Season: the overall season *shall* open on August 15 and continue through January 31. Should that read the overall season *may* open to give the Department the opportunity to move the seasons earlier or later to meet the objectives of the area?

The SCFGC has concerns that some SHARE properties enrolled in the program could be of smaller acres. The current minimum acres necessary to participate in the 555 program is 640 acres. We support setting a minimum acreage of 640 acres to participate in the SHARE program unless there are special circumstances. Rather than reducing the size of individual SHARE (or 555 program) acreages required to participate in the program we recommend the ability to combine adjacent properties to increase the size of the property enrolled in the program. Establishing a minimum acreage necessary to enroll in the SHARE or 555 program would help to reduce safety concerns, hunter ethic issues, game retrieval issues, and regulation enforcement difficulties.

Available Data

On May 10, 2022 the Siskiyou County Fish and Game Commission hosted a meeting at which the California Department of Fish and Wildlife presented information on the current available data on elk within the Siskiyou EMU.

A number of management recommendations and changes to hunting tags to be issued were presented at that meeting, however, the Department stated the proposals were beyond the Department's ability to implement given the available data and the limited management actions that had been assessed in the 2010 Final Environmental Document, Elk Hunting.

The current Department proposals calls for up to a 100% increase to the number of bull tags issued and a roughly 400% increase in cow tags issued within the Siskiyou unit. We would like to meet with the Department to review the data that allows for an increase in tag numbers to this level. If additional elk tags can be issued, the SCFGC recommends that a new Environmental Document be prepared and that available tags be distributed more evenly to the General Public Hunts (364), the SHARE program, and the Cooperative Hunting Area program (555).

Thank you for the opportunity to provide comments.

Mike Ford
Siskiyou County Fish and Game Commission Chair

Public Comments - Elk Hunting

Marie Kyle [redacted]
Mon 04/01/2024 03:05 PM
To:FGC <FGC@fgc.ca.gov>

Please see the comments in response to the California Fish & Game Commission's Notice of Proposed Changes in Regulations published on January 23, 2024.

Marie

--

Marie Kyle

[redacted]

[redacted]

April 1, 2024

Submitted via email to FGC@fgc.ca.gov

Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Dear Sir or Madam:

I am submitting these comments on behalf of Barbara Page, who owns Elk Meadow Cabins near Orick, California. Given the nature of her business, which relies heavily on elk tourism, Mrs. Page has a direct interest in the health and stability of the elk population in Humboldt County.

ISSUE: The Commission should reject the adoption of 14 CCR § 555.1 and decline to increase the number of Roosevelt elk SHARE tags under 14 CCR § 364.1.

ARGUMENT: For the reasons outline below, we oppose the addition of Section 555.1 and the changes proposed to Section 364.1, both of which would allow increased hunting of Roosevelt elk at a time when the stability of the population is already threatened.

As you know, Roosevelt elk—the largest species of elk in the world by body mass, and the largest free-ranging megafauna remaining in California—were once hunted nearly to extinction.[1] Although their numbers have increased in recent years, they are nowhere near historic levels.[2] In fact, the Department of Fish & Wildlife lacks a clear picture of how many elk are present in the region. The agency did not begin conducting systematic elk surveys in the North Coast Elk Management Unit until to 2016, and monitoring elk populations is notoriously difficult in Northern California.[3] While recent efforts to track Roosevelt elk in Humboldt and Del Norte counties are commendable, the scale of the capture and collar program remains small. Given these challenges in population monitoring—and the threats mentioned below—it is prudent to adopt a conservative approach to the management of elk in this area.

Roosevelt elk currently face a variety of threats, ranging from habitat loss to predation to disease. As you are aware, the population is presently suffering from an outbreak of treponeme-associated hoof disease (TAHD). Few studies have been completed on TAHD, which can eliminate large numbers of the herd very suddenly and yet remains poorly understood even amongst wildlife experts. Until more is known about this dangerous disease and how it may affect elk populations, the Commission should refrain from allowing increased hunting of Roosevelt elk. Conversely, a larger population buffer will ensure elk survival during a potential

[1] *See* National Park Service *Elk in the Redwoods* Fact Sheet, *available at* https://www.nps.gov/redw/planyourvisit/upload/Elk-site-bulletin-508.pdf (last visited April 1, 2024) (noting that the population in California dropped to as few as 15 in 1925).
[2] *See* 2018 California Department of Fish & Wildlife Elk Management Plan at 15 (explaining that 500,000 is a "reasonable estimate" of the tule elk population prior to European settlement).
[3] *See* Management Plan at 88 (noting that "aerial surveys were not effective for surveying elk in the densely canopied forests along the north coast").

widespread outbreak. Habitat loss—fueled by factors such as increased development, wildfires, and climate change—only exacerbates the impact on the elk population.

As noted above, we oppose the addition of Section 555.1 to Title 14. This new provision represents a drastic change in current policy and may threaten the stability of the elk population in Northern California. Section 555.1, which essentially carves out an exception to the standard requirements for Cooperative Elk Hunting "Landowner" tags, would make elk hunting much easier in what the agency describes as the four "conflict zones." These include the Siskiyou, Mendocino, Tehachapi, and Northwestern hunt zones (the latter, of course, encompasses Humboldt County, where Mrs. Page operates her lodge). It would do this by: (1) reducing qualifying landowner criteria in these areas; (2) increasing antlerless tag distribution relative to public tags; and (3) extending the hunt season each year. We believe these changes could have a significant and negative impact on the Roosevelt elk population in these areas.

We also oppose the Commission's proposed increase in hunting tags administered under the SHARE program under Title 14 Section 364.1. Significant increases in Roosevelt elk tags are proposed in the Siskiyou, Northwestern, and Mendocino hunt zones. In the area surrounding Mrs. Page's lodge, the proposed regulations would increase Roosevelt elk SHARE tags from a total of 68 to a total of 100; in the other two hunt zones, these numbers could increase by a factor of ten or more. For the reasons discussed above, we believe it is a mistake to allow increased hunting of Roosevelt elk at this time.

Instead of increased hunting, we urge the Commission to focus its efforts on alternatives that will allow the Department to balance the competing interests among stakeholders. For example, translocating elk may be used not only to alleviate conflict but also contribute to genetic diversity and herd viability. The Department has already demonstrated that this is a safe and effective method for helping to reestablish herds in other locations. We also encourage the use of elk exclusion fences to limit or prevent elk from accessing private property where damage may occur. Although there may be a high cost associated with installing and maintaining physical barriers, the Department itself has recognized that—if done properly—this can be an effective, long-term solution for providing relief from elk damage.[4] These are just a few alternatives we urge the Commission to consider in managing human-elk conflict while balancing the agency's competing objectives for managing this indispensable wildlife resource.

<u>RECOMMENDATION</u>: For the reasons outlined above, we urge the Commission to reject the adoption of Section 555.1 and decline to increase the number of Roosevelt elk SHARE tags under Section 364.1.

We appreciate your consideration of these very important issues.

Sincerely,

Marie Kyle

Marie Kyle

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[4] *Id.* at 77.

Comments-Amend Mammal hunting regulations in Title 14, California Code of Regulations

THPO Consulting [redacted]

Wed 04/03/2024 04:29 PM

To:FGC <FGC@fgc.ca.gov>

Good afternoon Ms. Melissa Miller-Henson,

If you have any questions about the attached letter please feel free to contact me.

Thank you,

Timothy Wilcox
Tribal Archaeologist
[redacted]

AGUA CALIENTE BAND OF CAHUILLA INDIANS

TRIBAL HISTORIC PRESERVATION

02-039-2023-001

April 03, 2024

[VIA EMAIL TO:fgc@fgc.ca.gov]
California Fish and Game Commission
Ms. Melissa Miller-Henson
P.O. Box 944209
Sacramento, CA 94244-2090

Re: Amend Mammal hunting regulations in Title 14, California Code of Regulations

Dear Ms. Melissa Miller-Henson,

The Agua Caliente Band of Cahuilla Indians (ACBCI) appreciates your efforts to include the Tribal Historic Preservation Office (THPO) in the Amend Mammal hunting regulations in Title 14, California Code of Regulations project. No physical location

> *Both Bighorn sheep and Pronghorn were important to the Cahuilla because they were an integral part of economic, social, and religious dealings. Therefore, sustainable hunting is fully supported the ACBCI Tribal Historic Preservation Office. These culturally important animals need to persist into the future.

Again, the Agua Caliente appreciates your interest in our cultural heritage. If you have questions or require additional information, please call me at [redacted] You may also email me at [redacted]

Cordially,

Timothy Wilcox
Archaeologist
Tribal Historic Preservation Office
AGUA CALIENTE BAND
OF CAHUILLA INDIANS

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California Fish and Game Commission
P.O. Box 944209
Sacramento, Ca 94244-2090

June 7, 2021

Notice of Petition: Southern California Steelhead (*Oncorhynchus mykiss*)

Commissioners,

California Trout ("CalTrout") is pleased to submit the following petition to list the Southern California steelhead (*Oncorhynchus mykiss*) as an Endangered Species under the California Endangered Species Act (CESA, FGC § 2050 et seq). This petition demonstrates warranted listing under CESA based on the factors specified in the statute.

CalTrout has been a statewide leader on trout, salmon, and steelhead conservation since its founding 50 years ago. It is CalTrout's belief that abundant wild fish indicate healthy waters and that healthy waters benefit all Californians. With more than sixty large-scale, "boots on-the-ground" conservation projects underway, in tandem with public policy efforts in Sacramento, CalTrout's six regional offices work tirelessly to advance our cause through a three-pillared approach to conservation.

Southern California steelhead ("Southern steelhead") is an iconic species on the South Coast of California. Southern steelhead are culturally important and serve as an indicator species to gauge the broader health of the entire watershed. The species is currently experiencing an alarming rate of habitat loss, compounded by climate crisis impacts. According to the California Department of Fish and Wildlife's Steelhead Restoration and Management Plan for California (1996), "southern steelhead are the most jeopardized of all of California's steelhead populations." This petition utilizes the best available science to fully establish that Southern California steelhead face the threat of certain extinction.

Twenty-five years ago, CalTrout was recognized in the forward of the state's Steelhead Restoration and Management Plan as being a leader in this cause. Today we again see a clear need for action by the Fish and Game Commission, and we request that the Fish and Game Commission list Southern California Steelhead as endangered.

We appreciate your consideration and look forward to working with the Commission on this critical listing. Please do not hesitate to reach out if you have any questions or would like to further discuss the petition.

Sincerely,

Curtis Knight
Executive Director
California Trout

CALIFORNIA TROUT
FISH · WATER · PEOPLE

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

June 7th, 2021

The California Department of Fish and Wildlife (CDFW) published their Steelhead Restoration and Management Plan for California twenty-five years ago (McEwan and Jackson, 1996). This plan laid out the blueprint for restoring this important and valued state resource by restoring degraded habitat and re-establishing access to historic habitat that is currently blocked. This plan reaffirmed the state's mandate framed in The Salmon, Steelhead Trout, and Anadromous Fisheries Act of 1988 (SB 2261) to significantly increase natural production of salmon and steelhead by the year 2000. As stated in the Plan, severe anadromous fish population declines, the potential for species listings under the Endangered Species Act (ESA), fulfillment of legislative mandates, and the state's Public Trust obligations called for immediate implementation of CDFW's Steelhead Management Plan.

Since its publication in 1996, agencies and concerned organizations have made consistent efforts to reverse the course of population decline for Southern California Steelhead (*Oncorhynchus mykiss*). It is now 2021, and Southern steelhead have seen little demonstrable improvement in population numbers and long-term persistence (National Marine Fisheries Services (NMFS) 5-Year Update, 2016) since the species' federal ESA listing in 1997. We respectfully submit this petition to list Southern California Steelhead as an endangered species under the California Endangered Species Act (CESA F&GC § 2050 et seq.).

Southern steelhead is an iconic species on the South Coast of California. Southern steelhead are culturally important and serve as an indicator species to gauge the broader health of the entire watershed. The species is experiencing an alarming rate of habitat loss, compounded by climate crisis impacts. Yet it is still not listed as endangered by the State of California.

The State of the Salmonids: Status of California's Emblematic Fishes (2017) used an exhaustive literature review and a standardized protocol (Moyle et al. 2015) to determine that Southern steelhead are of "Critical Concern," with the population in danger of extinction with the next 25–50 years due to anthropogenic and environmental conditions. Going further, it states, "Since their listing as an Endangered Species in 1997, Southern steelhead abundance remains precariously low." This statement only reinforces how dire the situation has become. CDFW, in their own management plan, stated that "Southern steelhead are the most jeopardized of all of California's steelhead populations."

Preventing the extinction of Southern steelhead will have long-term implications for all steelhead populations on the West Coast (Boughton et al. 2007b, 2006, NMFS 2016). Over millennia, steelhead have evolved an ability to use a variety of shifting habitats. Southern steelhead took advantage of this plasticity and honed it in the naturally dynamic environment of Southern California and Northern Mexico (NMFS 2016). The mechanisms underlying anadromy for Southern steelhead, which is an important component of their life history variation, are not completely understood. However, research and *in situ* studies point to both environmental and genetic components having significant influence on their life-history pathway.

Extirpation of Southern steelhead would initiate a process of irreversible, cumulative extinctions of other native *O. mykiss* populations through three main pathways. First, irreversible loss of heritable genetic loci responsible for anadromy will prevent their transmission to future progeny. Second, *O. mykiss* in Southern California tolerate higher water temperatures and more variable dissolved oxygen levels, and can therefore contribute these adaptive traits to steelhead in northern regions as they experience warming of coastal waters. Third, fish passage barriers that completely block access to freshwater spawning grounds prevents genetic mixing on a regional scale, and thus the few remaining Southern steelhead or the freshwater resident native rainbow trout that maintain anadromous genetic characteristics, are substantially reproductively isolated (Hoelzer et al. 2008). This isolation by habitat fragmentation represents an important uncoupling in the evolutionary legacy of the species and a direct threat to its continued existence.

Paraphrasing Fish and Game Code 2062, an endangered species under CESA is a native species or subspecies which is in serious danger of becoming extinct throughout all, or at least a significant portion of its range due to one or more causes—including loss of habitat, change in habitat, overexploitation, predation, competition, or disease. Southern steelhead are in danger of becoming extinct throughout their entire range primarily through modification, degradation, and simplification of required habitat for full life-history, and loss of access to historical habitat to maintain genetic diversity. Southern steelhead's continued existence is threatened by predation and competition from non-native aquatic species in their currently accessible habitat and in historical habitat once access is restored. The requirements to list Southern California steelhead as endangered under CESA F&GC § 2050 et seq. are met and exceed over its entire range and distribution.

This petition utilizes the best available science to fully establish that Southern steelhead face the immediate threat of certain extinction due to the loss, fragmentation, and simplification of their habitat and provides clear evidence that the State of California must exercise its mandate to protect native salmonids and steelhead by listing Southern steelhead as endangered.

California Trout, Inc was recognized in the foreword of the state's Steelhead management plan as being a leader in this cause. Today we again see a clear need for leadership and action by the Fish and Game Commission. We request that the Fish and Game Commission list Southern California Steelhead as endangered.

Scientific Information Required for Listing Petition:

Population trend (A)

The Southern steelhead population has decreased substantially from the estimated historic population size (Boughton et al. 2005, Boughton and Goslin 2006, Boughton et al. 2006). The Southern California Coast Steelhead distinct population segment (DPS) has been estimated to have annual runs of between 32,000 and 46,000 returning adults. Today, the annual run is estimated to be less than 500 total returning adults in any given year (Busby et al. 1996, Williams et al. 2011, Good et al. 2005, Helmbrecht and Boughton 2005, Boughton and Fish 2003). The four watersheds historically exhibiting the largest annual anadromous runs—Santa Ynez River, Ventura River, Santa Clara River, and Malibu Creek—have experienced declines in run size of greater than 90 percent (Boughton et al. 2005, Good et al. 2005, Helmbrecht and Boughton 2005, Busby et al. 1996). Simply put, Southern steelhead remain in danger of extinction (Williams et al. 2011, Moyle 2017).

A comprehensive status review of steelhead was conducted by Busby et al. (1996), who characterized Evolutionarily Significant Units (ESUs) using the conceptual framework of Waples (1991), and then assessed extinction risk of each ESU. The Southern California Coast Steelhead DPS, based on the ESU definition, was subsequently listed as endangered by NMFS under the U.S. Endangered Species Act in 1997. The original listing characterized the southern range limit as the eastern end of the Santa Monica Mountains. In 2002, the ESA listing area was extended further south to the Tijuana River system at the U.S. border with Mexico. The listing was further modified in 2006 to include only the anadromous component of the ESU, which is composed of both anadromous and freshwater-resident forms of O. mykiss which can co-exist within watersheds. Good et al. (2005) updated the status of Pacific coast steelhead populations and another update was conducted in 2010 (Williams et al. 2011). None of these updates or reviews led to changes in the status of the species' listing. It has remained endangered under ESA.

Following the significant rise in Southern California's human population after World War II and the associated land and water development within coastal drainages, the Southern steelhead's population rapidly declined. This led eventually to the extirpation of populations in many watersheds, leaving only remnant or sporadic populations (Boughton et al. 2005, Good et al. 2005, Helmbrecht and Boughton 2005, Busby et al. 1996). A central tenet of the NMFS Recovery Plan (2012) is that a viable DPS will consist of a sufficient number of viable discrete populations that may be spatially dispersed but nevertheless adequately connected to achieve the long-term persistence and evolutionary potential of the species. The goal of status-review updates is to assess whether viability metrics for the DPS are moving toward or away from the viability criteria. The consensus of publications is that the status of the Southern California Coast steelhead DPS has not changed appreciably since the federal listing in 1997 (NMFS 1996, Busby et al. 1996, NMFS 2016). The most recent publication which compiled adult steelhead abundance through existing monitoring programs of various types and anecdotal observations within this DPS documented only 177 adult steelhead observations in the past 25 years (Dagit et al. 2020).

Range (B) and Detailed Distribution Map (L)

NMFS identifies the Southern California steelhead DPS as being comprised of the coastal watersheds extending from the Santa Maria River system south to the U.S. border with Mexico (Titus et al. 2010, NMFS 2012). Historically, *O. mykiss* occurred at least as far south as Rio del Presidio in Mexico (Behnke 1992, Burgner et al. 1992).

The range of watersheds within the DPS are generally classified in two basic types depending on their geomorphology; short coastal streams that are part of the coastal ranges, and larger river systems that extend inland through the coastal ranges. The smaller coastal systems are typified by the character of the Santa Monica and Santa Ana Mountain watersheds. The larger watershed class includes the Santa Maria, Santa Ynez, Ventura, Santa Clara, San Gabriel, Santa Ana, Santa Margarita, San Luis Rey, and San Diego

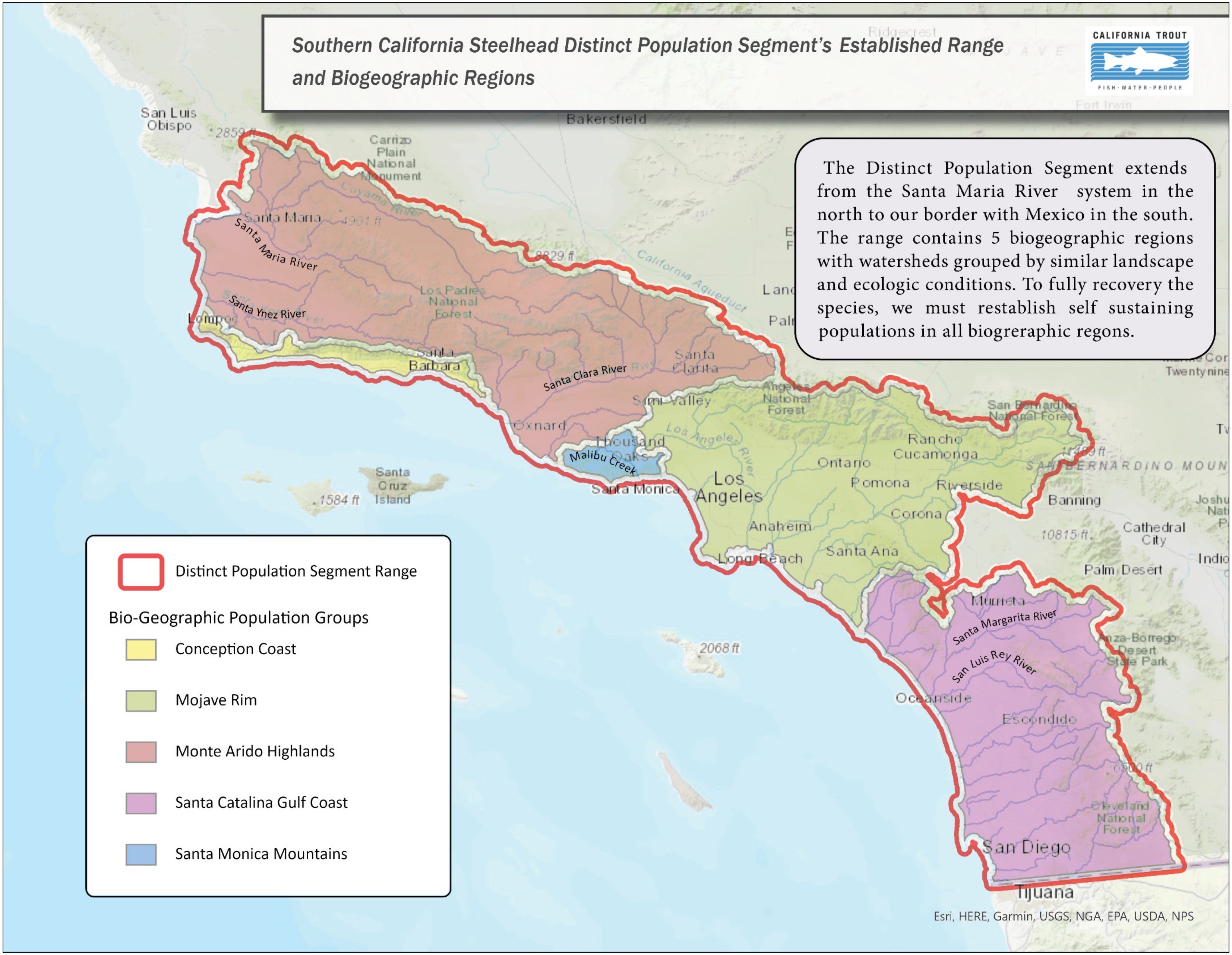
Rivers. These systems were further classified by predominate environmental and climate processes into five biogeographic population groups (BPGs). The entire range covers approximately 12,700 mi^2 with 25,700 mi. of streams (NMFS 2012). The established range of Southern steelhead contains several large human population centers with almost 22 million people. This figure, and level of landscape development and resource use implicit in it, is central to the current degraded condition of Southern steelhead

The range of the Southern steelhead is generally accepted as stated above, but not all stream miles within this range are equally habitable. NMFS used an Intrinsic Potential model to characterize and prioritize habitat suitability for species recovery. These models used an established set of factors to predict the potential for unimpaired over-summering habitat to be present at any given location in the DPS (Boughton 2006, NMFS 2012).

In general, Intrinsic Potential modeling is based on the idea that natural processes will tend to generate suitable habitat in reaches where discharge, gradient and topography meet certain criteria (Burnett et al. 2003). The parameters to model potential over-summering habitat for Southern steelhead included mean annual air temperature, mean discharge of streams during August and September, mean August air temperature and limiting access gradient in addition to stream gradient, discharge, and topography (Boughton et al 2006).

This work developed the ranked prioritization of watersheds within the DPS based on their environmental capacity to support a Southern steelhead population. This led to the designation of Category 1, identified to have the highest priority for recovery, followed by Category 2 then Category 3 populations within each of the five BPGs. This works assists in prioritizing restoration activities for target watersheds. However, the NMFS Recovery Plan describes the scientific basis for population-level and DPS-level recovery criteria whereby multiple populations within each BPG must have self-sustaining populations (NMFS 2012, NMFS 2016)

The delineation of the physical boundaries of Southern steelhead's range has been supported by genetic analysis and the observed variances among different *O. mykiss* populations. Early allozyme analysis of mitochondrial DNA performed before the ESA listing demonstrated a high degree of interpopulation differentiation within California (Nielsen 1994). Comparison of DNA samples among watersheds within the DPS to populations north of the DPS showed large differences in genetic markers. Samples collected from river system between the Santa Ynez River and Malibu Creek indicate the presence of mitochondrial DNA that is rare in steelhead populations north of the Southern steelhead DPS. (Busby et al. 1996). More recent genetic analyses of *O. mykiss* populations at the southern end of their range, using high-resolution genotyping of microsatellite loci and single nucleotide polymorphism (SNP) loci, indicate that the southern boundary of Southern steelhead range extends to northern Baja California, south of the U.S. border with Mexico (Abadia-Cardoso et al, 2015; Abadia-Cardoso et al, 2016).


Southern California Steelhead Distinct Population Segment's Established Range and Biogeographic Regions
CALIFORNIA TROUT
FISH · WATER · PEOPLE
The Distinct Population Segment extends from the Santa Maria River system in the north to our border with Mexico in the south. The range contains 5 biogeographic regions with watersheds grouped by similar landscape and ecologic conditions. To fully recovery the species, we must restablish self sustaining populations in all biogreraphic regons.
Distinct Population Segment Range
Bio-Geographic Population Groups
Conception Coast
Mojave Rim
Monte Arido Highlands
Santa Catalina Gulf Coast
Santa Monica Mountains
Santa Maria River
Santa Ynez River
Santa Clara River
Malibu Creek
Santa Margarita River
San Luis Rey River
San Luis Obispo
Bakersfield
Santa Maria
Lompoc
Santa Barbara
Oxnard
Simi Valley
Thousand Oaks
Santa Monica
Los Angeles
Santa Clarita
Long Beach
Anaheim
Santa Ana
Ontario
Pomona
Rancho Cucamonga
Riverside
Corona
Banning
Palm Desert
Murrieta
Oceanside
Escondido
San Diego
Tijuana
Santa Cruz Island
Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

Distribution (C)

The spatial structure of Southern steelhead is influenced by fish passage barriers. The majority of watersheds historically occupied by Southern steelhead experienced extirpation due to anthropogenic barriers (Boughton et al 2005). The current distribution of Southern steelhead is defined as all anadromous waters below total natural barriers or man-made structural barriers (NMFS 1997). Anadromous adult Southern steelhead have been extirpated from approximately 60% of their historical range due to habitat fragmentation (NMFS 2012).

Southern steelhead have a complex life history that is central to their historical and current distribution. As covered in more detail in the Life History and Required Habitat sections, Southern steelhead predominantly express two forms: full anadromy and resident-freshwater. The anadromous and the resident-freshwater form co-exist throughout the DPS (Boughton et al 2006, Pearse et al. 2014).

The interplay of their life-history, their required habitat types, and distribution --both historical and current -- is complex (Boughton 2006). The freshwater resident form, or rainbow trout, are an integral part of the steelhead population, because anadromous adults can be the offspring of freshwater resident parents (Courter et al. 2013, Kendall et al. 2015, Abadia-Cardoso et al. 2016). It is likely that a combination of environmental and genetic factors determines anadromous or resident phenotype, which may be regulated by epigenetic factors (Baerwald et al, 2016). Genetic sampling above and below impassable dams within the established DPS for Southern steelhead indicates that they tend to be each other's closest relative (Clemento et al 2009.)

A number of barrier removal and habitat restoration projects have been implemented over two decades to address threats throughout the DPS (NMFS 2016). However, a number of large, complex fish passage barriers remain in place or not fully functional, even though significant investment over the years has supported advanced engineering design. The state ESA listing is anticipated to help move these projects forward into construction to realize their potential in species recovery. Environmental impacts from high intensity wildfires, floods, and extended drought have further reduced the number of small, isolated, remnant freshwater resident populations found in the upper tributaries (NMFS 2012). The Thomas Fire (2017) impacted many drainages throughout Santa Barbara and Ventura Counties; the Whittier Fire (2017) impacted the Santa Ynez watershed in Santa Barbara County, the Woolsey Fire (2018) impacted all creeks in the Santa Monica Mountains except Topanga Creek. The Holy Fire (2018) burned through Coldwater Canyon Creek in Riverside County which contains one of two known native rainbow trout populations descended from steelhead at the most southern extent of their range in California. Subsequent fire related floods and debris flows following these catastrophic events can cause local extirpation if emergency translocations are not performed in time.

Abundance (D)

Steelhead abundance numbers are naturally subject to high variability. Due to the character of the river systems in the DPS, monitoring of run sizes is difficult to quantify. Estimates of the historical (pre-1960s) abundance are available for several rivers in the DPS. The Santa Ynez River before 1950 is estimated to have had an annual run of 20,000-30,000 adult Southern steelhead. The Ventura River, pre-1960, had estimated annual runs of 4,000-6,000 returning adults. The Santa Clara River, pre-1960, was 7,000-9,000 returning adults and Malibu Creek, pre-1960, 1,000 adult returns. (NMFS 2012).

A review of the data from life-cycle monitoring stations at Vern Freeman Diversion Fish Ladder, Robles Diversion Fish Passage Facility, from migrant trapping by Cachuma Operation and Maintenance Board and the CDFW's Coastal Monitoring Program (CMP) support the finding that little to no change has been observed in total abundance or spatial structure of Southern steelhead since the initial federal listing (Williams et al 2011, NMFS 2012, NMFS 2016). The most productive systems support single digit runs of returning adults on any given year (Busby 1996, Williams et al. 2011, Dagit et al. 2020). Contemporary literature reviews of monitoring data support the conclusion that the total population estimate is dangerously low. This is further illustrated by the recent compilation of all monitoring program data and independent observations within the federal ESA listing area between 1998-2018. This work documented only 177 positive identifications of returning adult Southern steelhead in the past 25 years (Dagit et al. 2020).

Fish that express the resident freshwater life-history strategy play a central role to the continued existence of Southern steelhead. If the current course of modification and loss of available habitat for anadromous Southern steelhead is not corrected, there will be a greater need for resident freshwater rainbow trout to produce the vast majority of smolts that express anadromy and enter the Pacific Ocean. Smolt production is the product of both resident freshwater and anadromous life-history strategies (NMFS 2012). Due to shrinking suitable habitat below natural or man-made barriers to migration; rainbow trout will be a key component to ensure we maintain and re-establish the expression of anadromy and that any smolts produced by freshwater residents have access to required habitat over the entire course of their journey to the ocean and upon their return.

Recent studies have shown the resident freshwater populations still possess the alleles associated with anadromy (Pearse et al. 2009; Abadia-Cardosa et al. 2016). These results indicate that adoption of the freshwater resident life-history pattern does not necessarily result in the loss of the genetic potential for anadromy. The genetic potential of resident *O. mykiss* to express anadromy remains (Nielsen 1999; Courter et al. 2013; Phillis et al. 2016; Apgar et al. 2017) and, given the opportunity through restoration activity, could support re-establishing viable anadromous populations.

It is important to note that these freshwater resident populations are at risk from watershed-scale adverse anthropogenic impacts, quickening climate stress and other population level threats to their continued success. Catastrophic wildland fire, long term drought and continued human alteration of headwater habitat all put additional pressure on resident freshwater rainbow trout populations (NMFS 2012). Excessive loss of local freshwater resident populations can lead to lower genetic variability and fitness (Pearse et al. 2014; Abadia-Cardoso et al. 2016; Leitwein et al. 2017). Indeed, genetic analysis of rainbow trout at the southernmost extent of their range in the United States indicate that these populations have low allelic diversity (Clemento et al. 2009; Pearse et al. 2009; Jacobson et al. 2014; Abadia-Cardosa et al. 2016; Apgar et al. 2017), potentially leading to decreased retention of the genetic markers that support anadromy and overall fitness

The movement of adult steelhead between watersheds is an important factor as well. Anadromous adults are known to stray from their natal systems and could be important for re-establishing viable populations in formerly occupied watersheds (Bell et al. 2011). This could serve as a pathway to re-introduce genetic material across separate sub-populations (Garza et al. 2014). The inter-play of resident freshwater and anadromous life-histories is a critical component of Southern steelhead's current and future abundance and must be considered for recovery of the species.

Life history (E)

Steelhead are a highly migratory and adaptive species utilizing multiple habitat types over their complete life-history. The life cycle of Southern steelhead generally includes a freshwater period in coastal river systems followed by a migration to a marine environment to reach sexual maturity. Southern steelhead can express a great amount of variation in the timing and duration of each life-history stage in comparison to other species within the genus (Hayes et al. 2011, Quinn 2005, Hendry et al. 2004) This flexibility and malleability of life-history trajectories unique to Southern steelhead (Sloat and Reeves 2014, Kendall et al. 2015) is the evolutionary manifestation of the variability in environmental conditions that is characteristic of Southern California. This is particularly evident in the high number of sand-berm built estuaries in the DPS that must breach due to sufficient streamflow following winter rains to allow steelhead migratory access to a particular watershed.

Southern steelhead will spend one to four years maturing in the Pacific Ocean (Jacobs et al. 2011, Borg 2010, Haro et al. 2009, Leder et al. 2006, Quinn 2005, Davies 1991, Groot and Margolis 1995, Northcote 1958). Anadromous adults grow substantially larger than freshwater residents, leading to higher fecundity of returning anadromous females (NOAA 2012). After reaching maturity, Southern steelhead typically return to their natal river system to spawn, although strays do occur and may be an important vector to maintain genetic variability and connection across basins (Garza et al. 2014) Spawners typically return between January and May, but year-to-year variation in environmental conditions across diverse geographic settings have allowed Southern steelhead variability in spawning period. Variability in access to any river system is compounded by the sporadic nature of hydrologic connectivity common to river systems in Southern California.

Following sand-berm breaching, whereby a lagoon becomes an estuary that connects a freshwater stream to the ocean, steelhead will move into coastal river systems. Upon entering the river system, Southern steelhead can migrate several to hundreds of miles to reach suitable spawning habitat. Upon finding suitable gravel, females excavate a redd and deposit their eggs. Males then fertilize the eggs, after which the eggs are covered with gravel by the female. The embryos' incubation time may vary from three weeks to two months depending on environmental conditions. Newly hatched *O. mykiss* or alevins will then remain in the gravel for an additional two to six weeks. Unlike salmon, adult steelhead do not typically die following their spawning trip, and have been observed to return to the ocean and then come back to freshwater to spawn again. The frequency and nature of repeat spawning by Southern steelhead as a species, is poorly understood, but this iteroparous life-history strategy can occur (Moyle et al 2008, Moyle 2002).

Juvenile Southern steelhead or parr will rear and forage in a variety of freshwater habitat types depending on their maturation rate before beginning their migration to the ocean. Southern steelhead parr will spend between one to three years in freshwater before migrating to the ocean (Shapovalov and Taft 1954, Moore 1980, Quinn 2005). The timing of out-migration is influenced by a variety of environmental cues including streamflow, temperature, and breaching of the sand berm at the river's mouth. Out-migration to the ocean usually occurs in the late winter and spring . Smolts will spend a short time in the estuary. Here the mixing of fresh and saltwater habitats allows for the morphological changes that smolts need to undergo to prepare themselves for the ocean environment. In some watersheds, smolts may rear in a lagoon or estuary for several weeks or months prior to entering the ocean.

In contrast to Central California lagoons where juveniles grow substantially faster and larger than their riverine reared counterparts (Smith 1990, Bond et al. 2008, Hayes et al. 2008, Atkinson 2010), Southern steelhead are less frequently observed in estuaries. This may be attributed to low population numbers, adaptation for rapid outmigration, and/or poor lagoon habitat. Studies from more northern estuaries support the idea that larger juveniles have a higher survival advantage after outmigration into coastal marine waters and, as a result, have a greater opportunity to return to their natal streams as adults for spawning (Bond et al. 2008, Hayes et al. 2008, and Atkinson 2010). Therefore, if conditions permit, increased juvenile steelhead estuarine rearing prior to emigration could be a critical contributor to enhance the viability of steelhead populations.

The cycle described above is referred to as their fluvial-anadromous life-history strategy. Southern steelhead can also express two additional life-history trajectories: a freshwater-resident pathway and a lagoon-anadromous pathway. The freshwater-resident pathway describes *O. mykiss* that complete their entire life cycle in freshwater. Fish that follow this life-history trajectory are commonly known as rainbow trout. Rainbow trout will incubate, hatch, rear, mature, reproduce, and die in freshwater. A lagoon-anadromous pathway describes a hybrid option. Southern steelhead smolts out-migrate, but can remain in the lagoon or estuary for a year before returning upstream to freshwater habitat to spawn.

These descriptions only cover the predominant life-history pathways for *O. mykiss*. It does not, however, capture the full complexity of the life-history permutations that can be exhibited by *O. mykiss*. Plasticity of life-history should be considered the central characteristic for Southern steelhead in understanding their life cycle (Kendall et al. 2015). An interplay between environmental conditions and adaptive behavior likely causes shifts between resident and migratory life-history behavior expressed by a Southern steelhead (Kendall et al. 2015, Pearse et al. 2014, Pearse 2016, Satterthwaite 2012; Beakes 2010). The seasonality of the hydrologic cycle impacts the predominant life-history trajectory expressed in particular watersheds. Southern steelhead's long-term viability is dependent on this life-history plasticity, and on their ability to migrate to new habitat.

Kind of habitat necessary for survival (F)

Habitat characteristics at any one location may change significantly from year to year in the Southern California Mediterranean climate. A Mediterranean climate is distinguished by warm, wet winters under prevailing westerly winds and calm, hot, dry summers, as is characteristic of the Mediterranean region and parts of California, Chile, South Africa, and southwestern Australia. As water warms and preferred habitat alters seasonally, hydrological connectivity between habitat types becomes important, and influences the ability of *O. mykiss* to move throughout the river system to seek refuge areas if needed. Their multiple life-history trajectories rely on a network of habitat types to build in the critical redundancy. This allows any individual to complete their life cycle by exploiting the best available habitat for that stage of development at any given time. A simple example is that juvenile Southern steelhead can find the necessary thermal refugia to over-summer in a tributary that flows year-round or in the river's estuary. The interplay of habitat type, habitat condition, and the connectivity between habitats over time is paramount in their development and survival.

Southern steelhead require cool, clean water, and complex, connected habitat. Each habitat type must provide sufficient nutrients and foraging opportunities to allow for the growth and development required for their current life-history stage (NMFS 2012). Ocean-going adult steelhead require sufficient water quality, depth, cover, and marine vegetation. Estuary and lagoon habitats must provide uncontaminated water and substrates with connected wetlands for juveniles. Effective mobility for juvenile and adult Southern steelhead requires mainstem river migration corridors that are free of obstruction. They must also minimize excessive risk of predation and provide enough water quantity to allow for cover, shelter, and holding areas.

The geological character of their geographic range is young, highly erodible sedimentary rock. Excessive sedimentation and turbidity are critical water quality components in all habitat types and impacts how Southern steelhead utilize each habitat type. Freshwater spawning sites must provide sufficient water quantity as well as good water quality. Southern steelhead gravel sizes must fall within a range that supports spawning and incubation. Freshwater rearing habitat must provide sufficient water quantity and quality with lateral connectivity to the floodplain. These characteristics are essential for rearing and foraging as it provides refugia and habitat complexity.

Within each of these habitat types, Southern steelhead realize changes in their availability depending on the habitat conditions or quality. The preferred biotic conditions of any habitat type are subject to the immense variability common in Southern California. Documented habitat tolerances and ranges are important, but Southern steelhead's ability to move into microenvironments in response to changing conditions is a critical component of their required habitat types and conditions (Moyle et al. 2017). Their required habitat conditions align with habitat types suited to their life-history development stage.

The primary habitat conditions that influence Southern steelhead development are temperature, dissolved oxygen, water depth, and velocity. Of these, water temperature is the best studied and can change significantly diurnally and seasonally. Southern steelhead tolerate warmer water temperatures than more northern salmonids, as they have adapted to a wider range of environmental conditions characteristic of a highly variable climate. The upper temperature threshold of 25°C has been observed to coincide with cessation of feeding and retreat to thermal refugia in Southern steelhead (Boughton et al. 2015, Sloat and Osterback 2013, Spina 2007).

Juvenile Southern steelhead regularly persist in conditions outside of the ideal range. Juvenile steelhead prefer water temperature in the range of 10–17 ° C, but have been observed in the Ventura River with water temperature that peaked at 28°C (Carpanzano 1996). The relatively warm water of the Ventura River has been observed to result in more rapid growth of juvenile steelhead than has been observed in more northerly populations (Moore 1980, McEwan and Jackson 1996).

While temperature is a principle biotic condition impacting overall survival of Southern steelhead, dissolved oxygen, water depth, and water velocity during their freshwater development stages are important factors as well. Dissolved oxygen levels, as influenced by water temperature, above 5mg/L is considered adequate for survival. In contrast, 3 mg/L is considered to be the lethal lower limit for unimpaired growth (EPA 1986) , but is dependent on duration, magnitude, frequency, and accessibility of refugia (McLaughlin et al. 2009, Matsubu et al. 2017, Huber and Carlson 2020).

For returning adult Southern steelhead, 7 inches is considered the minimal water depth needed for successful migration. Water velocities over 10 ft/sec are considered sub-optimal for migration upstream (Bovee 1978, Thompson 1972, Barnhartt 1986). Water velocities that hinder the swimming of adult returners have a greater impact on effective migration than depth (Barnhartt 1986). Southern steelhead fry prefers water depths that are from 2–14 inches with juveniles occupying similar depths with observed preference for 10–20 inches (Bovee 1978).

Factors affecting the ability to survive and reproduce (G)

Destruction, modification, and fragmentation of native habitat are recognized as the primary causes for the decline of the Southern steelhead (NMFS 2012). This has occurred due to the development of water infrastructure, agriculture, urbanization, and climate change-induced events including catastrophic wildland fire and drought. Water storage, withdrawal, diversions, flood control, and hydropower have greatly reduced, disconnected, simplified, or eliminated Southern steelhead habitat. These actions have modified natural flow and sediment regimes, which in turn have resulted in degraded water quality, changes in aquatic species communities, depletion of necessary flows for life-history development, and disrupted habitat maintenance processes (NMFS 2012). The Conservation Action Planning (CAP) Workbooks (Hunt, 2008) prepared for NMFS informed the federal recovery plan and hold true today. The CAP Workbooks resulted from reviewing existing information on steelhead habitat conditions and assessing the magnitude and extent of threats to steelhead and their habitats. These workbooks were used to develop recovery planning actions across the DPS.

Large dams in the Ventura River, Santa Clara River, Santa Ynez River, Malibu Creek, and other impassable barriers created by water diversions, flood control channels and certain bridges have had the most profound effect on blocking Southern steelhead migration between the ocean and upstream freshwater spawning, rearing, and foraging areas. These barriers disconnect the longitudinal and lateral ecosystem processes of the headwaters from lower sections and restrict floodplain access. This not only blocks migration to upstream spawning, rearing and foraging habitat but also restricts and impedes the effective out-migration of smolts (Stoecker and Kelley 2005). In some cases, migration through and access to critical habitat is blocked as is the case for 100-ft tall Rindge Dam in the lower three miles of Malibu Creek in the Santa Monica Mountains BPG (U.S. Army Corps of Engineers, 2020). Land development, whether for agriculture or urban development, leads to reduction in habitat complexity, alteration of flow and sediment transport, and degrades water quality (Moyle et al. 2017). Both agriculture and urbanization increase water demand. Even though almost 80% of water in Southern California is imported, over-reliance on surface diversion and groundwater pumping has resulted in depletion of instream flows and groundwater aquifers.

The rate of change in climate conditions brought on by climate crisis is a significant challenge to the continued existence of Southern steelhead. Climate change models for Southern California that evaluate conservative atmospheric forcing projections predict warmer atmospheric temperatures, sea level rise, ocean acidification, increased surface water temperatures, and changes in frequency, severity, duration, and intensity of drought and precipitation (Wade et al. 2013). Climate crises will exacerbate the problems associated with anthropogenic degradation of riverine, estuarine, and marine habitats already present (Williams et al. 2015). Floods and persistent drought conditions have periodically reduced already limited spawning, rearing, foraging habitats, and migration corridors.

Impacts to Southern steelhead from climate crisis impacts include direct effects from temperature such as mortality from heat stress, changes in growth and development rates, expanded parasite range and disease susceptibility. Changes in the flow regime also affect survival and behavior. Southern steelhead mortality and growth rates are also expected to suffer from the indirect effects that result from changes in the freshwater habitat structure and the invertebrate and vertebrate community, which govern food supply and predation risk (Crozier et al. 2008, Petersen and Kitchell 2001). Expected behavioral responses include shifts in seasonal timing of important life-history events, such as adult migration, spawning, fry emergence, and juvenile migration (Hayes et al. 2011, Boughton et al. 2009).

Direct threats to survival and reproduction include the presence of non-native vegetation and aquatic species that outcompete Southern steelhead for limited resources. Poor water quality and inconsistent water flow are hallmarks of unsuitable habitat for Southern steelhead, which can be exacerbated by competition or predation from non-native species.

As the impacts of climate change become more pervasive, catastrophic events such as fire and extended drought will lead to sudden extirpation of already fragmented populations. These reproductively isolated populations become more inbred through time, and as their genetic diversity decreases, their resilience to environmental threats may also decrease. All of these interactingand negative feedback loops have earned Southern steelhead a rating of “critically vulnerable” to the impacts of climate change, with a forecast of being likely to go extinct by 2100 without strong conservation measures (Moyle et al 2013).

Degree and immediacy of threat (H)

Southern steelhead are facing the highest degree of concern and an immediacy of threat to the continued persistence of this species over the next 50 years. Anadromous *O. mykiss* in southern California face significant threats from water and land management practices that have degraded or curtailed freshwater and estuarine habitats. This has severely reduced the capability of the species to sustain viable populations within most watersheds (Moyle et al. 2011, 2008). Given the current status of the species and the degraded condition of many freshwater and estuarine ecosystems, the continued existence of the species may be further threatened by shifts in climatic and oceanographic conditions (NMFS 2012).

Recent assessments of Southern steelhead forecast that they are in danger of extinction within the next 25–50 years due to the degradation of habitat associated with human development and the widespread impacts of climate crisis (Moyle et al 2017). This assessment is the result of a standardized protocol scoring for seven metrics: area occupied (anadromous and resident freshwater), estimated adult abundance, dependence on human intervention for persistence, environmental tolerance under natural conditions, genetic risks, vulnerability to climate change and anthropogenic threats. Scoring of the metrics was based on literature reviews, expert knowledge, and interviews with species experts (Moyle et al 2017).

Impact of existing management efforts (I)

Federal

The principal management strategy for Southern steelhead lies at the federal level for regulatory and recovery planning within the DPS boundaries. The listing of the Southern steelhead in 1997 under the Endangered Species Act (62 FR 43937) covered steelhead in anadromous water below natural and man-made fish passage barriers within the Southern California Coastal Steelhead DPS, which followed the geographic boundaries of the Southern steelhead ESU. The original listing was bounded by the Santa Maria River at the northern end, to Malibu Creek in the Santa Monica Mountains at the southern end. After documentation of steelhead in San Mateo Creek in San Diego County by CDFW biologists in 1999-2001, and genetic analysis by NOAA showing native steelhead ancestry, the ESA listing was extended south to the U.S.-Mexico border in 2002 (67 FR 21586). As such, the federal ESA listing established requirements for steelhead consultation under NMFS jurisdiction for this amended area, and the Southern California Steelhead Recovery Plan was produced by NMFS pursuant to that listing.

Four U.S. National Forests within the DPS (Angeles, Cleveland, Los Padres, San Bernardino) all have land management practices in place that require protection and conservation decisions to account for listed species. The federal government's oversight of the Clean Water Act (CWA) Section 404/401 Program requires that any project undergo consultation with NMFS when in the listing area for Southern steelhead. Additionally, the federal governments oversight and certification of the Flood Insurance Program through the Federal Emergency Management Agency (FEMA) strongly influences development of floodplains.

Even with these tools at the federal government's disposal, their impact on the long-term survivability of Southern steelhead has been challenging. No discernable change in total population size has been detected since the species was listed by the federal government in 1997. NMFS oversight and management of the species to date has been a key component directing the work of recovering the species. This has been supplemented by project funding from multiple federal agencies to implement NMFS Recovery Plan across the DPS. As stated above, many steelhead migration barriers have been remediated since the federal ESA listing. However, a number of large fish passage barriers remain in place or not fully functional. Significant investment over the years has supported advanced engineering design for remediation of these barriers, but implementation has been problematic.

The lack of legal basis to enforce recalcitrant landowners, entities, and agencies that are responsible for providing protections under ESA has presented problems. The rapid translation of scientific advances in understanding watershed and population dynamics, the ambiguity in the criteria established by NMFS during their oversight of passage barrier remediation has hindered implemented needed restoration actions. Without the species listed under CA Endangered Species Act, NMFS is, in most cases, the only government agency with direct oversight over the condition of the species and its required habitat. This has resulted in protracted legal battles and little option for enforcement.

The impact from the loss of habitat, exploitation of natural resources and the threat from aquatic invasive species has remained unchanged in successive status reviews by NMFS (Williams et al 2011, NMFS 2016). Major milestones of the federal recovery plan remain unachieved. Obsolete dams in the Ventura River and Malibu Creek system still stand. The Vern Freeman Diversion, long recognized as an ineffective partial passage barrier on the main stem of the Santa Clara River, a Core 1 population, has not been remediated over two decades and two lawsuits. Flow releases from Bradbury Dam to support Southern steelhead development in the Santa Ynez, a Bureau of Reclamation project, were secured after a lengthy regulatory process, but Bradbury Dam provides no opportunity for passage to two-thirds of Southern steelhead native headwater habitat in this system. Additional legal protection is imperative to move forward these projects essential to the species' survival.

Another impact of the federal listing is the ability to conduct scientific analysis on the species itself. It is not for lack of interest or want that the most fundamental research to establish the genetic uniqueness of the species pre-dates the federal listing. Federal guidelines and policies on the handling of the species for research purposes are a deterrent to continued research even though there has been significant innovation and advancement in DNA and gene sequencing technology.

State of California

The State of California has several published plans that provide for the management and conservation of Southern steelhead. The Steelhead Restoration and Management Plan for California (1996) written by California Department of Fish and Wildlife is foremost among these. This management plan identified the "impending extinction" of Southern steelhead within twenty-five years. Southern steelhead were given the highest priority for department management conservation action. The State of California's application of the Public Trust Doctrine is a second tool that provides the state a broad-based legal precedent to address threats to Southern steelhead survival. Fish and Game Code Sections 1600–1603 and 5935–5937 are additional mechanisms for State oversight in the management of Southern steelhead. The California State Water Resources Control Board (SWRCB) administers the water rights permitting system. They control utilization of waters for beneficial uses throughout the state (Grantham and Moyle 2014).

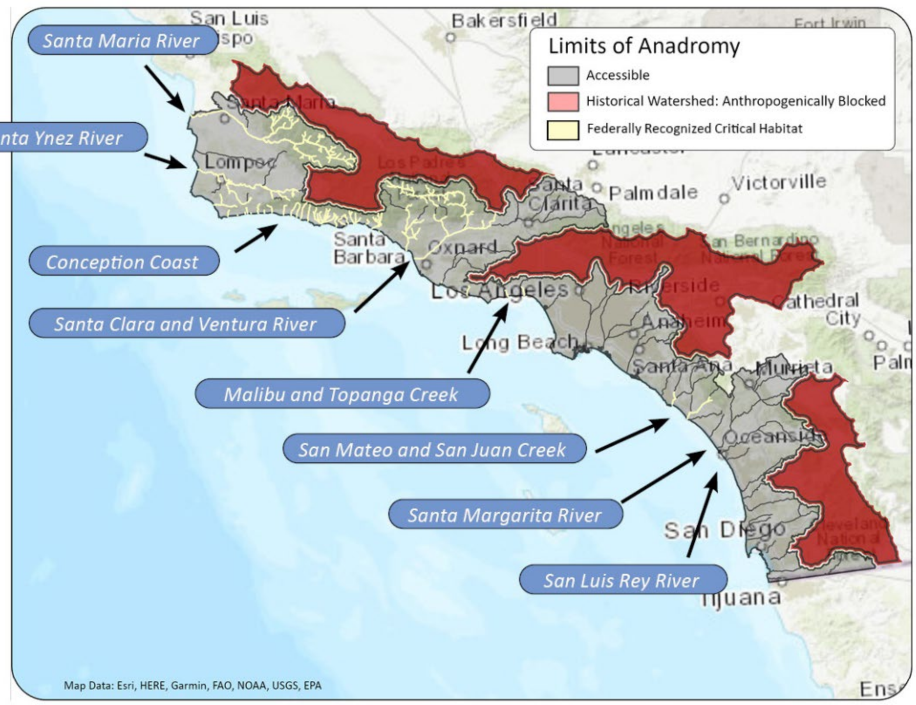
However, the system does not provide an adequate regulatory mechanism to implement the requirements of CDFG Code Sections 5935–5937 for the owner of any dam to protect fish populations below impoundments. Additionally, SWRCB generally lacks the effective oversight and regulatory authority over groundwater development comparable to surface water developments for out-of-stream beneficial uses.

Section 1600 Lake or Streambed Alteration Agreements program is the principal mechanism through which the CDFW provides protection of riparian and aquatic habitats. However, increased protection through this mechanism is needed to protect riparian and aquatic habitats important to migrating, spawning, and rearing steelhead.

Finally, monitoring of stocks (particularly annual run-sizes) is essential to assess the current and future status of individual populations and the DPS, as well as to develop basic ecological information on the Southern steelhead populations of the Recovery Planning Area. However, the Coastal Monitoring Plan remains unfinished for the Southern California region, and long-term funding for its implementation has not been identified and secured.

Suggestions for future management (J)

CalTrout recommends that the Fish and Game Commission list the species as endangered under CESA accepting the current limits of anadromy as established by the ESA listing for this species (NMFS 2002, 2012). The federal ESA listing covers *O. mykiss* downstream of total manmade or natural barriers in anadromous waters, and these fish are under jurisdiction of NMFS. O. mykiss upstream of total barriers are not covered under the federal ESA listing, and are under jurisdiction of the U.S. Fish & Wildlife Service.



We need to recognize Southern steelhead as endangered at the state level to augment the protection provided by the federal listing.

This recommendation is put forth because no demonstrable increase in Southern steelhead abundance has occurred since the initial ESA listing and the threat of extinction is immediate (NMFS 2011, NMFS 2016, Moyle et al. 2017).

CalTrout wants to ensure that all state agencies have the clear mandate to prioritize for Southern steelhead protection and conservation in strategic planning, funding appropriations, and resource management plans. The listing of Southern Steelhead as endangered will provide full acknowledgement to Californians of the fundamental importance this species has to the state and the ecosystem.

Listing of the species as endangered will allow the state and its citizens to realize the value of funds invested to date in Southern steelhead recovery. Many of these Southern steelhead conservation projects are large scale efforts with multiple stakeholders, and have required significant funds for planning, design, and implementation. As more projects are planned and move into construction, the state listing will be important for successful implementation and effectiveness monitoring of these projects.

Specifically, when the commission lists the Southern steelhead as endangered, CDFW will have direct authority to oversee projects proposed within the current limits of anadromy. This will provide CDFW the ability to establish species-specific mitigation measures that must be met for take coverage to be authorized.

CalTrout supports following the federal ESA listing coverage for below barrier steelhead, while keeping the above-barrier resident rainbow trout outside the ESA listing coverage. Above-barrier native rainbow trout are precious genetic resources for Southern steelhead recovery, but also are part of a robust sport fishery in the mountains of Southern California. Excluding these rainbow trout from CESA coverage also allows for emergency translocation after wildland fire without regulatory delays, and allows for conservation brood stock development and research to be performed to increase the genetic and geographic diversity of native rainbow trout of steelhead ancestry.

Our recommendation of adopting the federal ESA listing structure is intended to conserve key ecologic and evolutionary processes to preserve species diversity, while incorporating ESU-defining features of reproductive isolation and adaptation (Waples 1991). The anadromous component of the ESU covers a precariously small steelhead population expressing the anadromy trait in a discontinuous spatial context trending towards extinction. It therefore meets the four Viable Salmonid Population criteria (abundance, trends, spatial structure, diversity) used to guide ESA risk assessments (McElhany et al 2000), as well meeting the discrete and significant criteria for listing under CESA. The resident component of the ESU covers a large number of native rainbow trout that are geographically dispersed, but are genetically demonstrable remnant populations of Southern steelhead (Abadia-Cardoso et al 2016). These trout have been reproductively isolated behind barriers for decades, and have undergone localized adaptation.

Following the existing paradigm of quantitative genetics, most phenotypes are controlled by many genes of small effect (Waples, 2018). The interplay of neutral and adaptive loci enabling rainbow trout to survive in diverse above-barrier habitats, as well as the extent to which anadromy-associated genes are subject to selective pressure in resident trout, is not clearly understood. This is particularly evident in the case of chromosomal inversions (e.g., *Omy5* locus)(Pearse et al 2014) and transcriptional regulators (e.g., Greb1L)(Hess et al 2016, Prince et al 2017, Mohammed et al 2013). These have been shown to be important in triggering anadromy and/or run timing, in which a small number of genes produce a large impact on phenotypes. In this regulatory hierarchy, one or more master regulator proteins and/or epigenetic conditions can regulate hundreds of genes of varying penetrance, and thereby produce ecological/evolutionary diversity.

Native rainbow trout that have undergone adaptive evolution are still at risk from environmental threats such as drought, fire, flood in addition to anthropogenic threats. The proposed CESA management framework allows for emergency translocation of these above-barrier fish before sudden extirpation. It also allows for research to increase understanding of physiological tolerances unique to Southern steelhead and applicable to salmonids statewide. This ESA listing framework also provides for continued recreational fishing in the mountains of Southern California where native rainbow trout persist above major barriers. This in itself is a significant consideration for the state and its people. This is further impetus for the state, considering the diverse threats to steelhead and resident rainbow trout, to remove barriers and provide access to historical habitat in high priority watersheds, as identified through Intrinsic Potential modeling and designated in the NMFS Recovery Plan, to promote genetic interbreeding to the extent possible as soon as possible.

Additionally, CalTrout recommends that:

a) special restrictions of catch-and-release, barbless lures only regulations apply to native trout in areas demonstrated to have steelhead lineage (Abadia-Cardoso et al 2016),
b) signs be posted and fishing survey boxes be installed at key access points in the DPS for fishers that clearly state the role of these native rainbow trout in Southern steelhead recovery and what information is being collected,
c) only triploid (non-reproducing) rainbow trout be stocked in streams within the DPS, and
d) that stocked reservoirs and still-water bodies have adequate barriers to escape of hatchery trout into high priority Southern steelhead recovery rivers throughout the DPS.

CalTrout recommends the adopting of the current ESA listing area not only to preserve the organizing principles that currently directs recovery actions, but also to establish a state-level endangered species redundancy. For a species that is endemic and iconic to the coast of Southern California, redundancy in the species' protection at the state level will lay the groundwork for redundancy in Southern steelhead populations within the DPS.

Availability and sources of information (K)

The National Marine Fisheries Service as a part of the National Oceanic and Atmospheric Administration generated the majority of the information presented here through the NMFS Southern California steelhead Recovery Plan and 5-year status reviews, other technical documents, scientific publications, and biological opinions. CDFW and other state agencies have published Southern steelhead planning, recovery, and assessment documents which have also served to draft this petition. CDFW's Steelhead Restoration and Management Plan for California and NMFS's Southern California Steelhead Recovery Plan are cited throughout. Extensive research on *O. mykiss* physiological tolerances and behavior, particularly on resident rainbow trout, is provided by reference herein, as well as the most recent assessment of adult steelhead population abundance (Dagit et al. 2020).

The scoring of the potential for extinction of Southern steelhead is a product of the comprehensive overview of salmonid species in California conducted most recently by Moyle and co-authors in 2017.

CESA Listing Factors

CESA regulates that a species should be listed as endangered or threatened if the Fish and Game Commission determines that its continued existence is in serious danger by one or any combination of the following factors:

Present or Threatened Modification or destruction of habitat

Southern steelhead have declined in large part because of the degradation, simplification, fragmentation, and total loss of habitat (Hunt & Associates 2008). The destruction of habitat is the result of human land use, agriculture, and flood control management decisions. Water withdrawal, storage, conveyance, and diversions have greatly reduced or eliminated historically accessible Southern steelhead habitat.

Modification of natural flow regimes by water infrastructure development has resulted in increased water temperatures and depleted the flow necessary for migration, spawning, rearing, and forging. This has also resulted in the disruption of habitat forming and ecosystem maintenance processes. While previous loss of habitat was strictly the result of more tangible, direct anthropogenic activity, climate crisis is amplifying these impacts at an accelerating pace.

This assessment of the Present or Threatened Modification or Destruction of habitat is the result of a comprehensive analysis outlined in the Conservation Action Planning Workbooks. This process used available information in a consistent, transparent, and reproducible fashion to assess aquatic habitat quality and anthropogenic threats to that habitat (The Nature Conservancy 2010, Kier Associates and NMFS 2008, Hunt & Associates 2008). This process was applied to all 45 watersheds that comprise the Southern steelhead DPS. The assessment published in 2012 concluded that the general DPS-wide condition of all major watershed was “Fair” to “Poor” with only 4 of the 45 watersheds were assessed to score a ”Good” rating (NMFS 2012).

The DPS-wide threat of habitat modification and destruction remains a concern (NMFS 2011, NMFS 2016). While a number of smaller restoration actions have created landscape level habitat improvements, the practices over the past century including large dam construction, mainstem channel straightening and floodplain disconnection, remain in place and their legacy of alteration continues to ripple through time to this day.

Overexploitation

Southern steelhead populations historically supported an important recreational fishery throughout their range. Reporting on recreational angling for Southern steelhead on the Santa Ynez indicated a vibrant fishery with substantial angling opportunities prior to development of the Bradbury Dam/Lake Cachuma Facilities. Similar accounts are true for the Ventura, Santa Clara, and other river systems such as San Juan Creek and San Mateo Creek in the DPS (NMFS 2012). Recreational angling for Southern steelhead increased the mortality of returning and freshwater-resident adults, but is not considered the principal cause for the decline of the species (NMFS 2012).

Predation

Introductions of non-native aquatic invasive species (AIS) resulted in increased predator populations in numerous river systems in the DPS. Once established, these introduced species increase the level of predation experienced by native salmonids (NMFS 1996, Busby et al. 1996). AIS in the Southern steelhead DPS are pervasive and deleterious. These species are known to prey on rearing juvenile Southern steelhead (Cucherousset and Olden 2011).

NMFS concluded that the information available on these impacts to steelhead did not suggest that the DPS was in danger of extinction, or likely to become so in the foreseeable future because of predation. (NMFS 2012). It is recognized that small, isolated populations of Southern steelhead can be more vulnerable to extinction through the combination of multiple secondary threats, and the role predation plays may be heightened under the current degraded condition of their native habitat.

Competition

In addition to the increase of predation on Southern steelhead by AIS, Southern steelhead are also in direct competition for critical aquatic habitat and resources with AIS (Marks et al. 2010, Scott and Gill 2008, Fritts and Pearson 2006, Bonar et al. 2005, Dill and Cordone 1997) including fishes and amphibians such as largemouth bass, redeye bass, bullhead, sunfish species, and bullfrogs. All these species thrive in warmer slow-moving water. They can also withstand lower water quality conditions than Southern steelhead. The combination of a Mediterranean climate and decades of habitat loss led to habitat conditions suitable for uncontrolled AIS population growth. This uncontrolled population growth of AIS is evident in Sespe Creek, a tributary of the Santa Clara River. Designated as critical habitat by NMFS and a State identified Wild and Scenic River, it is teeming with AIS in the slow-moving pool habitat. However, in the smaller tributaries in this system with cool water temperatures and greater slope, there are healthy juvenile Southern steelhead population numbers (Stillwater 2019).

The presence of invasive species in San Mateo Creek in northern San Diego County is another example where invasive species threaten the recovery of Southern steelhead. In recent years, the San Diego Regional Water Quality Control Board has sought to combat this problem using a novel approach by preparing a 303d listing for invasive aquatic species in San Mateo Creek as a non-point source pollutant. This proposal has received preliminary approval by the Regional Water Board for incorporation into the San Diego Regional Basin Plan. A formal 303d listing would open up significant funding to remove invasive aquatic species from San Mateo Creek. The last purported Southern steelhead observed in 2017 in lower San Mateo Creek was likely lost due to predation by invasive species.

Disease

The combination of disease, AIS infestation and predation are likely to play a major role in the population size of Southern steelhead. Many diseases are known to influence the development and survival of steelhead (Noga 2000, Wood 1979, Rucker et al 1953), although limited data or information exists to explicitly link infection levels and rate of mortality (NMFS 2012). With the increased environmental stress on resident rainbow trout populations that are experiencing impacts due to climate crisis, they will likely encounter new parasites that have expanded range which may lead to sudden extirpations of the few remaining coastal steelhead populations.

Other Natural Occurrences or human related activities

Southern steelhead are on the front line for climate crisis impacts. The DPS covers the southern edge of the species' total range on the West Coast. The DPS is projected to experience the greatest overall increase of air and water temperatures. Persistent drought has increased surface air temperatures and altered natural precipitation patterns (Williams et al. 2015, NMFS 2016). This has accelerated the loss of habitat needed for all life-history stages for an already stressed population. Climate change will have a significant impact on their continued existence (Wade et al 2013). Climate crisis impacts on salmonid species are increasing over time. Building resiliency into the remaining populations of Southern steelhead is essential to their survival (Williams et al. 2016) and to the survival of salmonids further north along the coast. Even given their inherent plasticity, the impacts of climate crisis will outpace their ability to utilize this flexibility. The most recent NMFS 5-year status review completed in 2016 concluded that the ongoing drought and ocean conditions in the years preceding its publication likely reduced the survival of Southern steelhead across the DPS.

Conclusion

Southern steelhead are an iconic California species that deserve the highest level of state protection. State and federal entities have had decades to address the precipitous and continuing decline in Southern steelhead populations through all manner of guidance, policy, and mandate. Yet this species remains on the brink of extinction throughout its range. The principal condition for protection under CESA is met.

Southern steelhead have an irreplaceable impact on Southern California watersheds and communities. The total loss of this species will have irreversible consequences.

For this reason and all of those presented in this petition, CalTrout requests that the California Fish and Game Commission use the powers that it has vested to list this species as endangered under the California Endangered Species Act. We must ensure that future Californians have the ability to enjoy this amazing species.

Sincerely,

Curtis Knight
Executive Director
California Trout

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State of California
Department of Fish and Wildlife

Original on file,
received January 18, 2024

M e m o r a n d u m

Date: January 8, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Status Review Report for Southern California Steelhead (*Oncorhynchus mykiss*)

The California Department of Fish and Wildlife (Department) has prepared the attached status review report for southern California steelhead (*Oncorhynchus mykiss*) for the California Fish and Game Commission (Commission) pursuant to the California Endangered Species Act, Fish and Game Code section 2050 et seq. The Commission published the Notice of Candidacy Findings on May 11, 2022, directing the Department to prepare a status review report. On October 12, 2022, the Commission approved a Department request for a 6-month extension to further analyze the petition and complete its status review report in accordance with Fish and Game Code section 2074.6.

The Department completed the attached status review report as required by Fish and Game Code section 2074.6. The status review report contains the Department's review of the best scientific information available to the Department on the status of southern California steelhead and serves as the basis for the Department's recommendation to the Commission that the petitioned action to list southern California steelhead as endangered is warranted. The Department finds that southern California steelhead is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

If you have any questions or need additional information, please contact Jay Rowan, Branch Chief, Fisheries Branch at (916) 212-3164 or by email at Jay.Rowan@wildlife.ca.gov.

Attachment

ec: California Department of Fish and Wildlife

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State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION
CALIFORNIA ENDANGERED SPECIES ACT STATUS REVIEW OF SOUTHERN CALIFORNIA STEELHEAD (ONCORHYNCHUS MYKISS)

January 2024


Southern California Steelhead Rainbow Trout, CDFW photo

Prepared by
California Department of Fish and Wildlife

Suggested citation:

California Department of Fish and Wildlife (CDFW). 2023. Report to the California Fish and Game Commission. California Endangered Species Act Status Review for Southern California Steelhead (*Oncorhynchus mykiss*). California Department of Fish and Wildlife, 1416 Ninth Street, Sacramento CA 95814, Sacramento CA 95814. 186 pp., with appendices.

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LIST OF ABBREVIATIONS, ACRONYMS, AND TERMS

BEUTI – Biologically Effective Upwelling Transport Index
BPG – Biogeographic Population Group
CATEX – Categorical Exclusion
CCE – California Current Ecosystem
CESA – California Endangered Species Act
CEQA – California Environmental Quality Act
CFS – cubic feet per second
CMP – California Coastal Monitoring Program
CMWD – Casitas Municipal Water District
COMB – Cachuma Operations and Maintenance
Commission – California Fish and Game Commission
Creeks Division – City of Santa Barbara Creeks Restoration and Water Quality Improvement Division
CRR – cohort replacement rate

CUTI – Cumulative Upwelling Transport Index
CWA – Federal Clean Water Act
Department – California Department of Fish and Wildlife
DIDSON - dual-frequency identification sonar
DO – dissolved oxygen
DPS – Distinct Population Segment
DWR – California Department of Water Resources
EA – Environmental Assessment
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
EPA – United States Environmental Protection Agency
ESA – Federal Endangered Species Act
ESU – Evolutionary significant unit
FERC – Federal Energy Regulatory Commission
FONSI – Finding of No Significant Impact
FRGP – Fisheries Restoration Grant Program
GSA – Groundwater sustainability agency
GSP – Groundwater sustainability plan
HCP – Habitat Conservation Plan
LWD – large woody debris
NCCP – Natural Community Conservation Plan
NEPA – National Environmental Policy Act
NGO – Non-Governmental Organization
NMFS – National Marine Fisheries Service
RCDSMM – Resource Conservation District of the Santa Monica Mountains
SCCWRP – Southern California Coastal Water Research Project
SCWRP – Southern California Wetlands Recovery Project
SGMA – Sustainable Groundwater management Act
SNP – single nucleotide polymorphism
SST – sea surface temperature
SWRCB – California State Water Resources Control Board
TMDL – Total Maximum Daily Load
USACE – United States Army Corp of Engineers
USBR – United States Bureau of Reclamation
USFWS – United States Fish and Wildlife Service
UWCD – United Water Conservation District
WSRA – Federal Wild and Scenic Rivers Act
YOY – young-of-the-year

EXECUTIVE SUMMARY

This status review of southern California steelhead (*Oncorhynchus mykiss*) (Status Review) has been prepared by the California Department of Fish and Wildlife (Department) for the California Fish and Game Commission (Commission) pursuant to the requirements of the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.). This Status Review is based on the best scientific information currently available to the Department regarding each of the components listed under Section 2072.3 of the Fish and Game Code and Section 670.1 of Title 14 of the California Code of Regulations. In addition, this Status Review includes a preliminary identification of habitat that may be essential to the continued existence of the species, the Department's recommendations for management activities, and other recommendations for the recovery of the species (Fish & G. Code, § 2074.6). This Status Review has been independently reviewed by scientific peers pursuant to Fish and Game Code Section 2074.6.

In this Status Review, southern California steelhead are defined as "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories, from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border." This range encompasses five biogeographic population groups of *O. mykiss* (from north to south): Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast. To capture the life history variability that is included in the scope of the CESA listing unit evaluated in this Status Review, "southern California steelhead rainbow trout" (Southern SH/RT) is used to describe the proposed CESA listing unit.

The Department recommends that the Commission find the petitioned action to list Southern SH/RT as an endangered species under CESA to be warranted. The Department further recommends implementation of the management recommendations and recovery measures described in this Status Review.

The scientific data available to the Department indicates a long-term declining trend of Southern SH/RT and low range-wide abundances. The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions and limited the amount of suitable and accessible spawning and rearing habitats. Dams and other impediments obstruct access to a significant portion of historical Southern SH/RT habitats in many rivers within the proposed listing area, some of which have multiple major dams on a single mainstem.

Climate change projections for Southern SH/RT range predict an intensification of typical climate patterns, such as more intense cyclic storms, droughts, and extreme heat. These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form. Impacts of the most recent prolonged period of drought from 2012 – 2017 resulted in significant reductions in all life-history forms and stages of Southern SH/RT, and few populations have rebounded as current abundance estimates remain low relative to pre-drought conditions. The ability of Southern SH/RT to persist will likely depend on the successful recruitment of migrants from resident populations in refugia habitats. However, virtually all refugia populations are currently above impassable barriers. Furthermore, many southern California watersheds do not contain upstream drought refugia. In these instances, recolonization of Southern SH/RT from source populations in other watersheds is likely the only mechanism for these populations to rebound (Boughton et al. 2022a).

1. INTRODUCTION

1.1 Petition History

On June 14, 2021, the California Fish and Game Commission (Commission) received a petition (Petition) from California Trout to list southern California steelhead (*Oncorhynchus mykiss*) as endangered pursuant to the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.).

On June 23, 2021, pursuant to Fish and Game Code Section 2073, the Commission referred the Petition to the California Department of Fish and Wildlife (Department) for evaluation.

On July 16, 2021, pursuant to Fish and Game Code Section 2073.3, the Commission published notice of receipt of the Petition in the California Regulatory Notice Register (Cal. Reg. Notice Register 2021, No. 29-Z, p. 921-922).

On August 18, 2021, pursuant to Fish and Game Code Section 2073.5, the Commission approved the Department's request for a 30-day extension to complete its petition evaluation report.

On October 29, 2021, the Department provided the Commission with a report, "Evaluation of the Petition from California Trout to List Southern California Steelhead (*Oncorhynchus mykiss*) as Endangered under the California Endangered Species Act" (Evaluation). Based upon the information contained in the Petition, the Department concluded, pursuant to Fish and Game Code Section 2073.5, that sufficient information exists to indicate that the petitioned action may be warranted and recommended to the Commission that the Petition be accepted and considered.

On April 21, 2022, at its public meeting pursuant to Fish and Game Code Sections 2074 and 2074.2, the Commission considered the Petition, the Department's Evaluation and recommendation, comments received, and oral testimony. The Commission found that sufficient information exists to indicate the petitioned action may be warranted and accepted the Petition for consideration.

On May 13, 2022, pursuant to Fish and Game Code Section 2074.2, the Commission published its Notice of Findings for southern California steelhead in the California Regulatory Notice Register, designating southern California steelhead as a candidate species (Cal. Reg. Notice Register 2022, No. 19-z, p. 541).

On October 12, 2022, pursuant to Fish and Game Code Section 2074.6, the Commission approved the Department's request for a six-month extension to complete its status review report.

1.2 Status Review Overview

Pursuant to Fish and Game Code Section 2074.6 and the California Code of Regulations, Title 14, Section 670.1, the Department has prepared this status review to indicate whether the petitioned action to list southern California steelhead as endangered under CESA is warranted (Status Review). An endangered species under CESA is "a native species or subspecies . . . which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species under CESA is "a native species or subspecies . . . that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (*id.* at § 2067). A species' range for CESA purposes is the species' California range (Cal. Forestry Assn. v. Cal. Fish and Game Com. (2007) 156 Cal.App.4th 1535, 1551).

Using the best scientific information available to the Department, this Status Review includes information on each of the following components pursuant to Fish and Game Code Section 2072.3 and Title 14 of the California Code of Regulations Section 670.1: population trend(s), range, distribution, abundance, life history, factors affecting the species' ability to survive and reproduce, the degree and immediacy of threats, the impact of existing management efforts, the availability and sources of information, habitat that may be essential to the continued existence of the species, and the Department's recommendations for future management activities and other recovery measures to conserve, protect, and enhance the species.

Southern California steelhead, as defined in the Petition, means all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border (CDFW 2021a Petition Evaluation). The Department accepts the taxonomy as published by Behnke (1992) that identifies southern California *O. mykiss* as being included in the range of Coastal Rainbow Trout (*O. mykiss irideus*), which have a broad distribution extending from Alaska to Baja California (Moyle 2002). The Department has long referred to these fish as "steelhead rainbow trout" (Shapovalov and Taft 1954), which captures the life history variability that is included in the scope of this status review for both anadromous and resident forms of the species. Thus, the Department will refer to the Petitioner's proposed listing unit as southern California steelhead rainbow trout (*O. mykiss*;

Southern SH/RT) throughout the remainder of this Status Review. This naming convention is slightly different than what was used by the Petitioner in the Petition, but the Department asserts the importance of recognizing the full scope of life history diversity included in the listing unit.

This Status Review report is not intended to be an exhaustive review of all published scientific literature relevant to the Southern SH/RT. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, provide that information to the Commission, and serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted. Specifically, this Status Review analyzes whether there is sufficient scientific information to indicate that the continued existence of Southern SH/RT throughout all or a significant portion of its range is in serious danger or is threatened by one or a combination of the following factors: present or threatened modification or destruction of its habitat; overexploitation; predation; competition; disease; or other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)).

1.3 Federal Endangered Species Act Listing History

The federal Endangered Species Act (ESA) defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532). In 1991, the National Marine Fisheries Service (NMFS) adopted its policy on how it would apply the definition of "species" to Pacific salmon stocks for listing under the ESA (ESU Policy). Under the ESU Policy, a salmon stock is considered a distinct population segment (DPS) if it constitutes an evolutionary significant unit (ESU) of the biological species (NMFS 1991). In February 1996, the United States Fish and Wildlife Service (USFWS) and NMFS published a joint DPS policy for the purposes of ESA listings (DPS Policy) (NMFS 1996a). Section 3.1 of this Status Review describes the ESU Policy and DPS Policy in greater detail.

In 1997, NMFS listed the Southern California Steelhead ESU as endangered under the federal ESA. The Southern California Steelhead ESU only included naturally spawned populations of anadromous *O. mykiss* (and their progeny) residing below long-term, natural and manmade impassable barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to Malibu Creek, Los Angeles County (inclusive) (NMFS 1997). In 2002, NMFS extended the geographic range of the Southern California Steelhead ESU listed under the federal ESA south to the U.S.-Mexico border (NMFS 2002).

In 2001, the U.S. District Court in Eugene, Oregon, ruled that NMFS improperly excluded certain hatchery stocks from the listing of Oregon Coast Coho Salmon after NMFS had concluded that those hatchery stocks were part of the ESU being considered for listing but not essential for recovery (*Alsea Valley Alliance v. Evans* (D. Or. 2001) 161 F. Supp. 2d 1154, 1162). Based in part on the *Alsea* decision, in 2002 NMFS announced that that it would conduct an updated status review of 27 West Coast salmonid ESUs, including the Southern California Steelhead ESU (NMFS 2006). In 2004, NMFS proposed to continue applying its ESU Policy to the delineation of DPSs of *O. mykiss* and to include resident *O. mykiss* that co-occur with the anadromous form of *O. mykiss* in 10 *O. mykiss* ESUs, including the Southern California Steelhead ESU (NMFS 2006).

In 2005 USFWS wrote to NMFS stating USFWS's "concerns about the factual and legal bases for [NMFS's] proposed listing determinations for 10 *O. mykiss* ESUs, specifying issues of substantial disagreement regarding the relationship between anadromous and resident *O. mykiss*" (NMFS 2006). After discussions with USFWS regarding the relationship between anadromous and non-anadromous *O. mykiss*, in 2006 NMFS decided to depart from their past practice of applying the ESU policy to *O. mykiss* stocks and instead apply the joint DPS Policy (NMFS 2006). Concurrent with that decision, NMFS relisted the Southern California Steelhead ESU as the Southern California Steelhead DPS under the federal ESA (NMFS 2006). As part of its 2006 relisting of southern California steelhead, NMFS concluded that the anadromous life form of *O. mykiss* is markedly separate from the non-anadromous life form of *O. mykiss* within the geographic boundary of the Southern California Steelhead DPS—as well as the geographic boundaries of the other nine *O. mykiss* ESUs that NMFS was relisting as DPSs at that time—due to "physical, physiological, ecological, and behavioral factors" (NMFS 2006). The Southern California Steelhead DPS only includes the anadromous life-history component of *O. mykiss* and is defined as including all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassible barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico border (Table 1) (NMFS 2006).

2. BIOLOGY AND ECOLOGY

2.1 Species Description

The species *O. mykiss* is one of the most widely distributed of Pacific salmonids, occupying nearly all coastal streams from Alaska to southern California and from Russia's Kamachatka Peninsula to South Korea in the western Pacific. Steelhead is the common name for the anadromous form of *O. mykiss*, while Rainbow Trout is the common name applied to the freshwater resident form (Behnke 1993; Moyle 2002). *O. mykiss* possess 10–12 dorsal fin rays, 8–12 anal fin rays, 9–10 pelvic fin rays, 11 – 17 pectoral fin rays, and a slightly forked caudal fin (Moyle 2002). They have 9–13 branchiostegal rays and 16–22 gill rakers on each arch (Moyle 2002). Teeth are present on both upper and lower jaws, the tip and shaft of the vomer, as well as on the tip of the tongue (Fry 1973; Moyle 2002). Between 110–180 small, pored scales make up the first row above the lateral line (Fry 1973; Moyle 2002).

Table 1. Common nomenclature for Oncorhynchus mykiss (adapted from Boughton et al. 2022b).

Term	**Description**
Oncorhynchus mykiss	A species of Pacific salmonid composed of both anadromous and freshwater-resident forms, which all spawn in freshwater rivers and streams.
Steelhead	Individuals: *O. mykiss* that are anadromous (individuals that migrate to and spend one or more seasons in the ocean); here used to mean adult steelhead.
Rainbow Trout	Individuals: *O. mykiss* that are freshwater resident (individuals that complete their life cycle in freshwater), here used to mean adult Rainbow Trout.
Steelhead Rainbow Trout	Population(s): contains both steelhead individuals and Rainbow Trout individuals.
Juvenile *O. mykiss*	Immature fish whose fate as steelhead or Rainbow Trout cannot yet be established.
Anadromous waters	Stream reaches that are accessible to migrating steelhead (those not blocked by complete natural or artificial barriers). It is important to note that *Oncorhynchus mykiss* individuals, occurring in anadromous waters, may or may not express the anadromous life history type (e.g., smoltification).

The steelhead life history form is thought to be named for the sometimes silvery-metallic appearance of its back and head. The steelhead body profile is fusiform, with typically "bullet-shaped" heads and distinct narrowing at the base of a powerful tail, suited for often-demanding and lengthy upstream spawning migrations. In the marine environment, steelhead body coloration includes a blueish-green dorsum (back) and silver or white coloration over the rest of the body (Fry 1973; Moyle 2002). Black spots typically cover the dorsal, adipose, and caudal fins, as well as the head and back (Fry 1973). When adult steelhead return to spawn in freshwater, their silver sheen fades and a pink or red lateral band develops along the sides and on the opercula, while the silvery-blue coloration on the back transitions to an olive green or brown (Barnhart 1986). These characteristics are very similar to those exhibited by resident Rainbow Trout (Fry 1973); thus, it can be difficult to differentiate the anadromous and resident forms based only on outward appearance. Adult steelhead, however, are generally larger than adult Rainbow Trout in a given stream system since they spend time feeding and growing in the ocean (NWF 2020; USFWS 2020).

Juvenile *O. mykiss* have body coloration similar to that of resident adults, while also exhibiting 5–13 oval parr marks along the lateral line on both sides of the body (Moyle 2002). These parr marks are dark bluish-purple in coloration and are widely spaced, with the marks themselves being narrower than the spaces between them (Moyle 2002). A total of 5–10 dark spots also line the back, typically extending from the head to the dorsal fin. There are usually few to no marks on the caudal fin, and the tips of the dorsal and anal fins are white to orange (Moyle 2002).

After a year or more of development, some *O. mykiss* undergo the transitional process of smolting, which is a series of morphological, physiological, and behavioral changes that prepare the fish for entry into brackish estuaries and then ocean environments (Fessler and Wagner 1969; McCormick 2012). Smolting is the primary physiological characteristic that distinguishes the anadromous life history variant from the resident one within the species. Smolts lose their parr marks and develop silver coloration during the downstream migration process. After entering the ocean, young steelhead will reside in the saltwater environment for 1–4 years while feeding and growing quickly (Moyle 2002). Juvenile *O. mykiss* that do not smolt and remain in freshwater generally lose their parr marks as they grow and develop into adult Rainbow Trout.

The sexual maturation process for anadromous steelhead involves the development of secondary sex characteristics such as bright coloration and sexual dimorphism, including the development of a hooked snout, or kype, in males. These secondary sex characteristics are typically reabsorbed once spawning is complete, although jaw shape may never fully revert to the pre-spawn condition (Shapovalov and Taft 1954).

Different populations of *O. mykiss* can exhibit variations in growth rate, size, and body shape depending on their life histories and habitats utilized. For example, Bajjaliya et al. (2014) studied morphometric variation between four California steelhead DPSs and found that coastal steelhead (populations with adults migrating less than 160 km from the ocean to their sample site) were significantly larger in size and had a more robust body type than steelhead found in California’s Central Valley drainages and the Klamath-Trinity basin (populations with adults migrating more than 160 km from the ocean to their sample site). These morphological differences provided the basis for recognizing “coastal type” and “inland type” steelhead in California (Bajjaliya et al. 2014). However, the morphometric variation in populations of steelhead occurring in more southerly DPSs, such as the Southern California Steelhead DPS, may include features of both the large, coastal type as well as smaller, inland-type *O. mykiss* that occur in interior drainages (Bajjaliya et al. 2014).

2.2 Taxonomy and Systematics

Steelhead and Rainbow Trout are members of the bony fish class Osteichthyes, in the order Salmoniformes and family Salmonidae. In 1792, J. J. Walbaum classified Rainbow Trout from populations on the Kamchatka Peninsula in Russia as *Salmo mykiss* (Moyle 2002). During the next century, using J. Richardson's description of Columbia River steelhead as *S. gairdneri* and Gibbons's description of juvenile steelhead from San Leandro Creek as *S. iridea*, both the biology and fishing communities began referring to resident Rainbow Trout and steelhead as *S. irideus* and *S. gairdneri*, respectively. It was ultimately discovered that Rainbow Trout and steelhead are the same species, and North American scientists applied the original species name, *mykiss*, to North American populations (Moyle 2002).

In the 1970s, analyses of polymorphic proteins, or allozymes, were utilized to determine the degree of species relatedness and evolutionary divergence among salmonids (Quinn 2018). These studies indicated that Coho and Chinook salmon (*O. kisutch* and *O. tschawytscha*, respectively) were most closely related to Pink, Chum, and Sockeye salmon, and that Rainbow and Cutthroat trout were most closely related to each other (Quinn 2018). This phylogeny was assumed until researchers analyzed relatedness by looking at differences in mitochondrial DNA, which showed that Coho and Chinook salmon were related more closely to steelhead than they were to the other three genera of salmon (Quinn 2018). Based on this study, Smith and Stearley (1989) reorganized the taxonomy to reflect both the use of the name *mykiss* for North American Rainbow Trout and the inclusion of Rainbow and Cutthroat trouts in the Pacific salmon genus *Oncorhynchus*, but with their own distinct lineages.

Pacific salmonid lineages continue to be studied using a variety of genetic and statistical methods (Quinn 2018). There has been debate over the relationship between Rainbow and Cutthroat trouts with regards to genetics versus morphology and behavior. Stearley and Smith (1993) and Esteve and McLennan (2007) found that the idea of monophyly (a group descending from a most recent common ancestor) of these two trout species is not supported by either morphological or behavioral traits, even though mitochondrial DNA suggests otherwise. Esteve and McLennan (2007) attribute this contradiction to hybridization events that have led to a high rate of genetic introgression between the two species (Chevassus 1979). This introgression can dilute the distinctiveness of these close relatives and convolute phylogenetic reconstruction (Esteve and McLennan 2007). Although some uncertainty remains surrounding these evolutionary relationships, it is now accepted that within the genus *Oncorhynchus*, Coho and Chinook salmon have the closest relationship to each other, with Pink (*O. gorbuscha*), Chum (*O.*

keta), and Sockeye (*O. nerka*) salmon in their own group, and Rainbow (*O. mykiss*) and Cutthroat (*O. clarkii*) trout in another group (Kitano et al. 1997; Crête-Lafrenière et al. 2012; Quinn 2018; Figure 1).

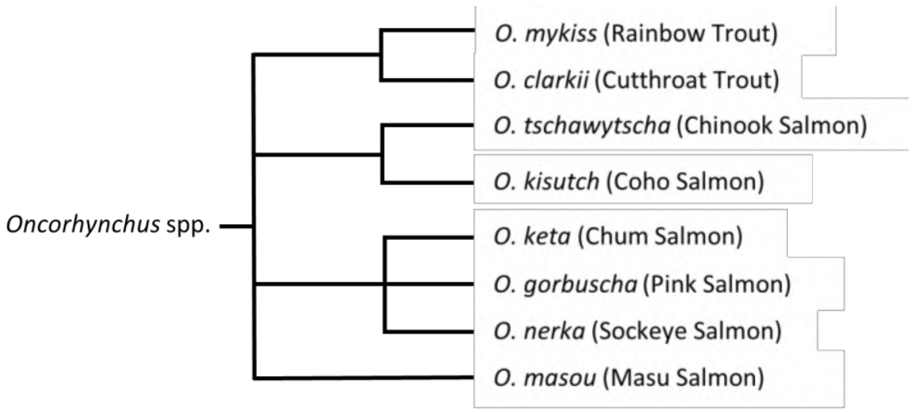


Figure 1. Consensus relationships of Oncorhynchus species from morphological, allozyme, ribosomal RNA, mitochondrial DNA, and short interspersed repetitive elements data across multiple studies. Adapted from Figure 1 in Kitano et al. (1997)

2.3 Range and Distribution

Range is the general geographical area in which an organism occurs. For purposes of CESA and this Status Review, the range is the species' California range (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551). Distribution describes the actual sites where individuals and populations of the species occur within the species' range.

Oncorhynchus mykiss is native to both coastlines of the Pacific Ocean and spawns in freshwater streams, from the Kuskokwim River in Alaska, south to Baja California along the eastern Pacific, and from Russia's Kamchatka Peninsula in the western Pacific (Moyle 2002). The species is widely distributed throughout the northern Pacific Ocean during its ocean phase. Coastal steelhead within the state historically occupied all perennial coastal streams, from the Oregon/California border to the U.S.-Mexico border (Moyle 2002). Steelhead are also native to the Central Valley, including both the Sacramento and San Joaquin River basins, and have been found as far upstream as the Pit and McCloud rivers (Moyle 2002). It is likely that most suitable streams in the Sacramento and San Joaquin River basins with ocean access have historically supported runs of steelhead (Moyle 2002).

Southern SH/RT currently occupy fluvial habitat from the Santa Maria River at the border of San Luis Obispo and Santa Barbara counties south to the U.S.-Mexico border. This range encompasses five biogeographic population groups (BPGs), collectively described by NMFS as the Southern California steelhead DPS (Boughton et al. 2007; NMFS 2012a). BPGs are steelhead subpopulations within a DPS that occupy contiguous areas that share broadly similar physical geography and hydrology, generally within a single watershed unit. The combinations of these physical characteristics represent the suite of differing natural selective regimes across the watersheds occupied by Southern SH/RT. These varying selective pressures have led to life history and genetic adaptations that enable subpopulations to persist in distinctive and dynamic habitats that have shaped each BPG. The purpose of delineating BPGs for steelhead populations is to ensure the preservation of the range of genetic and natural diversity within each DPS for recovery and conservation purposes (NMFS 2012a). The BPGs that form the Southern SH/RT DPS are (from north to south): Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast.

While some near-coastal populations of Southern SH/RT are small, there are likely dispersal dynamics that contribute to their stability and persistence (Boughton et al. 2007). The movement of spawning adults between BPGs may be an important mechanism for maintaining the viability of steelhead populations (NMFS 2012a). Dams and other impediments obstruct access to a significant portion of historical Southern SH/RT habitats in many rivers within the proposed listing area, some of which have multiple major dams on a single mainstem. There is evidence that loss of access to upstream habitat has resulted in a northward range contraction of anadromous Southern SH/RT (Boughton et al. 2005), whose study also found a strong correlation between steelhead population extirpations and anadromous barriers, as well as urban and agricultural development.

2.4 Life History

An individual fish's genotype, condition, and a variety of environmental factors influence the expression of anadromy versus stream residency (Sloat et al. 2014; Busby et al. 1996; Pascual et al. 2001; Courter et al. 2013). Juvenile *O. mykiss* prior to the smolting life stage are difficult to distinguish without genetic, morphological, or physiological evaluations (Negus 2003; Beeman et al. 1995; Haner et al. 1995; Pearse et al. 2014). Adult steelhead returning to streams from the ocean are often easier to identify due to their larger size relative to most resident Rainbow Trout adults in the same stream system and their overall steel-gray color (Dagit et al. 2020). While anadromy and residency are the two primary life histories, *O. mykiss* life history expression is notably plastic and can be quite variable (Moyle 2002). For example, individuals may exhibit the lagoon-anadromous life history, spending their first or second summer rearing in seasonal lagoons in the estuaries of streams before outmigrating to the ocean (Boughton et al. 2007).

Unlike other Pacific salmonids, which are semelparous and perish almost immediately after spawning, *O. mykiss* can be iteroparous (Moyle 2002), with the potential to spawn up to four times but typically not more than twice (Shapovalov and Taft 1954). Steelhead that spawn and return to the sea are called “kelts.” These fish can either spawn consecutively, returning the next season after their first spawn, or they may return a year later after spending an extra year at sea (Light et al. 1989). Reportedly, females survive spawning events more frequently than males (Shapovalov and Taft 1954; Ward and Slaney 1988; Busby et al. 1996; Marston et al. 2012), although males can repeat spawn in significant numbers, especially in smaller, near-coastal stream systems (Marston et al. 2012).

Steelhead exhibit two seasonal migratory patterns, or run types: 1) winter, also called “ocean-maturing” or “mature-migrating;” and 2) summer, also called “stream-maturing” or “premature-migrating.” The names of these two runs are reflective of the seasonal timing when adult steelhead reenter estuaries and rivers to reproduce (Busby et al. 1996; Moyle 2002). Only the winter-run form of steelhead occurs in southern California streams, consistent with what is believed to be the historical condition (Moyle 2002). Southern SH/RT typically begin migrating upstream from December through May, with returning adults often reliant upon winter rainstorms to breach sandbars at the mouths of stream estuaries and lagoons, providing seasonal upstream spawning passage (California Trout 2019). Steelhead age-at-maturity is dependent on a number of factors, including time spent in either or both freshwater and marine environments; however, adult returning spawners are usually 3 or 4 years old, having spent 1-3 years in freshwater and 1-2 years at sea (Shapovalov and Taft 1954). Southern SH/RT steelhead spawning runs are dominated by age 3+ fish, with 2 years spent in fresh water and 1 year in the ocean, although many smolt after only 1 year in fresh water (Busby et al. 1996). Shapovalov and Taft (1954) found that the average age of male spawners (about 3.5 years) was lower than that of female spawners (close to 4 years) in Waddell Creek, CA. Non-anadromous Rainbow Trout can mature anywhere between 1 and 5 years but are commonly age 2+ or 3+ years, with a fork length of ≥13 cm (Moyle 2002). Rainbow Trout typically spawn during the spring months, from February through June (Moyle 2002).

Spawning usually occurs in shallow habitats with fast-flowing water and suitable-sized gravel substrates, often found in riffles, faster runs, or near the tail crests of pool habitats. When female *O. mykiss* are ready to spawn, they will select a suitable spawning site and excavate a nest, or redd, in which they deposit their eggs to incubate (Moyle 2002). Adequate stream flow, gravel size, and low substrate embeddedness are crucial for egg survival, as these conditions allow oxygenated water to permeate through sediments to the egg (Coble 1961). During redd construction, the female may be courted by multiple males. Following completion of the redd, the most dominant males fight for position alongside the female, depositing milt while the female deposits her eggs (Quinn 2018). Immediately following fertilization, females cover their eggs with gravel (Barnhart 1986). Females dig multiple smaller pits within the broader redd where they deposit a portion of eggs into each pocket until all the eggs are expelled

(Shapovalov and Taft 1954; Quinn 2018). Adult steelhead are often accompanied by resident male Rainbow Trout during spawning, as they attempt to participate by quickly swimming, or darting, in and out of steelhead redds (Shapovalov and Taft 1954). These fish are sometimes referred to as "egg-eaters," although it is generally accepted that the main purpose of their presence is to contribute to spawning rather than consume newly laid eggs (Shapovalov and Taft 1954). If adult steelhead cannot emigrate back to the ocean after spawning, they require large, deep pools that provide refuge during the hot summer months (Boughton et al. 2015).

Fecundity, among other biological and environmental factors, contributes substantially to reproductive success. Egg production is positively correlated with fish length, although there is wide variation in female steelhead fecundity at a given size (Shapovalov and Taft 1954; Quinn 2018). Larger females tend to produce larger and greater numbers of eggs; however, energy demands for gonad development create a physiological tradeoff between the number and size of eggs produced (Quinn 2018). Thus, females generally produce either many smaller eggs or fewer larger eggs. Quinn (2018), referencing multiple sources of data, showed that female steelhead of average size produce slightly over 5,000 eggs. Moyle (2002) provides a range of eggs per female from 200 to 12,000 and states that steelhead generally produce about 2,000 eggs per kilogram of body weight. Rainbow Trout less than 30 cm in total length usually have under 1,000 eggs per kilogram of body weight (Moyle 2002).

Multiple factors contribute to egg development and incubation time; however, eggs generally incubate in stream gravels for up to several months. Temperature has the greatest effect on the incubation period; colder water slows development, and warmer water increases the rate of development (Quinn 2018). Incubation can take from 19 days at an average temperature of 60°F (15.6°C) to 80 days at an average temperature of 40°F (4.4°C) (Shapovalov and Taft 1954). Dissolved oxygen (DO) levels in surrounding waters also influence life stage development rates in Southern SH/RT and other salmonids. Higher DO levels lead to more rapid egg development, while eggs exposed to low levels of DO during incubation produce much smaller alevins (yolk-sac fry) than those exposed to high DO (Quinn 2018). Fry emerge from the gravel 2-3 weeks after hatching, once the yolk sac is fully or almost entirely absorbed, at which time they form schools along stream banks (Shapovalov and Taft 1954). During their first year of life, *O. mykiss* juveniles develop small territories and defend them against other individuals in their age class (Shapovalov and Taft 1954; Barnhart 1986). Juvenile *O. mykiss* generally feed on many different species of aquatic and terrestrial insects, sometimes cannibalizing newly emerged fry (Barnhart 1986). Further north, feeding generally peaks during the summer months and is depressed during the winter months; however, *O. mykiss* in California typically have higher growth rates in the winter and spring than summer and fall (Hayes et al. 2008; Sogard et al. 2009; Krug et al. 2012). As they grow, juveniles will move into deeper, faster water and are often found in riffle or swift-run habitats (Shapovalov and Taft 1954; Barnhart 1986). Larger juvenile *O. mykiss* can outcompete and displace their smaller counterparts from ideal habitats, such as deep pools or run complexes, leaving smaller individuals to often inhabit suboptimal habitats, such as riffles (Barnhart 1986).

Parr will ultimately begin transitioning into smolts and migrate downstream to estuaries and lagoons, where they complete the process of smolting. Smolt outmigration to the ocean typically occurs from March–May in southern California but can vary depending on factors such as connectivity between the ocean and estuary or lagoon and streamflow (Booth 2020). Compared to other Pacific salmonids, steelhead have the greatest variability in the timing and duration of freshwater inhabitance, ocean entry, time spent at sea, and return to freshwater (Barnhart 1986). Resident Rainbow Trout early life stages mirror those of anadromous steelhead, up until their life history strategies diverge (Moyle 2002). Rather than migrating out to the ocean like steelhead, resident *O. mykiss* will reside in freshwater for the remainder of their lives.

Little is known regarding steelhead stock-specific utilization of and distribution in the ocean environment. While much is known about the status and abundance of commercially important ocean stocks of Pacific salmon, steelhead-specific research on this topic is lacking and hampered by the inability to differentiate individual stocks using standard sampling methods (Barnhart 1986; Light et al. 1989; Moyle 2002). Unlike Pacific salmon species, steelhead are rarely captured in the ocean; therefore, information specific to Southern SH/RT ocean distribution is not available. Limited tag recoveries by North American fisheries research and management agencies showed no differences in the ocean distribution of steelhead by stock (Light et al. 1989). Attempts to distinguish steelhead population units from one another in terms of ocean distribution are confounded by findings that all steelhead apparently congregate in shared ocean feeding grounds, regardless of their origin or run type (Light et al. 1988).

Pacific steelhead smolts quickly migrate offshore after entry into the ocean (Daly et al. 2014) and, once in the open water, generally move in a northwestern trajectory from spring to summer and follow a southeastern pattern from fall to winter (Okazaki 1983; Light et al. 1989). In the winter, steelhead are found in the eastern North Pacific (Myers et al. 2016) and tend to be closer to shore than during other times of the year (Light et al. 1989). California steelhead do not appear to migrate any farther west than the Gulf of Alaska (Light et al. 1989), and, overall, steelhead migration patterns appear to be strongly tied to “thermal avoidance.” Migratory-based thermal avoidance involves fish movement patterns that remain within a narrow range of tolerable sea surface temperatures, suggesting that steelhead ocean migration may be largely influenced by physiological responses to temperature (Hayes et al. 2016). Ocean steelhead are typically found within seven meters of the sea surface, within the epipelagic zone, although they have been found at more than three times that depth (Light et al. 1989).

Studies addressing steelhead ocean behavior, distribution, and movement are limited; however, as with other salmonids, steelhead tend to exhibit strong homing behavior to their natal streams, with some exceptions. Evidence of straying has been documented in central California steelhead populations (Donohoe et al. 2021), while genetic population structure analyses suggest that historical (natural) exchange of genetic information occurred between coastal populations of steelhead (Garza et al. 2014).

2.5 Genetics and Genomics

2.5.1 Role of Genetics and Genomics in Evaluating Steelhead Population Structure

To date, most genetic studies focused on quantifying the population structure of salmonid species have used neutral genetic markers (e.g., microsatellite DNA). Neutral markers are not directly linked with a particular life history trait, and it is assumed that they are not under direct selection. This class of genetic marker continues to be used to investigate and define salmonid listing units and population structure (e.g., Busby et al. 1996) in both California and across the Pacific Northwest. These types of markers have also been successfully used for decades to delineate populations and ESUs based primarily on reproductively isolated lineages. These markers remain valuable, in that they are the standard for determining the genetic structure and relatedness of species and, thus, their evolutionary histories.

More recently, the advent and rapid development of “adaptive” genetic markers have provided fishery managers and geneticists with a new suite of tools. Adaptive genetic markers provide putative associations with specific life history characteristics, and the “genetic type”, or “variant” infers information about a phenotype of interest. Specific genes, or genomic regions, within individuals or subgroups may vary from the overall pattern exhibited by a species. Of particular relevance to Southern SH/RT is the role that adaptive genetic variation plays in migratory behavior. This relationship is still being evaluated, and uncertainties remain regarding the level of influence genetics may have on migration phenotype. See Section 2.6.5 for more information.

2.5.2 Patterns of O. mykiss Genetic Population Structure

Geography and local environmental factors influence the genetic structure of *O. mykiss* populations, a pattern referred to as "isolation by distance". Evidence of isolation by distance is shown in *O. mykiss* populations throughout their range. Studies based on neutral mitochondrial DNA analysis have demonstrated a pattern of isolation by distance in populations spanning the western coast of the United States, including among coastal California steelhead populations (Hatch 1990; Reisenbichler et al. 1992; McCusker et al. 2000). Nielsen (1999) found a pattern of isolation by distance when looking at the microsatellite loci of southern California and northern California steelhead populations. Bjorkstedt et al. (2005) suggested that genetic variation in salmonid populations generally increases with greater distances between watersheds. Pearse et al. (2007) analyzed geographic structure within the Klamath-Trinity River basin and consistently found a positive relationship between geographic distance and genetic relatedness—specifically, that genetic divergence between populations increased as a function of geographic distance.

Garza et al. (2004) evaluated population structure across coastal California populations using microsatellite loci to understand the relationship between genetic distance and the geography of coastal steelhead populations. This study's results included a bootstrap consensus tree showing clustering of geographic locations corresponding to five DPS assignments in coastal California steelhead (Figure 2). The long terminal branches in this consensus tree demonstrate that, while migration is important to the populations in this study, the conflicting evolutionary processes of random genetic drift and local adaptation were likely responsible for the genetic differentiation between the populations. The general isolation-by-distance pattern of genetic diversity is also visually apparent.

Aguilar and Garza (2006) found a significant relationship between geographic distance and genetic distance in coastal *O. mykiss* using both major histocompatibility complex genes, which can be helpful in identifying salmonid population structure, and microsatellite loci. This significant relationship represented isolation through distance. Garza et al. (2014) reaffirmed that genetic variation is associated with isolation by distance using microsatellite loci from samples of coastal California steelhead. Across all coastal California steelhead populations sampled, there was evidence that population structure is dependent on geographic distance. Their phylogeographic trees also suggested that population structure was almost entirely consistent with geographic proximity.

Populations within a watershed, even those disconnected by barriers, have been shown through microsatellite DNA analyses to be more genetically similar than those in adjacent watersheds (Clement et al. 2009; Garza et al. 2014). However, anthropogenic impacts including stocking, barrier construction, and habitat destruction have resulted in weaker relationships between geographic proximity and relatedness in modern *O. mykiss* populations (Pearse et al. 2011).

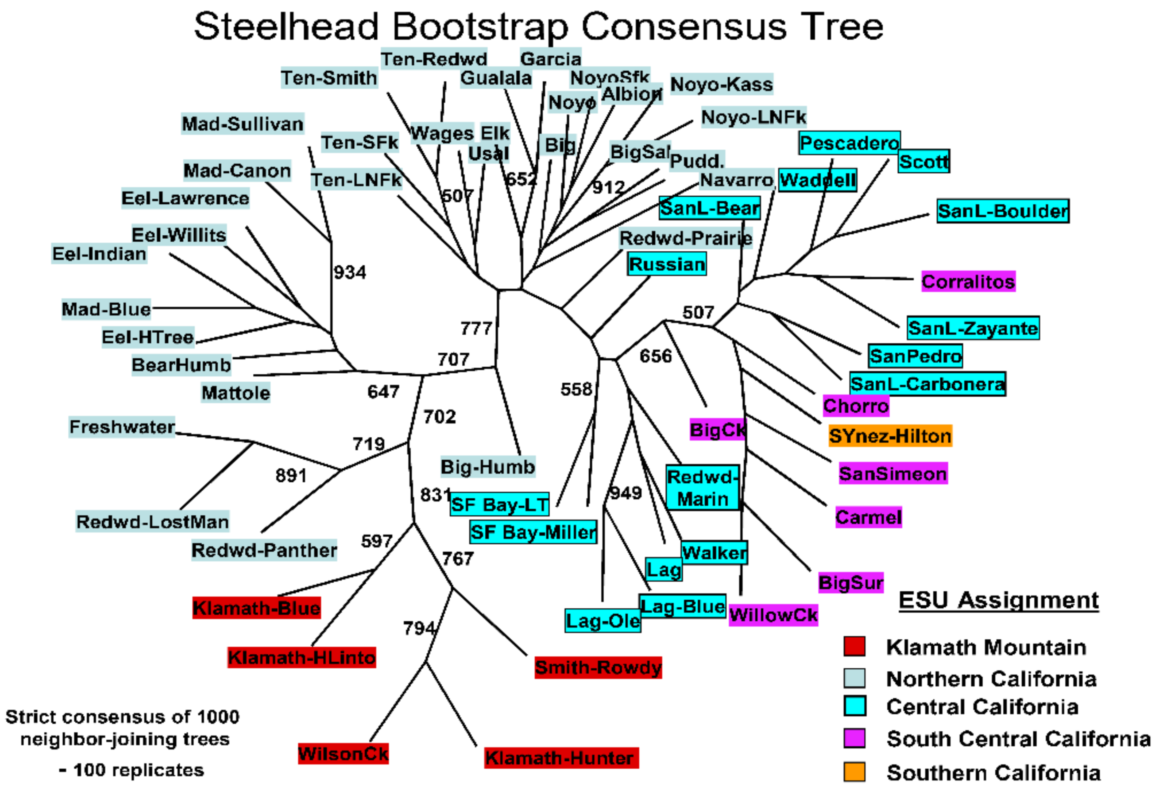


Figure 2. Majority-rule consensus tree, with genetic data bootstrapped 1,000 times, showing chord distances and neighbor-joining trees for 62 coastal California steelhead populations. (from Garza et al. 2004).

2.5.3 Genetics of the Southern California SH/RT

Busby et al. (1996) posited that the extreme environmental conditions found in southern California could result in both substantial local adaptations of and gene flow impediments between *O. mykiss* populations in the region. Nielsen (1999) hypothesized that the substantial interpopulation genetic diversity found in southern California's mostly small and somewhat isolated *O. mykiss* populations could be the result of a transitional ecotone, where two adjacent Pleistocene source populations have met and blended. Allozymes, mitochondrial DNA, and microsatellites have uncovered significant and unique genetic diversity in southern California steelhead, with traits not found in more northern populations. Busby et al. (1996) noted that a mitochondrial DNA type exists in steelhead populations between the Santa Ynez River and Malibu Creek that is rare in populations to the north, and samples from Santa Barbara County were found to be the most genetically unique of any wild coastal steelhead populations analyzed. In general, *O. mykiss* at the extreme southern end of their range have low genetic diversity (Clemento et al. 2009; Pearse et al. 2009; Jacobson et al. 2014; Abadía-Cardoso et al. 2016; Apgar et al. 2017). Loss of genetic diversity is often a consequence of declines in population size (Allendorf et al. 1997), which have been observed in Southern SH/RT populations.

2.5.4 South-Central and Southern California Genetic Relationships

Clemento et al. (2009) conducted a genetic analysis of steelhead populations in California south of Monterey Bay using microsatellite data to elucidate patterns of genetic differentiation and gene flow. In terms of coastwide population structure, the authors found that southern California steelhead populations were grouped with all other steelhead populations south of San Francisco Bay and were well-distanced from populations north of San Francisco Bay. Population genetic structure does not correspond with geographic management boundaries because genetically based population clusters are not separated by current federal-ESA-listed DPS boundaries. Overlap in clustering was detected between populations from nearby watersheds, and genetic differentiation between populations in the South-Central California Coast steelhead DPS and the southern California steelhead DPS could not be detected. Additionally, the construction of phylogeographic trees did not result in the separation of populations from the two DPSs into distinct genetic lineages based on their current ancestry (Figure 3). In populations south of San Francisco Bay, no apparent isolation by distance pattern corresponding with DPS boundaries was detected. This may be a result of metapopulation dynamics occurring between these *O. mykiss* populations. Although a lack of genetic differentiation was observed across these southern DPSs, allozymes, mitochondrial DNA, and microsatellites have uncovered significant and unique genetic diversity in southern California steelhead (see Section 3.2.2 for more information). Further, the Department recognizes other factors that define Southern SH/RT, such as unique regional biogeography, ecology, physiology, and behavior of the population groups (Boughton et al. 2007).

2.5.5 Role of Genetics in Life History Expression

Many *O. mykiss* populations are considered “partially migratory,” meaning they contain both migratory (e.g., anadromous) and non-migratory (e.g., resident) individuals (Chapman et al. 2011). It is widely accepted that migratory behavior and migration-associated traits are heritable in partially migratory populations (Pearse et al. 2014; Hecht et al. 2015; Phillis et al. 2016). In recent years, studies have revealed that important migration-related characteristics in *O. mykiss*, such as maturation, growth, development, and smolting, are linked to specific genomic regions that are under natural selection (Nichols et al. 2008; Martínez et al. 2011; Hecht et al. 2012; Miller et al. 2012; Pearse et al. 2014). Phenotypic expression of anadromy vs. residency has since been found to be strongly associated with a large genomic region on *O. mykiss* chromosome 5 (*Omy5*) (Martínez et al. 2011; Hecht et al. 2012; Pearse et al. 2014; Leitwein et al. 2017; Kelson et al. 2019). This *Omy5* migration-associated region exhibits unique alleles, associated with either anadromy or residency as their phenotypic expression, and these *Omy5* genetic variants are thought to be the result of a chromosomal inversion (Pearse et al. 2014; Leitwein et al. 2017).

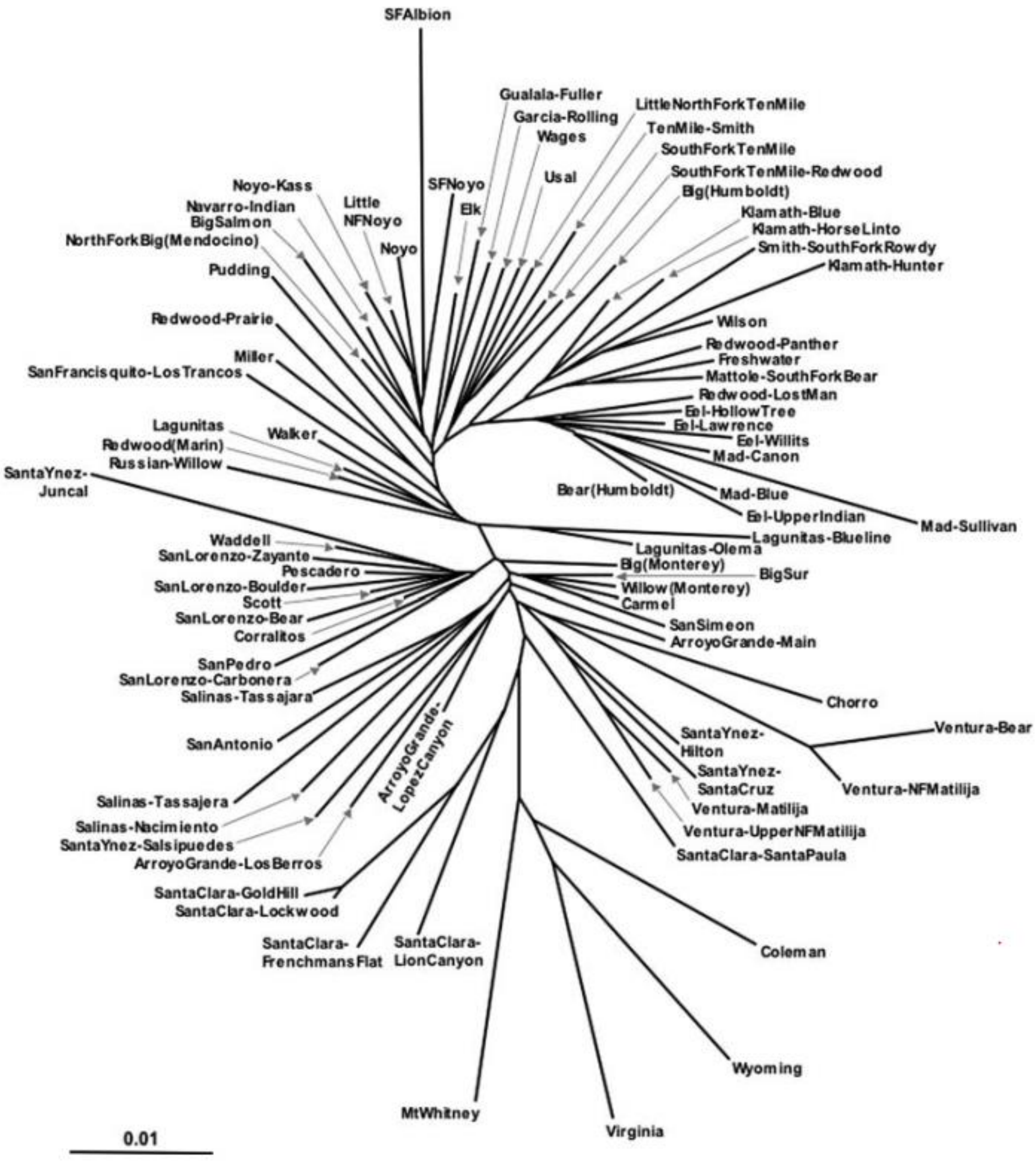


Figure 3. Unrooted neighbor-joining chord distance tree of 84 coastal O. mykiss populations in California (from Clemento et al. 2009).

Chromosome *Omy5* is associated with multiple life history characteristics related to migration vs. residency in *O. mykiss*, explaining morphological and developmental variation between the two life history forms (Nichols et al. 2008; Martínez et al. 2011; Hecht et al. 2012). Nichols et al.

(2008) used quantitative trait loci analysis to locate specific loci associated with smolting and found several genomic regions that were linked with morphological and physiological smolting indicators. The study was the first of its kind in terms of finding connections between specific genomic loci and the migration characteristics of a species of fish. In addition, Martínez et al. (2011) found multiple microsatellite markers on *Omy5* that were correlated with differential selection between anadromous and resident *O. mykiss*, while Hecht et al. (2012) identified associations between *Omy5*, body morphology, and skin reflectance, which are linked to the smolting process and the anadromous phenotype. Pearse et al. (2014) found that specific *Omy5* loci diverged between above-barrier and below-barrier *O. mykiss* populations that had differing frequencies of the anadromous phenotype.

Populations with higher potential to support anadromous or migratory individuals typically have a higher population-wide frequency of the anadromous variant of Omy5 than populations that have a higher frequency of the resident rainbow trout, such as those above manmade and natural barriers (Pearse et al. 2014; Leitwein et al. 2017). This suggests that utilizing comparative anadromous *Omy5* variant frequency data between steelhead populations may indicate which populations have a higher likelihood of producing anadromous offspring, as well as having utility in identifying above-barrier populations with the genetic potential to support or bolster downstream anadromous populations. Results from Kelson et al. (2020) suggest that the *Omy5* genomic region also regulates physiological traits, such as juvenile growth, which will subsequently influence residency vs. anadromy (Figure 4).

Sex determination has also been genetically linked to the migratory phenotype of *O. mykiss* (Rundio et al. 2012). Migratory ecotype composition within a population is typically female-dominated, a phenomenon that has been observed in multiple salmonid species (Jonsson et al. 1998; Páez et al. 2011; Ohms et al. 2014; Kelson et al. 2019) and may be due to a strong correlation between fecundity and body size (Hendry et al. 2004; Quinn 2018). Female steelhead that migrate to the ocean can grow larger in the highly productive marine environment than their counterparts in the less productive freshwater environment and, as a result, produce greater numbers of embryos. Their genetic traits, which control the anadromous ecotype, are therefore predominant in most populations.

Alternate life history ecotypes within a given watershed are typically more closely related to each other than to their life history stage equivalents in other watersheds (Nielsen and Fountain 1999; Docker and Heath 2003; Narum et al. 2004; Olsen et al. 2006; McPhee et al. 2007; Leitwein et al. 2017). These close genetic relationships indicate some degree of gene flow between sympatric life history forms of *O. mykiss* (Olsen et al. 2006; McPhee et al. 2007; Heath et al. 2008), although the level of gene flow is dependent on environmental, physiological, and genetic factors, such as watershed size and degree of reproductive isolation between life history forms (Heath et al. 2008). Regardless, the close genetic relationships between sympatric populations of steelhead and Rainbow Trout suggest that the populations interbreed and that close relatives, including full siblings, may express alternative ecotypes (or other life-history variation, e.g., adfluvial or lagoon migration). Therefore, managing individual fish with different life histories separately is biologically unjustified, and the two life history variants should be considered a single population when found coexisting in streams (McPhee et al. 2007). Additionally, freshwater resident populations can retain alleles associated with anadromy (Nielsen and Fountain 1999; Phillis et al. 2016; Apgar et al. 2017) and can contribute to the viability of anadromous *O. mykiss* populations.

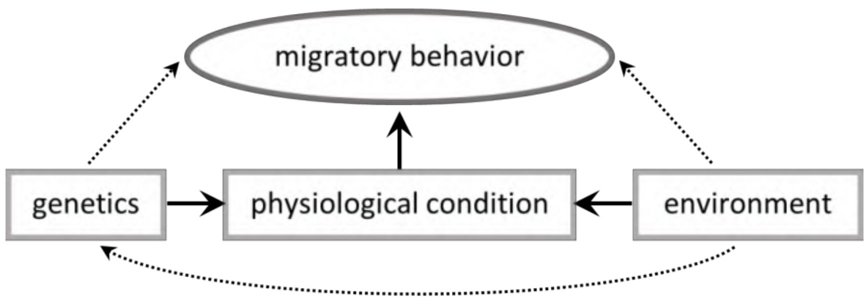


Figure 4. Schematic of indirect genetic control of migratory behavior. Genetic variation and the environment influence physiology, which then impacts migratory behavior (adapted from Kelson et al. 2020).

2.5.6 Above-Barrier vs. Below-Barrier Genetic Relationships

Studies have shown that populations of *O. mykiss,* above and below barriers within the same drainage, are closely related to one another (Heath et al. 2008; Clemento et al. 2009; Pearse et al. 2009; Leitwein et al. 2017; Fraik et al. 2021). Clemento et al. (2009) used microsatellite data to evaluate steelhead population structure above and below barriers in southern California streams and determined that populations separated by barriers are typically more closely related to each other than to populations in adjacent watersheds, consistent with many previous barrier studies. This relationship had strong bootstrap support, especially for natural-origin steelhead populations. For example, populations from the Santa Clara River formed a monophyletic lineage on the unrooted neighbor-joining tree constructed from samples taken in five main southern California watersheds (Figure 5).

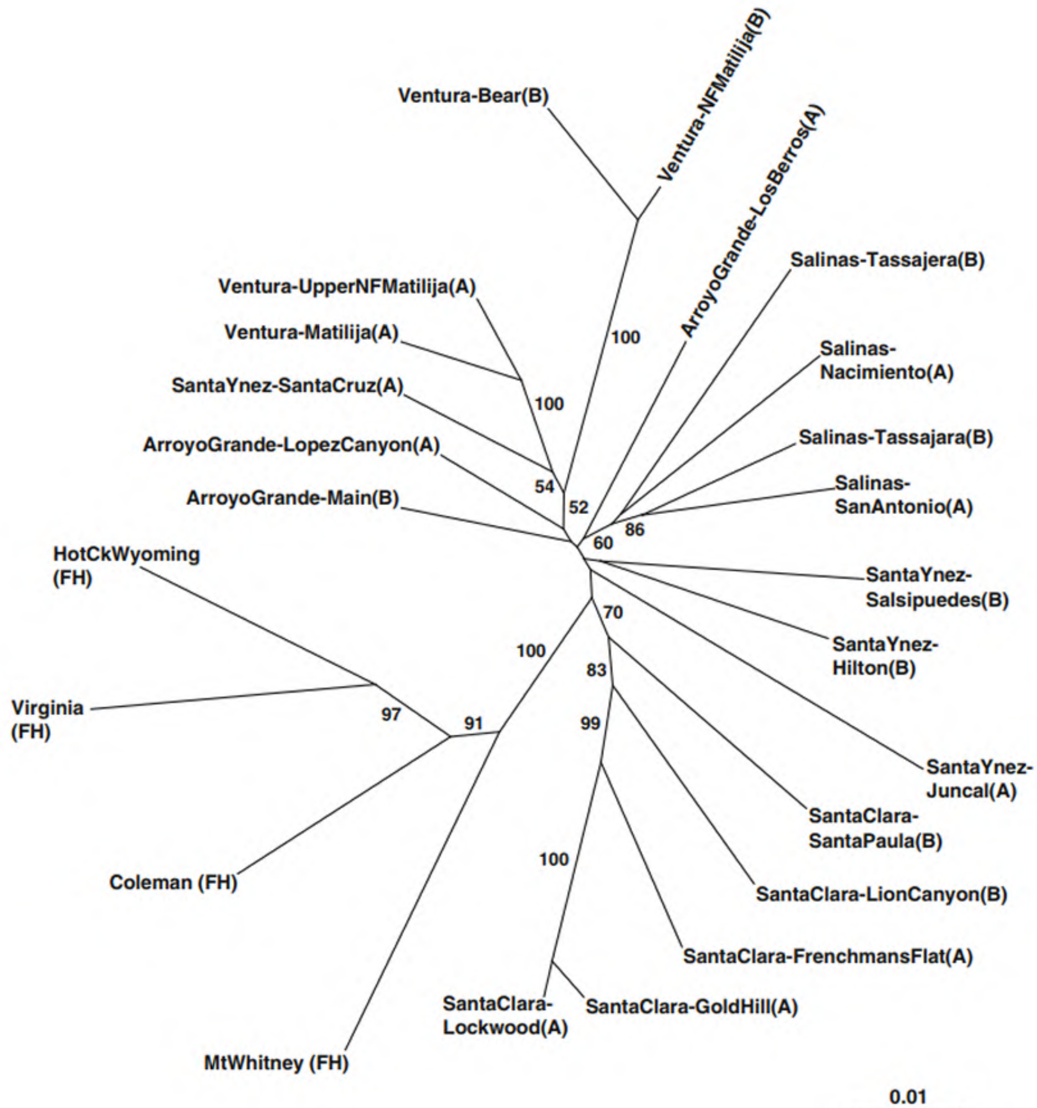


Figure 5. Unrooted neighbor-joining dendogram showing chord distances between 24 sampled naturally spawning populations both above and below barriers, denoted with A and B, respectively. Strains of Rainbow Trout from Fillmore Hatchery used for regional stocking are indicated with FH. Numbers associated with branches indicate percentage >50% of the 10,000 bootstrap replications in which the branch appeared (from Clemento et al. 2009).

Fraik et al. (2021) recently studied patterns of genetic diversity both before and after dam removal on the Elwha River (in Washington state) and determined that populations separated by natural barriers had greater genetic differentiation than those separated by long-standing dams. Following the removal of major artificial dams on the Elwha, they also detected admixture of above- and below-dam lineages and recolonization of upstream areas by steelhead.

While many fish populations separated by barriers within the same watershed have been shown to be closely related (Heath et al. 2008; Clemento et al. 2009; Pearse et al. 2009; Leitwein et al. 2017), major barriers to anadromy, both natural and artificial, have been found to prevent gene flow between populations upstream and downstream of the obstruction (Pearse et al. 2009; Abadía-Cardoso et al. 2019; Fraik et al. 2021). Multiple studies have demonstrated that there is often a discrepancy between life history expression (Nielsen 1999; Pearse et al. 2009) and associated adaptive genetic variation (Leitwein et al. 2017; Phillis et al. 2016; Apgar et al. 2017; Abadía-Cardoso et al. 2019) across major fish passage barriers. In a number of California watersheds, *O. mykiss* populations above major barriers, especially permanent artificial barriers, have shown decreased anadromous allelic frequency when compared with the population below (Leitwein et al. 2017; Phillis et al. 2016; Abadía-Cardoso et al. 2019). Likewise, in San Francisco Bay Area study streams, most above-dam *O. mykiss* populations, have significantly lower frequencies of the anadromous *Omy5* genotype than populations downstream of barriers (Leitwein et al. 2017). Abadía-Cardoso et al. (2019) also found decreased frequencies of anadromous alleles above barrier dams in the American River drainage.

Reduced migratory allelic frequency in fish populations above longstanding natural barriers is the expected condition since the population is fragmented and gene flow is unidirectional. Fish can almost always move, either passively or volitionally, over barriers in the downstream direction, potentially contributing genes to the downstream population. Those that inhabit waters upstream of permanent barriers either assume a resident life history or must migrate downstream, taking migratory alleles with them and further reducing their frequency in the upstream population (Leitwein et al. 2017). It is also important to note that some above-barrier fish populations exhibit less genetic diversity (lower heterozygosity) than their below-barrier counterparts within the same drainage (Martínez et al. 2011). In some cases, however, fish carrying anadromous alleles may not be able to move downstream over barriers, especially large artificial dams and other complete barriers, which may help maintain anadromous *Omy5* variants in some above-dam populations (Leitwein et al. 2017; Pearse et al. 2014). It also appears that some large, above-barrier reservoirs can act as “surrogate oceans” and may assist in the retention of anadromous genotypes and the expression of the adfluvial life history type (Leitwein et al. 2017). However, a reservoir environment imposes different selective pressures than migration to the northern Pacific Ocean, and therefore we would expect the anadromous genotype to be changed over time and eventually lose its ability to express a successful anadromous phenotype.

Apgar et al. (2017) recently investigated the effects of climate, geomorphology, and fish passage barriers on the frequency of migration-associated alleles in *O. mykiss* populations across four California steelhead federal-ESA-listed DPSs (Southern California, South-Central

California Coast, Central California Coast, and Northern California). Long-term natural barriers and artificial dams that provide no fish passage had the most pronounced negative impact on migration-associated allele frequency. Southern California DPS populations had the lowest frequency of *Omy5* haplotypes associated with anadromy of all California DPSs sampled. The Southern California DPS also exists in a number of heavily developed watersheds, with the greatest average number of partial and complete artificial barriers of the DPSs sampled. Removal of these barriers was predicted to substantially increase the frequency of anadromous alleles in southern California watersheds (Apgar et al. 2017).

2.5.7 Genetic Impacts of Historical Stocking

Clemento et al. (2009) conducted a genetic analysis using microsatellite loci to elucidate the genetic population structure of *O. mykiss* in southern California, with an emphasis on above- and below-barrier genetic relationships. Their analysis included an evaluation of genetic influences of long-standing Fillmore Hatchery stocking on naturally spawned populations in the region. In regional population structure analysis, Fillmore Hatchery Rainbow Trout strains clustered separately from all wild populations, both above and below barriers. This dispersal pattern indicates that there was no evidence of hatchery introgression with wild *O. mykiss* within the Southern SH/RT range (Clemento et al. 2009).

Abadía-Cardoso et al. (2016) used microsatellite and SNP loci to elucidate *O. mykiss* ancestry at the extreme southern extent of its range. Most samples collected for this study were from populations above anadromous barriers, which mostly precludes any analysis of Southern SH/RT genetic lineage pertinent to the proposed CESA listing unit, which includes only below barrier *O. mykiss*. The evaluated southern California *O. mykiss* populations had lower genetic diversity than other California steelhead populations and, genetically, most resembled hatchery Rainbow Trout. The most northern of the evaluated populations of the Southern SH/RT exist in the Santa Maria, Santa Ynez, and Santa Clara rivers, all of which exhibit genetics associated with the native coastal steelhead lineage, matching the results of Clemento et al. (2009) and Nielsen et al. (1997). Many of the more southern populations have been almost entirely replaced by hatchery produced Rainbow Trout, and only select populations in the San Luis Rey River, Coldwater Canyon Creek, the Santa Ana River watershed, and the San Gabriel River were found to have significant native coastal steelhead ancestry. Based upon these findings, the authors recommended that conservation planning focus on these populations for the preservation of native coastal lineages. These populations also had shared ancestry with the native coastal *O. m. nelsoni* from Baja California. Secondarily, they identified Bear Creek and Devil's Canyon Creek as high value populations with remnant, detectable levels of native ancestry. Also, in contrast to northern coastal steelhead populations, southern California *O. mykiss* showed low allelic frequency correlated with anadromy at *Omy5* loci, again consistent with extensive introgressive hybridization with hatchery Rainbow Trout and limited opportunities to express the anadromous life history. Low genetic variation, observed in populations with predominantly native ancestry, may not allow them to endure changes in environmental conditions, particularly rapid and dramatic changes like those being driven by escalating climate change impacts to the region. Abadía-Cardosa et al (2016) further recommended a managed translocation strategy between the few remaining southern populations with native ancestry to help slow the erosion of native genetic diversity. They found a high variability in the frequency of alleles associated with anadromy, suggesting that many populations of Southern RT/SH may maintain the capability to express the anadromous phenotype.

Nuetzel et al (2019) examined population genetic structure of *O. mykiss* populations in the Santa Monica Mountains BPG using a set of SNP markers. Specifically, they conducted genetic analyses of *O. mykiss* from Topanga, Malibu and Arroyo Sequit creeks and compared SNP data to the existing data from the Abadía -Cardosa et al (2016) study, including Omy5 genetic marker data. Their results indicate that Malibu Creek trout are almost entirely of native ancestry. The analysis of Topanga Creek trout was more complex, suggesting that Topanga Creek is a predominantly unique native population with some introgressive hybridization with hatchery Rainbow Trout. The authors did not have a sufficient sample size from Arroyo Sequit Creek to draw meaningful inferences about the ancestry of that population. Both Malibu and Topanga creeks were also found to have relatively high frequencies of the anadromous Omy5 alleles. Together, both of these populations can be a valuable genetic resource for recovery of southern California native coastal *O. mykiss*.

3. ASSESSMENT OF PROPOSED CESA LISTING UNIT

The Commission has authority to list species or subspecies as endangered or threatened under CESA (Fish and G. Code, §§ 2062, 2067). The Legislature left to the Department and the Commission, which are responsible for providing the best scientific information and for making listing decisions, respectively, the interpretation of what constitutes a “species or subspecies” under CESA (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535, 1548-49). The Department has recognized that similar populations of a species can be grouped for efficient protection of bio- and genetic diversity (*id.* at 1546-47). Further, genetic structure and biodiversity in California populations are important because they foster enhanced long-term stability (*id*. at p. 1547). Diversity spreads risk and supports redundancy in the case of catastrophes, provides a range of raw materials that allow adaptation and persistence in the face of long-term environmental change, and leads to greater abundance (*ibid*.).

Courts should give a “great deal of deference” to Commission listing determinations supported by Department scientific expertise (*Central Coast Forest Assn. v. Fish & Game Com.* (2018) 18

Cal.App.5th 1191, 1198-99). Courts have held that the term "species or subspecies" includes ESUs (*id*. at 1236, citing *Cal. Forestry Assn.*, 156 Cal.App.4th at pp. 1542 and 1549). The Commission's authority to list necessarily includes discretion to determine what constitutes a species or subspecies (*id.* at p. 1237). The Commission's determination of which populations to list under CESA goes beyond genetics to questions of policy (*ibid.*). The Department and Commission's determinations of what constitutes a species or subspecies under CESA are not subject to the federal ESA, regulations based on the federal ESA, or federal ESA policies adopted by NMFS or USFWS, but those sources may be informative and useful to the Department and Commission in determining what constitutes a species or subspecies under CESA.

The ESU designation has been used for previous Pacific salmon listings under CESA, including the Sacramento River Winter-run Chinook Salmon ESU (Endangered, 1989), the Central Valley Spring-run Chinook Salmon ESU (Threatened, 1999), Southern Oregon-Northern California Coast Coho Salmon ESU (Threatened, 2005), and the Central California Coast Coho Salmon ESU (Endangered, 2005). In 2022, the Commission listed northern California summer steelhead as endangered under CESA. In support of that listing, the Commission determined that the petitioned listing unit qualified as a subspecies under CESA "based on the discreteness (when compared to other ecotypes) and significance of that listing unit within the state of California" (Cal. Fish and G. Com. 2022).

3.1 DPS and ESU Criteria

The federal ESA defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532). In 1991, NMFS adopted its policy on how it would apply the definition of "species" to Pacific salmon stocks for listing under the ESA. Under the NMFS ESU Policy, a salmon stock is considered a DPS if it constitutes an ESU of the biological species. To be considered an ESU, the salmon stock must meet two criteria (NMFS 1991):

1. "It must be substantially reproductively isolated from other conspecific population units; and
2. It must represent an important component in the evolutionary legacy of the species."

Generally, reproductive isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units (NMFS 1991). The evolutionary legacy of a species refers to whether the population contributes substantially to the ecological and genetic diversity of the species as a whole (NMFS 1991).

In February 1996, USFWS and NMFS published a joint DPS policy for the purposes of ESA listings. Three elements are evaluated in a decision regarding the determination of a possible DPS as endangered or threatened under the ESA. These criteria are (NMFS 1996a):

1. "Discreteness of the population segment in relation to the remainder of the species to which it belongs;
2. The significance of the population segment to the species to which it belongs; and
3. The population segment's conservation status in relation to the [federal ESA's] standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened [under the federal ESA's standards])."

A population segment is discrete if it meets either of two conditions specified in the DPS Policy (NMFS 1996a):

1. "It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of Section 4(a)(1)(D) of the [ESA]."

If a population segment is determined to be discrete based on physical, physiological, ecological, or behavioral factors, its significance and status are then evaluated based on several characteristics specified in the joint DPS Policy. These include, but are not limited to (NMFS 1996a):

1. "Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.
2. Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.
3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.
4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics."

Under the DPS Policy, if a population segment is found to be both discrete and significant, its status is then evaluated for listing based on listing factors established by the federal ESA.

3.2 Southern SH/RT Evaluation under the Joint DPS Policy

The proposed listing unit (Southern SH/RT) in the Petition is "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories, from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border." Southern SH/RT is a subtaxon of the species *O. mykiss*. The anadromous life history of Southern SH/RT is not markedly separate from the non-anadromous life history of Southern SH/RT below manmade and natural barriers to anadromy. To determine whether Southern SH/RT is a subspecies for the purposes of CESA listing, the Department used the joint DPS Policy to determine whether Southern SH/RT is a DPS. The Department evaluated the proposed listing unit by applying the first (discreteness) and second (significance) criteria of the joint DPS Policy but not the third criterion (the population segment's conservation status in relation to the federal ESA's standards). The Department did not apply the third criterion because after using the discreteness and significance criteria to determine whether Southern SH/RT is a DPS and hence a subspecies for purposes of CESA, the Department will assess the listing unit's status in relation to CESA's standards rather than the federal ESA's standards.

In 2006 NMFS concluded that application of the joint DPS Policy to West Coast *O. mykiss*, including the Southern California Steelhead DPS, was logical, reasonable, and appropriate (NMFS 2006). Further, NMFS concluded that use of the ESU Policy, which was originally intended for Pacific salmon, should not continue to be applied to *O. mykiss*, a type of salmonid with characteristics not typically exhibited by Pacific salmon (NMFS 2006). The Department finds that the application of the discreteness and significance DPS criteria from the DPS Policy is appropriate, logical, and reasonable for identifying whether Southern SH/RT is a subspecies for purposes of CESA because the taxon exhibits characteristics that are not typically exhibited by other Pacific salmonids, for which the ESU policy was developed.

3.2.1 Discreteness

Markedly Separate: Yes. The Department considers Southern SH/RT to be markedly separate from other populations of the taxon along the West Coast of North America based on unique regional biogeography, ecology, physiology, and behavior of Southern SH/RT. Point Conception in southern California is a well-studied biogeographic boundary that separates different physical oceanographic processes and the abundance and distribution of many marine species (Horn and Allen 1978; Horn et al. 2006; Miller 2023). The coastal areas north of Point Conception have cooler water temperatures, stronger upwelling, high nutrient concentrations, and the coastline is generally rocky. Within the southern California Bight, water temperatures are warmer, upwelling is weaker, and the coastline is typically sandy. While intraspecific genetic breaks do not always coincide with biogeographic boundaries near Point Conception (Burton

1998), the Department maintains that the DPS standards for discreteness do not require absolute separation of a DPS from other members of this species, because this can rarely be demonstrated in nature for any population of organisms (NMFS 1996a).

The life history of Southern SH/RT relies more heavily on seasonal precipitation than populations of the same taxon occurring farther north (Busby et al. 1996). Because average precipitation is substantially lower and more variable and erratic in southern California than regions to the north, Southern SH/RT are more frequently exposed to adverse environmental conditions in marginal habitats (i.e., warmer water temperatures, droughts, floods, wildfire) (Busby et al. 1996). Morphologically, anadromous forms of Southern SH/RT are typically longer in length and more streamlined in shape than more northern populations to enable passage through southern California's erratic and low streamflow watersheds (Moyle et al. 2017).

The Department also considers Southern SH/RT to be markedly separate from above-barrier populations of *O. mykiss* in watersheds that are within the geographic scope of the proposed listing unit, because these above-barrier populations do not contribute substantially to the below-barrier populations of Southern SH/RT. Despite several studies showing that above and below barrier *O. mykiss* populations within the same drainage are closely related, major artificial and natural barriers to anadromy prevent migration and gene flow between these populations (Heath et al. 2008; Clemento et al. 2009; Pearse et al. 2009; Abadia-Cardoso et al. 2019; Fraik et al. 2021). Disconnection between populations is further illustrated by the fact that a number of above-barrier *O. mykiss* populations exhibit reduced migratory allelic frequency compared to below-barrier Southern SH/RT. This is particularly true for *O. mykiss* populations in southern California, where long-standing natural and artificial barriers that impede fish passage have led to a lower frequency of migratory alleles associated with anadromy than in populations further north (Apgar et al. 2017).

International Border: No.

3.2.2 Significance

Unique Ecological Setting: Yes. The range of Southern SH/RT represents one of the southernmost regions of the taxon's entire West Coast Range of North America. Within this range, the watersheds that occur south of the Santa Monica Mountains have a semi-arid climate that is characterized by low precipitation, high evaporation rates, and hot and dry summers (CDFW 2021d). This climate type represents a unique ecological setting for Southern SH/RT relative to most *O. mykiss* populations along the West Coast of North America that occur in Mediterranean climates characterized by summer fog.

The ecological setting for Southern SH/RT is characterized by significant urbanization which is unique among many other federally listed steelhead DPSs that occur in coastal regions of California that are not as highly developed or populated. For example, approximately 22 million people reside in the southern California counties of Santa Barbara, Ventura, Los Angeles, Orange, San Bernardino, Imperial, and San Diego, whereas the population in the South-Central coast counties of Santa Cruz, Santa Clara, Monterey, San Benito, and San Luis Obispo is approximately 2.8 million people (NMFS 2012a; NMFS 2013). Furthermore, almost all Southern SH/RT-bearing watersheds contain dams and water diversions that have blocked access to most historic spawning and rearing habitats. Of the four DPSs sampled by Apgar et al. (2017), the Southern California Steelhead DPS contained the highest average number of partial anthropogenic barriers per watershed (n = 4.7) and the highest total number of complete anthropogenic barriers (n = 8). For context, the neighboring, and more northern South-Central Coast DPS contains a significantly lower average number of partial anthropogenic barriers per watershed (n = 1.6) and complete anthropogenic barriers (n = 1). Moreover, nearly all estuary and lagoon ecosystems in southern California have been severely degraded, thereby limiting the ability of juvenile Southern SH/RT to utilize these critical nursery habitats (Moyle et al. 2017). While these anthropogenic threats are not necessarily unique to the southern California coastal area, the region's highly variable and erratic hydrologic cycle and relatively arid climate, combined with the impacts of climate change, make Southern SH/RT increasingly vulnerable to extinction and less resilient to disturbance events and catastrophic events such as major wildfires and floods.

Gap in Range: Yes. The Department maintains that the loss of Southern SH/RT would result in a significant truncation of the southern range of the taxon along the West Coast of North America. The range of Southern SH/RT encompasses approximately 12,700 square miles with 25,700 miles of streams (NMFS 2012a).

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. Individuals from populations of Southern SH/RT have been shown to not be genetically isolated from populations of *O. mykiss* in the south-central California coast (Clemento et al. 2009). Evidence of straying has been documented in steelhead in central California (Donohue et al. 2021), and genetic population structure analyses suggest that there was historical exchange of genetic information between coastal populations (Garza et al. 2014). Although many steelhead populations can be partially isolated, at least a small amount of exchange between different populations of steelhead is to be expected due to natural straying. This connectivity results in a level of genetic similarity, which is more pronounced between neighboring populations, and prevents most populations from being completely isolated (Bjorkstedt et al. 2005; Garza et al. 2014; Arciniega et al. 2016).

Nonetheless, allozymes, mitochondrial DNA, and microsatellites have uncovered significant and unique genetic diversity in southern California steelhead, including traits not found in more northern populations. Busby et al. (1996) noted that a mitochondrial DNA type exists in *O. mykiss* populations between the Santa Ynez River and Malibu Creek that is rare in populations to the north, while samples from Santa Barbara County were found to be the most genetically unique of any wild coastal steelhead populations analyzed. Conservation of both neutral and adaptive genetic diversity, such genetic variation associated with migratory life history, is crucial in maintaining the ability of *O. mykiss* populations to adapt to altered environments. Given that Southern SH/RT populations have the lowest frequencies of anadromous genotypes, it is critical to preserve this genetic variation and ensure no more of it is lost.

3.2.3 Conclusion

Southern SH/RT satisfies the first (discreteness) and second (significance) criteria of the joint DPS Policy: i.e., Southern SH/RT is markedly separate and biologically significant to the taxon to which it belongs. Accordingly, the Department concludes that Southern SH/RT is a DPS and hence a subspecies for the purposes of CESA listing.

4. POPULATION TRENDS AND ABUNDANCE

4.1 Structure and Function of Viable Salmonid Populations

In this review, we use the definition of “population” from McElhany et al. (2000): “An independent population is a group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place, or in the same place at a different season.” In other words, a population as defined by McElhany et al. (2000) is a group of fish that experiences a substantial degree of reproductive isolation.

Steelhead have strong fidelity to their natal stream, which can lead to substantial reproductive isolation and, as a result, create local adaptation within somewhat isolated populations (Waples et al. 2008). Isolation can expose these local populations to varying degrees of genetic drift as well as different environmental pressures that ultimately lead to the development of genetic and phenotypic differences. Although many steelhead populations can be partially isolated, at least a small amount of exchange between different populations of steelhead is to be expected due to natural straying. This connectivity results in a level of genetic similarity, which is more pronounced between neighboring populations, and prevents most populations from being completely isolated (Bjorkstedt et al. 2005; Garza et al. 2014; Arciniega et al. 2016).

The concept of viable salmonid populations was introduced by McElhany et al. (2000). A viable salmonid population is defined as, “an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame,” and an independent population is defined as, “any collection of one or more local breeding groups whose population dynamics or extinction risk over a 100-year time period are not substantially altered by exchanges of individuals with other populations.”

McElhany et al. (2000) introduced four criteria for assessing viability of salmonid populations: abundance, productivity, population spatial structure, and diversity. These parameters form the foundation for evaluating population viability because they serve as reasonable predictors of extinction risk, reflect general processes important to all populations of species, and are measurable. Abundance is a key parameter because smaller populations are at greater risk of extinction than larger populations. Productivity, which is associated with abundance, serves as an indicator of population growth rate either over an entire life cycle or stage-specific life-history stage. Population spatial structure represents the distribution of individuals in habitats they use throughout their life cycle, as well as the processes that generate that distribution. Spatial structure often reflects the amount of suitable habitat available for a population as well as demographic stability and the level of straying among habitats. Diversity represents variation in traits such as anadromy, run-timing, and spawning behavior and timing. Typically, a more diverse population is more likely to contain individuals that will survive and reproduce in the face of environmental variation (McElhany et al. 2000). In this chapter, we evaluate, to the best of our ability, these four criteria for Southern SH/RT populations.

4.2 Sources of Information

We reviewed many sources of information for this Status Review, including primary research and literature review articles, the CESA listing petition, previous federal status reviews, recovery plans, viability assessments, Department reports and documents, annual reports from ongoing Southern SH/RT monitoring efforts, and historical reports. Agency staff with knowledge of watersheds supporting Southern SH/RT were also consulted for information.

Data limitations and uncertainties associated with historical accounts for Southern SH/RT limits our ability to understand their complete historical abundance and distribution in their range. The majority of available historical data are in reports, technical memos, and other documents that have not undergone a formal peer-review process. These types of historical sources are not necessarily at a high level of scientific rigor and have not been subject to peer review, but they represent the best information available at the time of this review regarding the historical distribution and abundance of Southern SH/RT populations.

Multiple data sources were used to evaluate viability metrics of Southern SH/RT populations. These data are mostly derived from monitoring reports from several single-basin annual survey efforts. For example, data for the Santa Ynez River population was sourced from monitoring reports developed by the Cachuma Operations and Maintenance Board (COMB). Data for the Ventura River was sourced from annual monitoring reports produced by Casitas Municipal Water District (CMWD), and data contained in Booth (2016) for the United Water Conservation District (UWCD) was used for the Santa Clara River population (See Appendices A – D for full data sources). Although data from these monitoring reports represent the best available scientific information in many southern California watersheds, the data may be derived from different monitoring approaches and designs, contain detection bias, and vary in the level of monitoring effort through time and geographic areas. These constraints may limit the power of statistical analyses to assess trends in viability criteria. Therefore, the results of the analyses conducted in subsequent portions of this chapter should be interpreted in the context of these limitations.

Dagit et al. (2020) describes the occurrences of adult steelhead from 1994-2018 and was also used as a source of peer-reviewed information to provide insight into the abundance trends of Southern SH/RT, particularly for the basins south of Los Angeles where historically no monitoring of steelhead occurred. Additional information on the data sources used in this chapter can be found in Appendices A - D. and Dagit et al. (2020).

4.3 Historical and Current Distribution

This section discusses the historical and current distribution of Southern SH/RT within their range. The section is structured on the five BPGs, which are a federal delineation based on a suite of environmental conditions (e.g., hydrology, local climate, geography) and watershed characteristics (i.e., large inland or short coastal streams) (NMFS 2012a). Separate watersheds within each BPG are considered to support individual populations of southern SH and RT; therefore, single BPGs encompass multiple watersheds and populations (Figure 6). Additional information on southern SH/RT distribution in watersheds not included in this section can be found in Good et al. (2005), Becker and Reining (2008) and Titus et al. (2010). In general, estimates of historical population abundance are based on sparse data and assumptions that are plausible but have yet to be adequately verified or tested. While the following historical estimates are likely biased either upward or downward, the examination of historical records of adult run size in southern California show consistent patterns of abundance that are at least two or three orders of magnitude greater in size than in recent years.

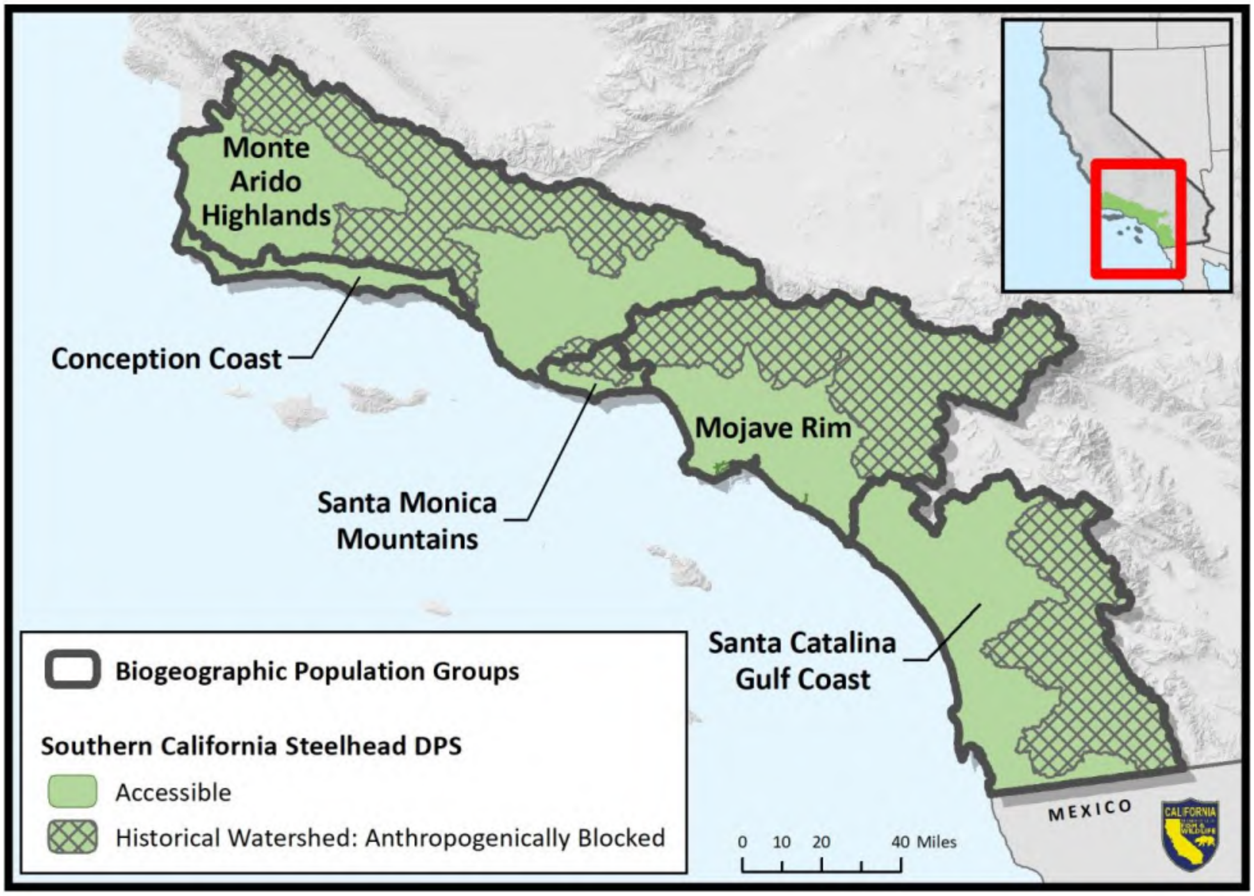


Figure 6. Map of the current and historical distribution of Southern SH/RT. BPGs represented are the Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast.

4.3.1 Monte Arido Highlands Biogeographic Population Group

The Monte Arido Highlands BPG includes four watersheds spanning San Luis Obispo, Santa Barbara, Ventura, and northern Los Angeles counties draining the west side of the Transverse Range and terminating at the Pacific Ocean (NMFS 2012a; Figure 7). Inland stretches of these watersheds are high in elevation and mountainous, but otherwise the watersheds contain different geographic features. Watersheds in this BPG are susceptible to “flashy” flows with seasonal storms and can also dry during the summer even in mainstem reaches. Perennial flows are mainly found in the upper reaches of tributaries that still retain groundwater connection (NMFS 2012a).

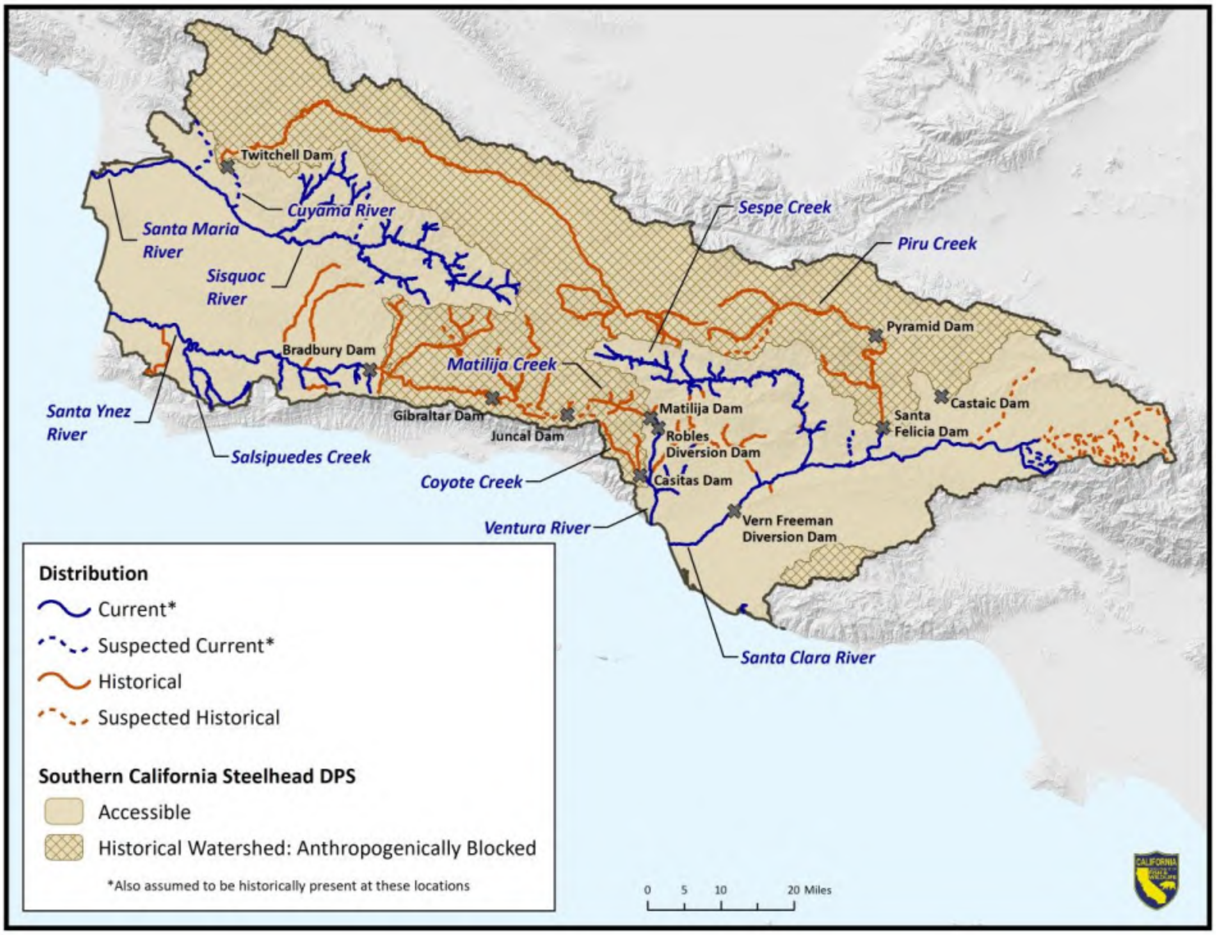


Figure 7. Map of the Monte Arido Highlands BPG depicting known and suspected current and historical distribution.

4.3.1.1 Santa Maria River

The Santa Maria River runs from the confluence of the Cuyama and Sisquoc rivers to the ocean and encompasses 1,790 square miles of watershed (Becker and Reining 2008). Historically, the Santa Maria River served mainly as a corridor for steelhead migrating to and emigrating from the Cuyama and Sisquoc rivers, rather than as habitat for spawning and rearing (Titus et al. 2010).

Hatchery stocking of *O. mykiss* occurred in the early 1930s in the Sisquoc and Cuyama watersheds (Titus et al. 2010). However, local newspaper records from the late 1800's reported abundant harvests of *O. mykiss* in the Sisquoc River watershed well before hatchery stocking occurred (Camm Swift, Emeritus, Section of Fishes, Natural History Museum of Los Angeles County, personal communication). In the early to mid-1940s, juvenile steelhead from the Santa Ynez River were rescued and translocated to the Santa Maria River. Tributaries of the Cuyama

River were stocked with Rainbow Trout in the 1940s to support recreational fishing; however, it is unknown if there was a historical run of anadromous Southern SH/RT in the Cuyama River tributaries (Titus et al. 2010). Starting in 1950, there was essentially no steelhead fishery for at least a decade (Titus et al. 2010).

The Sisquoc River had a robust population of resident *O. mykiss* in 1959 (Becker and Reining 2008) and fish were seen in smaller numbers in 1964 (Titus et al. 2010). Southern SH/RT of multiple age classes were also observed in the upper river during the 1990s (Becker and Reining 2008). In 2005, substantial numbers of young-of-the-year (YOY) *O. mykiss*, as well as some older age classes, were observed in the upper Sisquoc watershed during a population survey (Stoecker 2005).

Other smaller tributaries in the Santa Maria watershed, mostly tributaries of the Sisquoc and Cuyama rivers, have had limited historical and present *O. mykiss* observations from surveys, although some anecdotal sightings have occurred (Becker and Reining 2008). The streams include Deal Canyon Creek, Reyes Creek, Beartrap Creek, Tepusquet Creek, La Brea Creek, North Fork La Brea Creek, Manzana Creek, Davy Brown Creek, Munch Canyon Creek, Sunset Valley Creek, Fish Creek, Abel Canyon Creek, South Fork Sisquoc River, White Ledge Canyon Creek, Rattlesnake Canyon Creek, and Big Pine Canyon Creek. Some of these *O. mykiss* observations were made in tributaries of the Cuyama River post-dam construction (Becker and Reining 2008); however, it is possible that anadromous Southern SH/RT were able to access and inhabit these areas historically. Notably, many of these small tributaries were stocked with thousands of hatchery-raised *O. mykiss* in the mid-1900s for fishery supplementation (Titus et al. 2010).

Twitchell Dam was built on the Cuyama River in the late 1950s, almost 8 miles upstream from the confluence with the Santa Maria River. The dam currently impacts hydrologic function of the Santa Maria system by increasing the frequency of “false positive” migration flows in the Sisquoc River, reducing the frequency of downstream passable migration conditions, increasing the number of days with upstream passable flows that are not followed by additional days of passable flows, and reducing the frequency of long-duration migration flows (Becker and Reining 2008; Stillwater Sciences 2012). Twitchell Dam is a complete barrier to anadromy, and historically, water releases have not been regulated to provide instream flows for upstream and/or downstream steelhead migration in the Santa Maria River during the winter and spring migration periods (Stoecker 2005). Following construction of the dam, the Santa Maria and Cuyama rivers continue to have intermittent flows (Becker and Reining 2008). Currently, the lower mainstem of the Santa Maria River, which serves as a migration corridor for Southern SH/RT, is dry most of the year in most years due to managed aquifer recharge in the Santa Maria Valley (NMFS 2012a). The U.S. Court of Appeals for the Ninth Circuit recently held that under the legislation authorizing construction of Twitchell Dam, the U.S. Bureau of Reclamation and the Santa Maria Water District have discretion to manage and operate Twitchell Dam for the purpose of preventing take of Southern California Steelhead under the federal ESA, which may include adjusting water discharges to support their migration and reproduction (*San Luis Obispo Coastkeeper v. Santa Maria Valley Water Conservation Dist.* (9th Cir. 2022) 49 F.4th 1242, 1244). The case was remanded to the U.S. District Court for the Central District of California (*id.* at 1250), which adopted a pilot project involving supplemental flow releases, to be implemented while consultation under the federal ESA is conducted (*San Luis Obispo Coastkeeper et al. v. Santa Maria Valley Water Conservation Dist. et al.*, Case No. 2:19-CV-08696-AB-JPR, Dkt. No. 167 (October 12, 2023)).

4.3.1.2 Santa Ynez River

The Santa Ynez River is a major watershed spanning approximately 900 square miles and 90 river miles (Becker and Reining 2008). The river is thought to have supported the largest anadromous Southern SH/RT run (Titus et al. 2010). The earliest records of Southern SH/RT in the Santa Ynez occurred in the late 1800s prior to any stocking of the river with hatchery trout (Alagona et al. 2012). Upstream migration of Southern SH/RT past river km 116 was impeded in 1920 resulting from the construction of Gibraltar Dam (Titus et al. 2010). The reservoir supported landlocked steelhead following dam construction and was stocked in the 1930s with hatchery *O. mykiss* as well as steelhead rescued from the Santa Ynez River in 1939, 1940, and 1944 (Titus et al. 2010).

Upstream migration typically occurred from December to March following precipitation events. Southern SH/RT were seen spawning in all tributaries as well as the mainstem below Gibraltar Dam during the spring in the mid-1930s, though flow was observed to limit suitable spawning habitat (Titus et al. 2010). Most spawning in the Santa Ynez River occurred in the upper reaches between Buellton and Gibraltar Dam as well as the tributaries to the mainstem such as Alisal, Santa Cota, Cachuma, Tequepis Canyon, and Santa Cruz creeks. Fish rescues were required during the summer due to intermittent flows and drying of downstream tributary areas as well as the mainstem (DFG 1944).

Tens of thousands of hatchery *O. mykiss* were stocked in Gibraltar Reservoir in the 1930s, and over 100,000 hatchery-reared juvenile steelhead were planted in the Santa Ynez River from 1930-1935. In the 1940s, about 2.5 million juvenile Southern SH/RT were translocated from various areas of the watershed to the lower river (DFG 1944). An approximate run size of at least 13,000 spawners was inferred by a Department staff member based on comparisons with Benbow Dam counts on the South Fork Eel River, California in the 1930s and 1940s (Becker and Reining 2008; Titus et al. 2010). However, it is possible that the Santa Ynez steelhead population may have increased during this period due to ongoing rescue operations that resulted in lower mean mortality rates during the early to mid-1940s (Good et al. 2005). Nonetheless, these estimates may underestimate historical abundance because they were produced 24 years after a significant portion of spawning and rearing habitat had been blocked by Gibraltar Dam.

Construction of Bradbury Dam, originally named Cachuma Dam, downstream of Gibraltar Dam was finished in 1953. Bradbury Dam forms the Lake Cachuma reservoir, blocks Southern SH/RT access to upstream habitat, and alters natural flow regimes and sediment dynamics (Becker and Reining 2008; Titus et al. 2010). Even before the dam was built, the lack of precipitation limited upstream migration due to the sandbar at the mouth of the river remaining intact (Titus et al. 2010). Steelhead run size declined significantly after 1946 and only small numbers were seen in the stream reaches below Bradbury Dam in following decades (Titus et al. 2010). Anadromous Southern SH/RT were effectively extirpated by 1975 due to lack of flows below Bradbury Dam especially during summer months, though steelhead have occasionally been observed over the past few decades (Becker and Reining 2008).

Recently, Reclamation's permit to operate releases from Bradbury Dam was modified to require releases from the dam for purposes of protecting fishery resources in accordance with the 2000 NMFS Biological Opinion during wetter years. This modification also included additional measures to benefit Southern SH/RT, including opportunities to provide fish passage above and below Bradbury Dam, measures to reduce the impacts of predation, and restoration of stream and bankside habitat (SWRCB 2019).

Department staff have monitored steelhead in Salsipuedes Creek, Hilton Creek, and the mainstem Santa Ynez River and have found that most years can support a small steelhead run. However, zero adult steelhead have been found in the Santa Ynez River since 2012 (Boughton et al. 2022a). COMB has conducted uncalibrated, single pass snorkel surveys each year since the 1990s at multiple index sites to determine *O. mykiss* densities in the Santa Ynez River. Until 2012, fish densities were consistent but declined sharply in the following years due to drought conditions (Boughton et al. 2022a). The past few years have seen numbers rebound somewhat in response to wetter conditions. Similar trends were observed in the migrant traps on Hilton and Salsipuedes creeks and the mainstem Santa Ynez River, which have been in operation since 2001 (COMB 2022).

4.3.1.3 Ventura River

The Ventura River watershed encompasses 228 square miles and 16.5 stream miles (Becker and Reining 2008). Matilija Creek and North Fork Matilija Creek intersect to form the headwaters of the Ventura River. Multiple large storage and diversion dams occur in this watershed, altering the natural flow regime and causing negative impacts to Southern SH/RT habitat quantity and quality. About 2 miles downstream of the Ventura River headwaters is the Robles Diversion Dam, which was constructed in 1958 to direct water for storage into Lake Casitas (Becker and Reining 2008; Titus et al. 2010). Both Matilija Dam on Matilija Creek and Casitas Dam on Coyote Creek, are also attributed to population declines of Southern SH/RT on the Ventura River (Titus et al. 2010).

In the 1930s, tens of thousands of juvenile *O. mykiss* were stocked in the Ventura River, as well as thousands of fish that were transplanted from rescues conducted on the Santa Ynez River (Titus et al. 2010). Department staff estimated that the Ventura watershed supported 4,000 to 5,000 steelhead spawners in 1946. In 1973, Department staff estimated a run of between 2,500 and 3,000 steelhead (Becker and Reining 2008). However, the methodologies used to make these estimates were likely based on expert opinion. Similar to the Santa Ynez River, ongoing rescues may have had a small effect on the Ventura River steelhead populations in the 1940s. By the mid-1970s, the steelhead run size was estimated at approximately 100 fish, likely due to limited suitable rearing habitat below Robles Diversion Dam (Becker and Reining 2008).

There are four key tributaries to the Ventura River that historically provided substantial suitable spawning and rearing habitat for *O. mykiss*. These tributaries were Matilija Creek, San Antonio Creek, Coyote Creek, and Santa Ana Creek (Capelli 1974). Coyote Creek likely had a strong run of steelhead with up to 500 adult returns being probable prior to construction of Casitas Dam. Currently, the few returning Southern SH/RT spawners may use the lower reaches of the 13-mile stream for spawning (Becker and Reining 2008; Titus et al. 2010). Matilija Creek, which extends for almost 15 miles from its confluence with the Ventura River, contains ideal spawning and rearing habitat. However, access to the upper reaches of the creek was impeded with the construction of Matilija Dam (Becker and Reining 2008). Before completion of the dam, it is estimated that the creek could have supported runs of 2,000 to 2,500 spawners (Becker and Reining 2008). The removal of Matilija Dam, which is an important element of the Matilija Dam Ecosystem Restoration Project, is currently in the process of environmental review. Tributaries of Matilija Creek contain high quality habitat that continue to support resident *O. mykiss* (Becker and Reining 2008). The removal of Matilija dam will allow access to about 20 miles of stream habitat for Southern SH/RT (MDERP 2022). Historical presence of steelhead in San Antonio Creek is unknown, but the stream is thought to have produced steelhead in the 1980s and 1990s (Titus et al. 2010). Santa Ana Creek was home to *O. mykiss* in the headwater reaches during the 1930s through the 1940s as well as in 1979 (Becker and Reining 2008).

Construction on the Robles Fish Passage Facility, which allows fish passage through the Robles Diversion Dam, was completed in 2006. As a requirement of their federal Biological Opinion, CMWD monitors fish migration through the facility (CMWD 2019). A downstream migrant trap is also operated to evaluate if smolts can pass through the facility without injury (CMWD 2019). A weir trap is then used to evaluate success of smolt migration through the reach downstream of the facility (CMWD 2019). Small numbers of out-migrating smolts have been captured since operation of the weir trap began. However, during the most recent drought (2012-2017), trapping did not occur due to low flow conditions. Since 2017, zero to only a few fish have been observed per year in the vicinity of the passage facility. Presence/absence and redd surveys for *O. mykiss* have also been conducted by CMWD each year and numbers have declined substantially since the beginning of the drought (CMWD 2018).

4.3.1.4 Santa Clara River

The Santa Clara River is a major river that flows into the Pacific Ocean near Ventura, California. The watershed drains an area of approximately 1,600 square miles with 75 stream miles (Becker and Reining 2008). The historical steelhead run was estimated to be around 9,000 fish based on comparisons of habitat suitability metrics produced for the Ventura River (Moore 1980). Numerous instream water diversions have impeded anadromous migration since the 1950s (Becker and Reining 2008; Titus et al. 2010).

In 1991 UWCD built the Vern Freeman Diversion Dam across the Santa Clara River at about 10 river miles from the Pacific Ocean, near the unincorporated community of Saticoy. The Vern Freeman Diversion Dam includes a fish passage facility (Titus et al. 2010), however, in 2019 the U.S. District Court for the Central District of California issued an order that stated, in a factual summary, “the structure and operation of [Vern Freeman Diversion Dam] significantly hampers the migration of steelhead in the Santa Clara River to and from the Pacific Ocean” because it “reduces the availability of water downstream for steelhead migration” and “it is difficult for adult steelhead to successfully pass through the fish ladder” (*Wishtoyo Found., et al. v. United Water Conservation Dist.*, Case No. 2:16-CV-03869-DOC-PLA, Dkt. No. 254 (Mar. 5, 2019); see also NMFS 2012a). Operations of a downstream migrant trap at the Vern Freeman Diversion Dam began in 1993 and typically occur from January to June when flows in the river are sufficient to maintain consistent water levels at the fish trap. A total of 16 adult steelhead and 839 smolts were observed at the Vern Freeman Diversion Dam from 1993-2014 (Booth 2016).

In 2018, the U.S. District Court for the Central District of California issued a judgment in *Wishtoyo Foundation, et al. v. United Water Conservation District* finding that “[UWCD’s] operation and maintenance of Vern Freeman Dam (‘VFD’), including its operation and maintenance of the fish ladder at the VFD, and [UWCD’s] diversion of water from the VFD, constituted ‘take’ of the Distinct Population Segment of Southern California Steelhead . . . in violation of section 9 of the Endangered Species Act” (Case No. 2:16-CV-03869-DOC-PLA, Dkt. No. 248 (December 1, 2018)). In that judgment, the court issued a permanent injunction requiring UWCD to adhere to the water diversion operating rules set forth in a 2008 NMFS Biological Opinion until such time as UWCD obtains incidental take authorization from NMFS for the maintenance and operation of the Vern Freeman Diversion Dam (*ibid.*). The injunction further requires UWCD to design, construct, and obtain certain permits and authorizations for a new fish passage facility at the Vern Freeman Diversion Dam that is reasonably likely to meet NMFS criteria as specified in the judgment (*ibid.*). In September 2023, UWCD issued a Notice of Preparation under CEQA for an environmental impact report that will identify a hardened ramp structure as the preferred alternative for the project (available at https://www.unitedwater.org/wp-content/uploads/2023/09/Notice-of-Prepration-for-EIR_September-2023.pdf). In a joint stipulation filed with the court in July 2023, the plaintiffs and UWCD jointly proposed an order for the court to sign that would require UWCD to submit complete regulatory applications in February 2024 and submit 90% engineered design plans in June 2024 (*Wishtoyo Found., et al. v. United Water Conservation Dist.*, Case No. 2:16-CV-03869-DOC-PLA, Dkt. No. 590 (July 18, 2023).

Tributaries that intersect the Santa Clara River above the Vern Freeman Diversion Dam historically provided most of the suitable Southern SH/RT spawning and rearing habitat in the watershed. Santa Paula Creek, a tributary to the Santa Clara River, contains high quality suitable *O. mykiss* spawning and rearing habitat. The Harvey Diversion Dam is located on the lower reaches of Santa Paula Creek. While this diversion originally provided fish passage, strong flows rendered the facility irreparable in 2005 (Stoecker and Kelley 2005). More recently, the Harvey Diversion Fish Passage Remediation Project has the goal of restoring fish passage at the facility to reestablish connection to the upstream watershed on Santa Paula and Sisar creeks (California Trout 2018).

Sespe and Piru creeks are the largest tributaries of the Santa Clara River and support higher *O. mykiss* numbers than Santa Paula Creek (Stoecker and Kelley 2005). Sespe Creek contains over 198 km of habitat historically accessible to steelhead and sustains the highest relative abundance of wild *O. mykiss*. It is thought that Sespe Creek offers the highest potential for steelhead recovery because it lacks mainstem migration barriers (Stillwater Sciences 2019). However, Sespe Creek is known to dry in years with low precipitation, leading to a loss of connectivity with the Santa Clara River (Puckett and Villa 1985; Stoecker and Kelley 2005). A recent survey found high abundances of aquatic invasive species throughout most reaches of Sespe Creek downstream of its confluence with Howard Creek, which transports high abundances of invasive species from the Rose Valley Lakes (Stillwater Sciences 2019).

The Piru Creek watershed includes the Santa Felicia and Pyramid Dams. Both dams block access to upstream historical habitat on the Santa Clara River. Reservoir and dam operations also lead to unnatural and diminished flow regimes in the watershed (Moore 1980). Prior to the construction of both dams, adult steelhead were reported to migrate up into Buck and Snowy creeks (Stoecker and Kelley 2005). Piru Creek does not provide spawning and rearing habitat to Southern SH/RT (Moore 1980); however, Aqua Blanca and Fish creeks contain suitable habitat and currently support adfluvial *O. mykiss* populations, which could be important in the future for restoring an anadromous run in this tributary (Stoecker and Kelley 2005).

Various Santa Clara tributaries, including those mentioned above, were stocked in the 1930s through 1950s with hatchery *O. mykiss* as well as those rescued from the Santa Ynez River in 1944 (Titus et al. 2010). Some minor tributaries of the Santa Clara River were also stocked but have no historical records of *O. mykiss* presence. These tributaries include Hopper Canyon, Tom, Pole, and Willard creeks (Titus et al. 2010).

4.3.2 Conception Coast Biogeographic Population Group

Many small coastal watersheds that are relatively uniform in geographic features comprise the Conception Coast BPG, which spans about 50 miles of the southern California coast (NMFS 2012a; Figure 8). Streams in this BPG run north to south and have steep slopes in the upper portions of their watersheds where there is perennial flow. Precipitation can be much higher in the upper watersheds and can lead to “flashy” flows due to the steep stream gradients (NMFS 2012a). Both the Carpinteria Creek and Gaviota Creek watersheds have been the focus of habitat restoration in recent years, as both provide high-quality spawning and rearing habitat for Southern SH/RT and have high recovery potential (NMFS 2012a).

4.3.2.1 Gaviota Creek

Gaviota Creek is about six miles in length, connecting with the Pacific Ocean just south of Las Cruces, California. Steelhead were documented in Gaviota Creek in the 1930s in the winter (Becker and Reining 2008) and multiple ages of *O. mykiss* were observed in the 1990s and early 2000s (Becker and Reining 2008). Steelhead runs in Gaviota Creek, which were historically present in most years, were likely small (Becker and Reining 2008). Livestock grazing is responsible for reductions in suitable habitat for Southern SH/RT in the watershed (Becker and Reining 2008). In recent years, periodic bankside observations conducted by the Department have observed a range of zero to a few hundred *O. mykiss* and no adult steelhead in Gaviota Creek (K. Evans, CDFW, unpublished data).

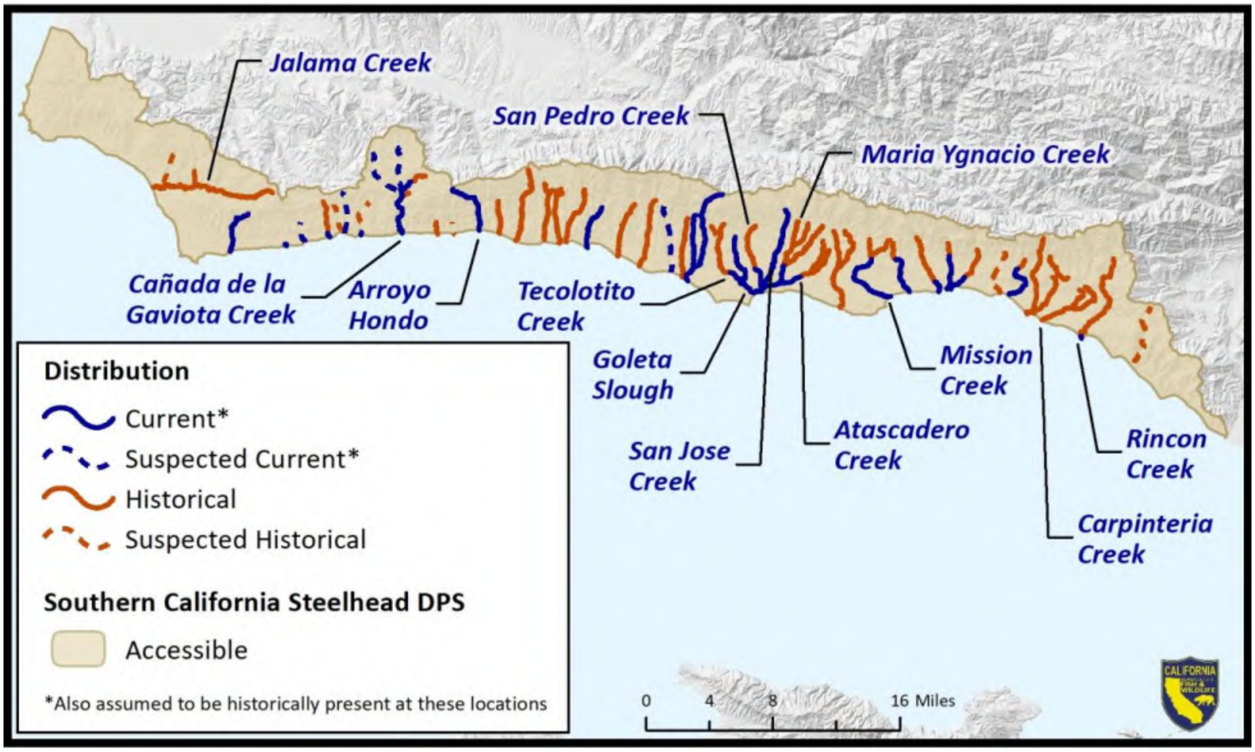


Figure 8. Map of the Conception Coast BPG depicting known and suspected current and historical distribution.

4.3.2.2 Carpinteria Creek

Carpinteria Creek is approximately 6.5 miles long and connects with the Pacific Ocean near Carpinteria, California. Southern SH/RT were observed in the watershed in 1942 (Stoecker et al. 2002) and the stream was understood to have a historical steelhead run (Becker and Reining 2008). Different life stages of *O. mykiss* were seen in the mid-1990s (Becker and Reining 2008), and many were seen in the upper watershed (Becker and Reining 2008) which is known to have suitable habitat (Becker and Reining 2008). A few *O. mykiss* of varying sizes were found in the lower watershed in 2008 (Becker and Reining 2008). In recent years, monitoring conducted by the Department from 2016-2022 have observed few if any individuals of either life-history forms (K. Evans, CDFW, unpublished data).

4.3.2.3 Other Creeks

There are many other creeks flowing into the Pacific Ocean, some of which may have supported Southern SH/RT historically (e.g., Jalama Creek), some where there have been recent observations, and others where *O. mykiss* has not been seen at all. These coastal creeks are typically no longer than 10 stream miles. In addition to Gaviota and Carpinteria creeks, other suitable streams with more recent sightings of Southern SH/RT include Arroyo Hondo Creek and

Rincon Creek (Becker and Reining 2008). Arroyo Hondo Creek contains the least number and severity of threats for Southern SH/RT in the Conception Coast BPG (NMFS 2012a).

4.3.3 Santa Monica Mountains Biogeographic Population Group

There are five watersheds in the Santa Monica Mountains BPG, the majority of which are small with geography resembling that of watersheds in the Conception Coast BPG (NMFS 2012a; Figure 9). Except for Malibu Creek, the headwaters of the streams occur prior to passing through the Santa Monica mountains. Malibu Creek is the largest watershed in the BPG (NMFS 2012a) but is similar to Topanga Creek in stream length (Becker and Reining 2008). There are two substantial anthropogenic migration barriers on Malibu Creek, Rindge Dam and Malibu Lake Dam. Rindge Dam is located a few miles upstream from the mouth and prevents access to nearly all historical Southern SH/RT habitat. The remaining three streams include Big Sycamore Canyon Creek, Arroyo Sequit, and Las Flores Canyon Creek (NMFS 2012a).

4.3.3.1 Malibu Creek

The Malibu Creek watershed encompasses about 105 square miles including 8.5 miles of stream that outflows into the Pacific Ocean at Malibu Lagoon State Beach in Santa Monica Bay (Becker and Reining 2008). Rindge Dam was constructed in 1924 about three miles upstream from the mouth (Becker and Reining 2008; Titus et al. 2010). Before the dam was built, steelhead were able to access spawning habitat in Las Virgenes and Cold creeks (Titus et al. 2010). In 1947, a steelhead run was observed when the sandbar at the mouth was manually opened. In the 1970s, steelhead were observed migrating upstream up to Rindge Dam (Becker and Reining 2008). In 1980, a Department employee counted 61 steelhead immediately downstream of Rindge Dam (Titus et al. 2010). Multiple life stages of *O. mykiss* were observed during a study conducted in the winter and spring of 1986. A total of 158 fish was reported though only one was an adult steelhead. Later in 1986 and in 1987, a handful of adult *O. mykiss* were found below Rindge Dam and a few adult *O. mykiss* were seen just below the dam in 1992 (Titus et al. 2010). The quality of spawning and rearing habitat is the best just below Rindge Dam (Titus et al. 2010), which explains the greater use of that area by juvenile *O. mykiss* (Titus et al. 2010). Stocking of hatchery Rainbow Trout occurred in 1984 at Malibu Creek State Park with additional stockings likely occurring frequently (Titus et al. 2010).

In addition to Rindge Dam and other migration barriers blocking access to historical habitat, the natural flow regime and water quality of Malibu Creek has been modified by operations of the Tapia Water Reclamation Facility (approximately 5 miles upstream from the ocean). Treated water releases from the facility sustain flows in Malibu Creek throughout the year (Titus et al. 2010). Currently, a new recycled wastewater treatment facility is being proposed that would treat effluent from the Tapia Water Reclamation Facility with the purpose of re-distributing the water to the service area rather than releasing it back to Malibu Creek (Las Virgenes-Triunfo Joint Powers Authority 2022). The implementation of this project could lead to less streamflow in Malibu Creek as a result of the repurposing of discharged recycled water that would have previously been released to Malibu Creek.

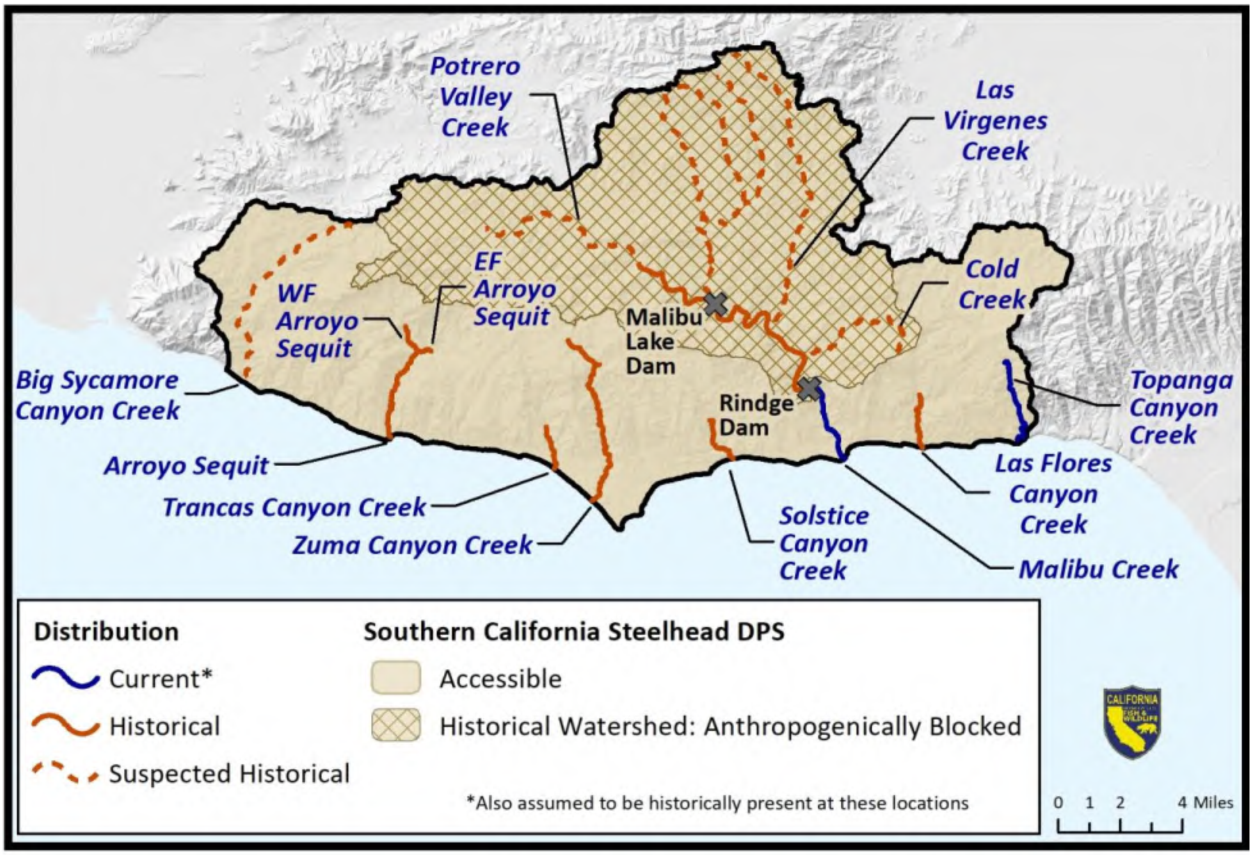


Figure 9. Map of the Santa Monica Mountains BPG depicting known and suspected current and historical distribution. Abbreviations: EF = East Fork, WF = West Fork.

In more recent years, *O. mykiss* have been seen in Malibu Creek below Rindge Dam (Becker and Reining 2008). A die off of about 250 *O. mykiss* occurred in the creek in 2006 after yellowing of the fish was noticed during snorkel surveys (Becker and Reining 2008). Recent drought conditions starting in 2012 have led to reduced abundances of *O. mykiss* in Malibu Creek based on similar observations on Topanga Creek (Dagit et a. 2017)

4.3.3.2 Topanga Creek

Topanga Creek empties into the ocean at Topanga Beach and contains similar stream mileage to Malibu Creek but contains less accessible habitat for Southern SH/RT (Becker and Reining 2008). Some steelhead can access Topanga Creek in years when there is sufficient precipitation (Becker and Reining 2008), and *O. mykiss* of various sizes were observed in the watershed in

1979 (Becker and Reining 2008). Juvenile *O. mykiss* were observed by Department staff in Topanga Creek again in 1982 (Becker and Reining 2008). Unlike in Malibu Creek, the upstream impassable migration barrier for Southern SH/RT is a natural barrier in Topanga Creek (Camm Swift, Emeritus, Section of Fishes, Natural History Museum of Los Angeles County, personal communication).

The Southern SH/RT population in Topanga Creek was recently monitored from 2001-2007, revealing consistent use by spawning steelhead adults and successful smolt production (Becker and Reining 2008). Bell et al. (2011b) characterized the Topanga population as a satellite population that is supported by other populations in the Southern SH/RT range but provides minimal production to other streams. As a satellite population, Topanga Creek *O. mykiss* support the metapopulation in southern California but are more vulnerable to extirpation (Bell et al. 2011b). The effects of the most recent prolonged drought on Southern SH/RT have been severe. Significant reductions for all life-stages were observed from 2012-2016, leading to reductions of the population from 358 individuals in 2008 to less than 50 individuals in 2016 (Dagit et al. 2017).

4.3.3.3 Other Creeks

Big Sycamore Canyon Creek was surveyed in 1989-1990 but no steelhead were observed (Becker and Reining 2008). NMFS (2005) designated the population as extirpated after another survey in 2002.

Arroyo Sequit Creek was reported to have a small historical steelhead run. Steelhead were seen in a 1989-1990 survey of the stream and again in a 1993 survey. From 2000-2007 steelhead were reported utilizing Arroyo Sequit Creek (Becker and Reining 2008).

Overall, from 2005-2019, monitoring in Arroyo Sequit Creek done by the Resource Conservation District of the Santa Monica Mountains (RCDSMM) has observed few *O. mykiss*, primarily due to two instream barriers that were eventually removed in 2016. Two adult observations occurred after the removal of barriers in 2017 (Dagit et al. 2019). There is also limited documentation of steelhead in the West and East forks of Arroyo Sequit Creek (Becker and Reining 2008). Las Flores Canyon Creek is reported to have suitable steelhead habitat but there is no evidence of historical or present use by steelhead (Becker and Reining 2008; Titus et al. 2010).

4.3.4 Mojave Rim Biogeographic Population Group

There are three relatively large watersheds that make up the Mojave Rim BPG (NMFS 2012a; Figure 10). These watersheds include the San Gabriel, Santa Ana, and Los Angeles rivers. The headwaters of these streams are in the San Gabriel and San Bernardino mountains, which experience greater seasonal precipitation than is seen in the neighboring BPGs. Lower watershed areas span the flat coastal plain of the Los Angeles River, which historically contained widespread springs and marshes (Mendenhall 1907). Over time the mouths of these rivers have drifted to different areas along the coast. Currently, the river mouths are each less than 20 miles apart (NMFS 2012a).

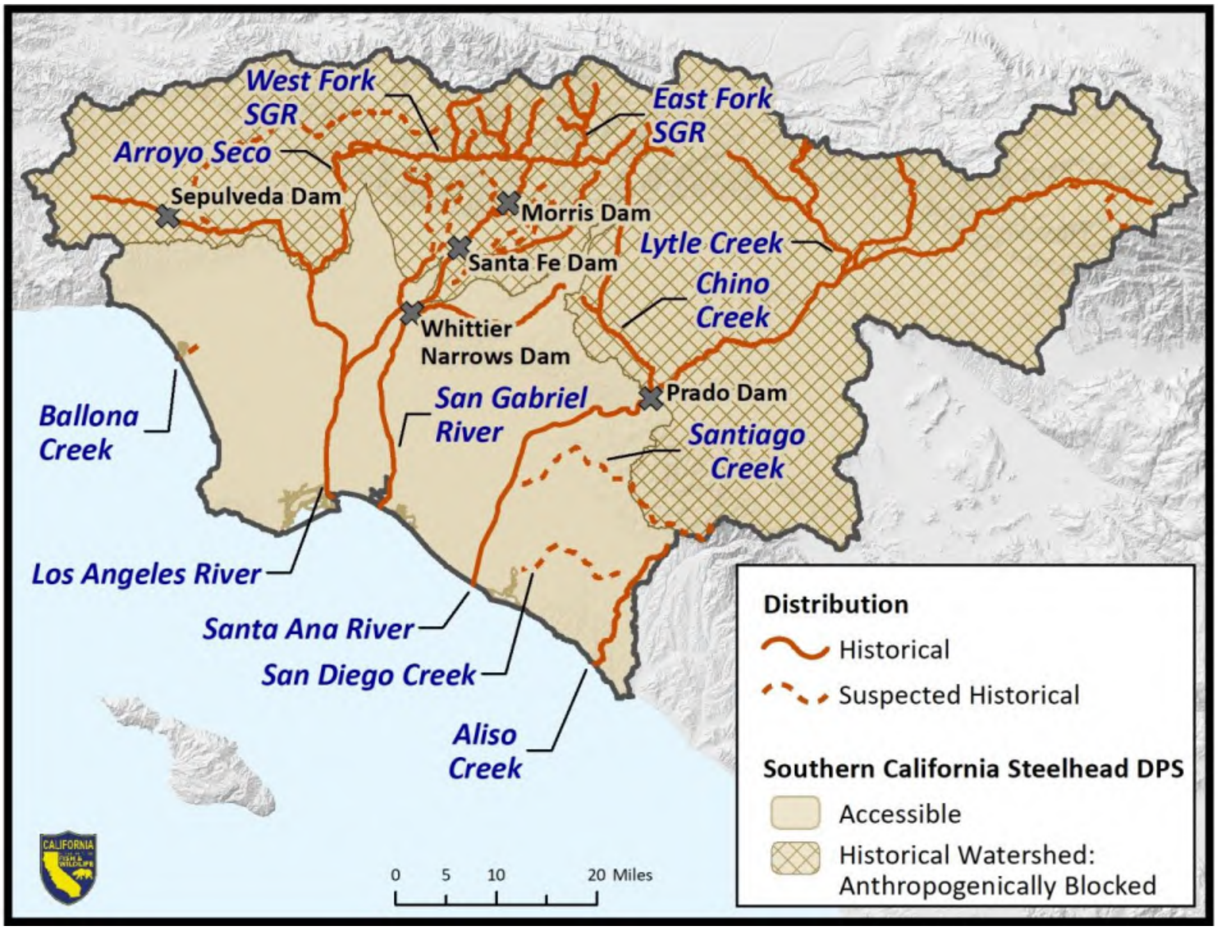


Figure 10. Map of the Mojave Rim BPG depicting known and suspected current and historical distribution. Abbreviations: SGR= San Gabriel River.

4.3.4.1 San Gabriel River

The San Gabriel River encompasses more than 58 stream miles but about half of it is channelized below Santa Fe Dam. Morris Dam and Santa Fe Dam were both constructed in the 1930s (Becker and Reining 2008) and are considered complete barriers to fish migration. Rainbow trout were seen by Department staff in the 1930s, but the river was also stocked during that time (Becker and Reining 2008). Stocking below Morris Dam also occurred on Little Dalton Creek in 1945 (Titus et al. 2010). Rainbow Trout fishing was good from the late 1930s to late 1940s according to various Department stream surveys and in 1951, Department staff noted that natural production was average (Becker and Reining 2008). Fish Canyon Creek and Robert's Canyon Creek, which are mainstem tributaries downstream of Morris Dam, were observed by Department surveyors to have *O. mykiss* in the 1940s, 1950s, and 1973 (Titus et al. 2010).

Southern SH/RT historically occurred in a few tributaries of the San Gabriel River such as San Jose Creek. Many tributaries to the San Gabriel River have been channelized and contain fish passage barriers. Most were stocked for recreational angling in the 1930s and 1940s (Becker and Reining 2008). Southern SH/RT remain in tributaries above the two barrier dams and are known to presently inhabit the East Fork. The ancestry of these fish is unclear and may have genetic influence from stocking *O. mykiss* from other watersheds (Nielsen 1999). There is also a remnant historical population of Rainbow Trout just below Morris Dam that appears to self-propagate (Becker and Reining 2008).

4.3.4.2 Santa Ana River

The Santa Ana River is the largest river within southern California at almost 100 miles long (Becker and Reining 2008). Prado Dam, which is located approximately 30 miles upstream of the river outlet, was constructed in 1941 (O.C. Public Works, n.d.). The lower 24 miles of channelized river below the dam outflows to the Pacific Ocean in Huntington Beach (Becker and Reining 2008). Rainbow Trout were first observed and captured in the upper Santa Ana River drainage in the 1850s (Boughton et al. 2006). Rainbow Trout were also observed in the mountainous upper watershed during the 1930s, coinciding with when stocking occurred (Becker and Reining 2008). A steelhead run was historically present in the lower river (Becker and Reining 2008); however, in 1951 and 1955, no *O. mykiss* were observed in any stream reaches below Prado Dam during Department surveys (Titus et al. 2010). Various water uses have highly altered flows in the Santa Ana River and low numbers of fish in the lower river are attributed to limited water releases from Prado Dam (Titus et al. 2010). Southern SH/RT are thought to be extirpated from the Santa Ana River (Nehlsen et al. 1991), but resident *O. mykiss* remain in the upper watershed above natural and manmade impassable barriers (Boughton et al. 2005).

Southern SH/RT were historically present in Santiago Creek below Prado Dam. Many tributaries upstream of where the dam was built were stocked with *O. mykiss* in the 1930s and fish have been observed reproducing naturally in the decades that followed (Becker and Reining 2008).

4.3.4.3 Los Angeles River

The Los Angeles River is approximately 52 miles long and flows to the Pacific Ocean in Long Beach. Like the San Gabriel River, the Los Angeles River is completely channelized with much of the lower mainstem channel paved with concrete for flood control purposes (Becker and Reining 2008; Titus et al. 2010). Southern SH/RT are assumed to have been present in the watershed but there have been no actual observations to confirm this assumption (Titus et al. 2010). Major tributaries to the Los Angeles River were stocked in the 1930s or 1940s (Becker and Reining 2008; Titus et al. 2010) but some of these tributaries were later channelized and no longer support *O. mykiss*. Due to the highly modified nature of the river basin, Southern SH/RT cannot utilize the mainstem Los Angeles River for spawning or rearing (Titus et al. 2010) and are considered extirpated (Nehlsen et al. 1991). However, resident *O. mykiss* have been observed in the major tributaries of the Los Angeles River, including Arroyo Seco and Big Tujunga Creeks (Becker and Reining 2008). Fish passage by native Southern SH/RT on Arroyo Seco is obstructed by Devil's Gate Dam. Recently, Department-led fish rescues have transplanted Southern SH/RT from the West Fork San Gabriel River and Bear Creek to Arroyo Seco as a result of the Bobcat Fire (Pareti 2020).

4.3.5 Santa Catalina Gulf Coast Biogeographic Population Group

Multiple medium sized watersheds comprise the Santa Catalina Gulf Coast BPG (Figure 11). Most have their headwaters in the Santa Ana or Peninsular Mountain ranges and flow south over coastal terraces (NMFS 2012a). Many watersheds in the BPG have intermittent flow and are seasonally dry due to limited precipitation and groundwater depletion (D. Boughton, NOAA, personal communication). Some smaller drainages within the BPG might occasionally support steelhead. Streams in this BPG have substantial tributary mileage in the upper watershed areas due to the fragmented landscape in the region (NMFS 2012a).

4.3.5.1 San Juan Creek

San Juan Creek is 22-mile stream located in Orange and Riverside Counties. Arroyo Trabuco Creek is a major tributary to San Juan Creek with approximately the same stream length (Becker and Reining 2008). Steelhead were observed in the creek in 1939 (Swift et al. 1993) and in the 1940s as well as in 1968 and 1974 (Becker and Reining 2008). Trout stocking to support fishing in San Juan Creek occurred year-round in 1981 (Becker and Reining 2008) and possibly in other years. San Juan Creek contains suitable habitat for *O. mykiss*, which have been observed in some but not all years in recent decades (Becker and Reining 2008).

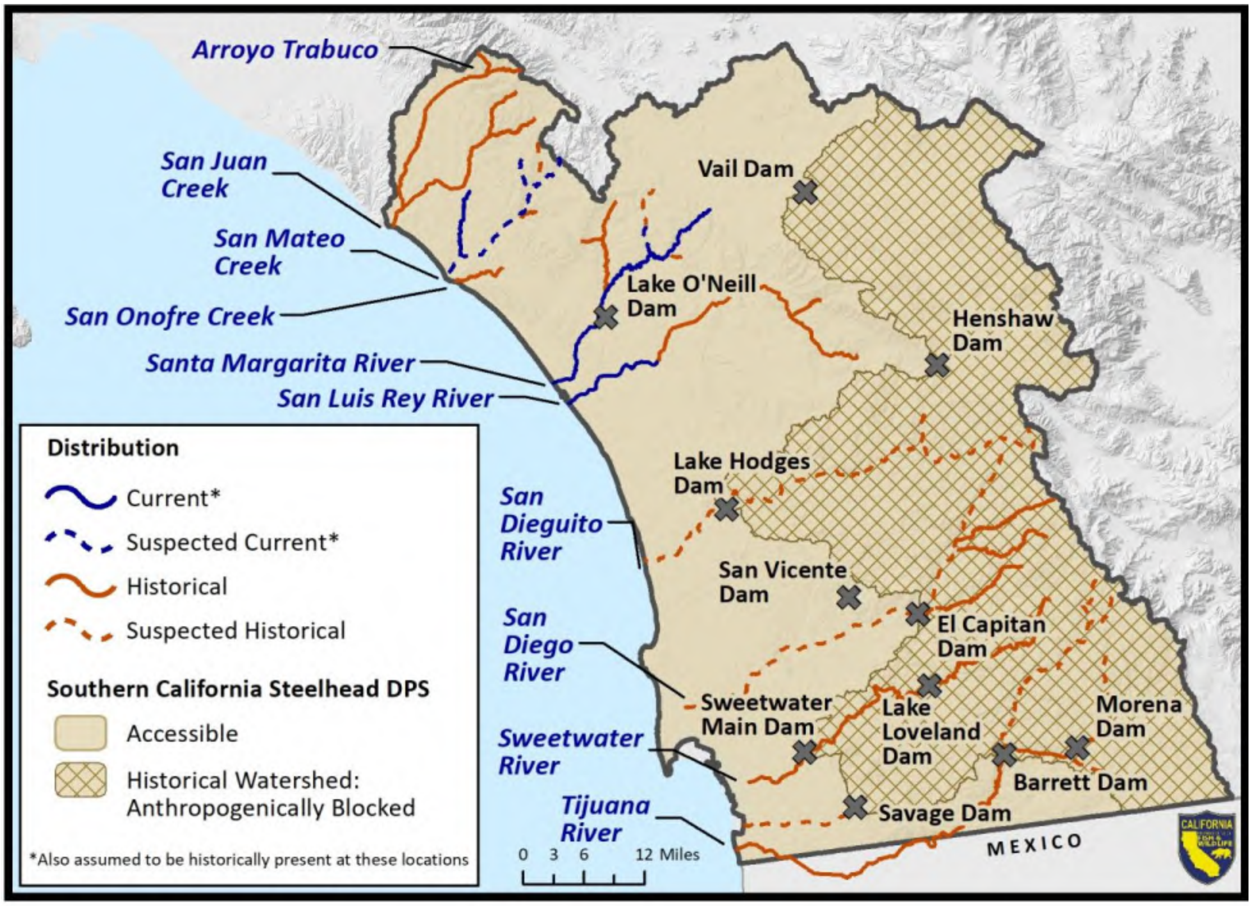


Figure 11. Map of the Santa Catalina Gulf Coast BPG depicting known and suspected current and historical distribution.

Arroyo Trabuco was a historical Southern SH/RT stream; however, there is now a complete barrier to fish migration about 2.4 miles from the confluence with San Juan Creek. Regardless, the stream still appears to contain suitable habitat and steelhead were still thought to be present in 2004 below the barrier (Becker and Reining 2008). Recently, efforts to remediate fish passage at two total barriers to migration on Trabuco Creek are in progress. Completion of this project would provide access to 15 miles of upstream spawning and rearing habitat.

4.3.5.2 San Mateo Creek

San Mateo Creek, which has a similar stream length as San Juan creek, supported a historical steelhead run (Titus et al. 2010). In the early 1900s, anglers were successful in catching Southern SH/RT of greater sizes than in other regional watersheds (Titus et al. 2010). In 1939, juvenile Southern SH/RT were observed and rescued in the thousands from isolated reaches and transferred to the estuary lagoon (Titus et al. 2010). Stocking of the creek began in 1945 (Becker and Reining 2008). Anadromous and resident Southern SH/RT were thought to persist in 1950 (Becker and Reining 2008), though after that year, Southern SH/RT encounters declined (Titus et al. 2010). In 1999, *O. mykiss* sampled by the Department were surmised to be offspring from anadromous Southern SH/RT because of the lack of a resident population (Becker and Reining 2008). Habitat quality in the watershed has been degraded by anthropogenic activities and intermittent streamflow has posed migration issues for Southern SH/RT (Titus et al. 2010). Steelhead were thought to be extirpated from San Mateo Creek (Nehlsen et al. 1991) until more recent monitoring by Hovey (2004) documented a small resident *O. mykiss* population in Devil Canyon Creek, a major tributary to San Mateo Creek. Currently, the San Diego Regional Water Quality Control Board is considered using a draft invasive species Total Maximum Daily Load (TMDL) and plan to certify that actions of other entities will correct impairments to the creek caused by invasive species (Loflen 2022).

4.3.5.3 San Onofre Creek

San Onofre Creek consists of 13 miles of stream in Orange County. Personal observations of annual steelhead runs in the creek prior to 1946 suggest it was a historical Southern SH/RT stream (Becker and Reining 2008). Fletcher Creek, a tributary to San Onofre Creek, was considered a steelhead rearing area in 1950 and *O. mykiss* were observed by Department staff during a survey in 1979 (Titus et al. 2010). By the 2000s, San Onofre Creek was observed to be dry (Boughton et al. 2005), though reaches in the upper watershed may still offer suitable *O. mykiss* habitat (Becker and Reining 2008).

4.3.5.4 Santa Margarita River

The Santa Margarita River is almost 30 miles long, but a diversion weir located approximately ten miles upstream within the boundaries of Camp Pendleton likely acts as a complete barrier to upstream fish migration (Becker and Reining 2008; Titus et al. 2010). This diversion eliminates surface flow during most of the year (Titus et al. 2010). Adult and juvenile steelhead were observed in the river in the 1930s and 1940s and steelhead were thought to migrate upstream to the town of Fallbrook when flows allowed (Becker and Reining 2008). DeLuz Creek, a tributary to the Santa Margarita River, also historically supported steelhead (Becker and Reining 2008). Stocking of *O. mykiss* in the Santa Margarita watershed began in 1941 (Becker and Reining 2008) and occurred most recently in 1984 (Titus et al. 2010). Currently, the reaches downstream of O’Neill Lake do not support Southern SH/RT spawning (Titus et al. 2010) and they are thought to be extirpated (Nehlsen et al. 1991). As part of the Santa Margarita River Conjunctive Use Project, the existing O’Neill weir diversion will be replaced with an inflatable structure that will allow fish passage during most flow events (FPUD 2016). Further upstream, efforts are also underway to replace a fish passage barrier at the Sandia Creek Drive bridge to provide passage to 12 miles of upstream rearing and spawning habitat (Dudek 2021)

4.3.5.5 San Luis Rey River

The San Luis Rey River is a large river in northern San Diego County that runs approximately 69 stream miles from its river mouth near Oceanside, California. Lake Henshaw Dam, which was built in 1924, reduces the downstream flow of the river and blocks steelhead access to the uppermost portion of the drainage (Becker and Reining 2008; Titus et al. 2010). According to Native Americans and other observers of *O. mykiss* in the late 1800s, there was a historical run of steelhead that was able to reach areas above where the dam was constructed (Becker and Reining 2008). Stocking of Rainbow Trout occurred sometime prior to 1946 (Becker and Reining 2008). Although resident Rainbow Trout remain in tributaries of the upper watershed like Pauma Creek and the West Fork San Luis Rey River (Becker and Reining 2008), native Southern SH/RT are extirpated from the lower reaches of the San Luis Rey River (Nehlsen et al. 1991; Becker and Reining 2008).

4.3.5.6 San Dieguito River

The San Dieguito River is a large river in San Diego County that runs for 23 stream miles before entering into the Pacific Ocean north of the City of San Diego. Hodges Dam, which was constructed 12 miles upstream from the mouth in 1918, serves as a complete barrier to anadromy (Becker and Reining 2008). A journal article by Hubbs (1946) mentioned anglers catching possible steelhead in the estuary (Titus et al. 2010). Rainbow trout have been stocked below the dam (Titus et al. 2010); however, those downstream reaches no longer support *O. mykiss* (Becker and Reining 2008). Prior to the construction of the Sutherland Lake dam on Santa Ysabel Creek, a major tributary of the San Dieguito River, Department staff saw *O. mykiss* in a creek upstream of the eventual dam site, though there had been stocking efforts in that creek (Becker and Reining 2008). Black Canyon Creek, another smaller tributary to the San Dieguito River, was also stocked for rainbow trout fishing (Becker and Reining 2008).

4.3.5.7 San Diego River

The San Diego River has a stream length of 52 miles but El Capitan Dam, built in 1934, blocks about 22 miles of historical Southern SH/RT habitat (Becker and Reining 2008). Additionally, channelization of downstream reaches has eliminated suitable habitat below the dam (Titus et al. 2010). Anglers may have caught steelhead historically (Titus et al. 2010) but the population is now thought to be extinct (Nehlsen et al. 1991). Upper watershed tributaries above the dam were stocked in the 1930s and earlier and may still support *O. mykiss* (Becker and Reining 2008; Titus et al. 2010).

4.3.5.8 Sweetwater River

The Sweetwater River is a large river in San Diego County that runs for 55 miles before emptying into San Diego Bay southeast of the City of San Diego. The Sweetwater Reservoir, formed by the construction of the Sweetwater Dam in 1888, serves as a total barrier to anadromy (Becker and Reining 2008; Titus et al. 2010). Although *O. mykiss* were present historically and may still be found in the upper watershed, there are no mentions of a historical anadromous steelhead run in the Sweetwater River (Becker and Reining 2008; Titus et al. 2010). In years leading up to 1946, Cold Stream, a small tributary to Sweetwater River, was stocked with Rainbow Trout and these fish may have continued to naturally reproduce for some time (Becker and Reining 2008).

4.3.5.9 Otay River

The Otay River enters the south end of San Diego Bay near the U.S.-Mexico Border. There are no known historical or current records of Southern SH/RT existing in the Otay River. Fish passage is obstructed by the dam that forms Lower Otay Lake, though there may be *O. mykiss* residing in upper reaches above the reservoir (Titus et al. 2010).

4.3.5.10 Tijuana River

The Tijuana River is the southernmost stream within the Southern SH/RT range and extends for 26 miles from the intersection of Cottonwood Creek (Becker and Reining 2008). Other than one account of a few steelhead seen in 1927 by Department law enforcement, there has been no other documentation of historical use of the mainstem river (Titus et al. 2010). Steelhead were present in Cottonwood Creek in the mid-1930s, which was stocked with *O. mykiss* at that time, but Southern SH/RT are no longer able to pass multiple dams within the creek (Titus et al. 2010). If a steelhead run did exist in the Tijuana watershed, it is now assumed to be extirpated (Titus et al. 2010).

4.4 Abundance and Trends

To provide the best scientific information in our evaluation of Southern SH/RT as required by Fish and Game Code Section 2074.6, we analyzed its status and trends with annual abundance data compiled from a variety of sources (see Section 4.2 for Sources of Information).

Southern SH/RT, as defined in the Petition, include both anadromous and resident forms below complete migration barriers. To account for both life-history forms in our review, our analyses in Sections 4.4-4.8 examine data on anadromous adult Southern SH/RT (Adult SH) separately from data on *O. mykiss* not identified as anadromous adult Southern SH/RT (Other *O. mykiss*), as most existing monitoring efforts produce datasets that use these two categories. This is because it is possible to distinguish anadromous adult Southern SH/RT in rivers and streams due to their larger size (fork length >400m), greater girth, and steel-gray appearance, but it is otherwise difficult to conclude which life history an individual *O. mykiss* that does not have the identifying characteristics of an adult fish has expressed or will express. (Dagit et al. 2020; Moyle et al. 2017).

The analysis presented below is structured on the five BPGs with an emphasis on Core 1 and Core 2 populations within each BPG (NMFS 2012a; Boughton et al. 2007). The BPGs are a federal delineation based on a suite of environmental conditions (e.g., hydrology, local climate, geography) and watershed characteristics (i.e., large inland or short coastal streams). Core 1 and 2 populations occupy watersheds that exhibit the physical and hydrological conditions necessary to sustain self-sufficient viable populations of Southern SH/RT (NMFS 2012a). Datasets were reviewed to ensure that they were collected from monitoring conducted below the upper limit to anadromy in each watershed to remain consistent with the geographic scope of the listing unit proposed in the Petition. Where sufficient data were available for a given population, we present and discuss abundance and long-term population trend estimates for each BPG. The Department was unable to analyze core watersheds in the Mojave Rim and Santa Catalina Gulf Coast BPGs in detail due to data limitations. In these instances, as well as in other cases where data was limiting or unavailable, we provide a qualitative discussion, such as a viability assessment, based on the sources identified in Section 4.2 (Boughton et al. 2022a).

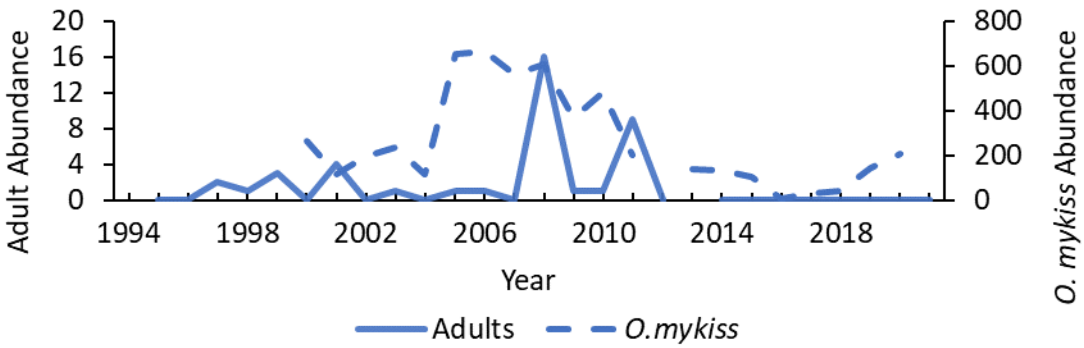
4.4.1 Time Series of Abundance

Southern SH/RT populations in the Monte Arido Highlands BGP have the longest running time-series dating back to the 1990s for the Santa Ynez and Santa Clara rivers (COMB 2022; Booth 2016) and the early 2000s for the Ventura River (CMWD 2005-2021; Dagit et al. 2020) (Figure 12). However, no organized monitoring efforts have been conducted on the Santa Maria River since steelhead were federally listed in 1997. Therefore, no further analysis of the Santa Maria Southern SH/RT populations are conducted in this chapter.

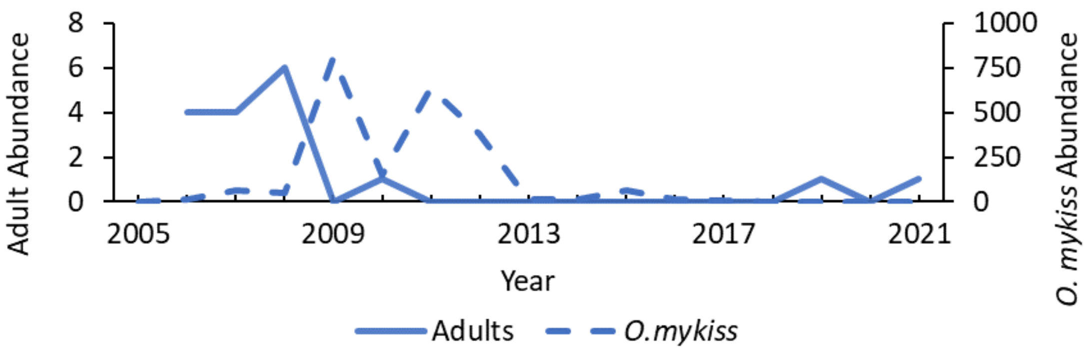
More recently, monitoring has been intermittently conducted on Carpinteria, Mission, and Arroyo Hondo in the Conception Coast BPG by the Department (Boughton et. al 2022a). Malibu, Topanga, and Arroyo Sequit creeks in the Santa Monica Mountains BPG have been actively monitored since the early 2000s (Dagit et al. 2019) (Figure 13). No recent or historical monitoring has been conducted in either the Mojave Rim or Santa Catalina Gulf Coast BPGs.

4.4.1.1 Monte Arido Highlands BPG

A. Santa Ynez River



B. Ventura River



C. Santa Clara River

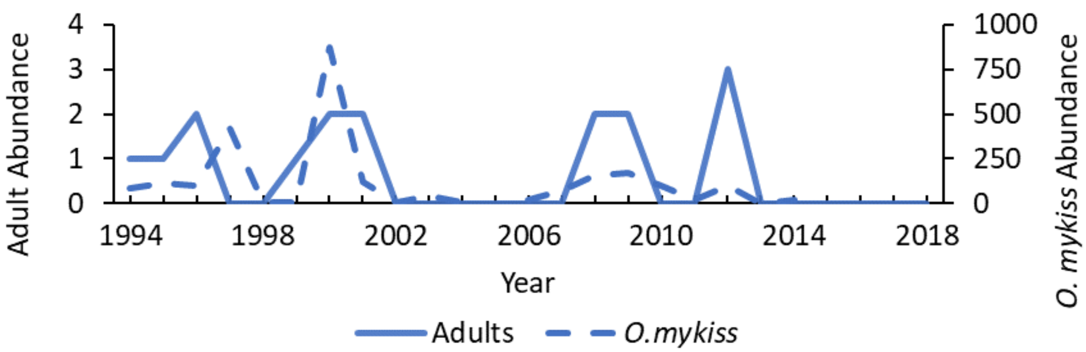


Figure 12. Adult steelhead (Adults) and other O. mykiss (O. mykiss) abundances for the Monte Arido Highlands BPG. A) Santa Ynez River; no data 2013. Biological Opinion Incidental Take provisions have been required since 2014. B) Ventura River. C) Santa Clara River. Adult abundance is on the left -axis with the solid blue line and O. mykiss abundance is on the right axis with the dashed blue line. Note different scales on the Y-axis.

4.4.1.2 Conception Coast BPG

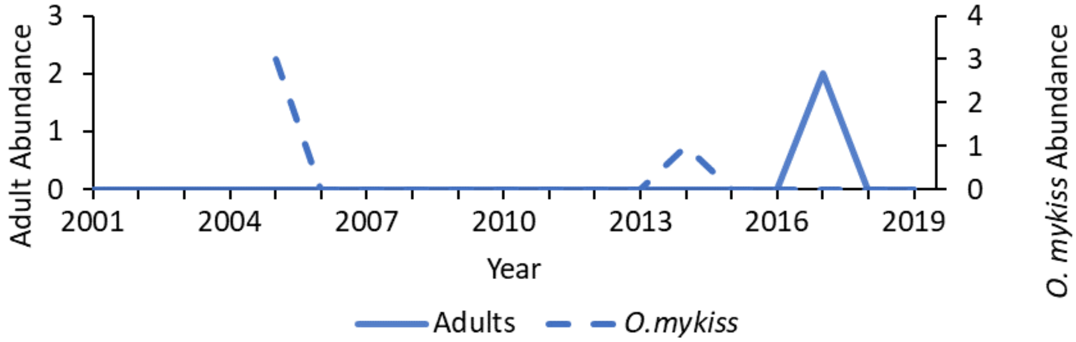
Very few monitoring activities have occurred throughout the Conception Coast BPG, and most of the work that has occurred in more recent years was conducted by the Department. We were unable to develop a full-time series of Southern SH/RT abundance for Conception Coast populations.

Although past monitoring is limited in this BPG, Dagit et. al (2020) documented a total of 42 adult steelhead opportunistic observations from 2000-2018. Two adults were observed in Arroyo Hondo Creek in 2017 and 10 adults were documented in the Goleta Slough Complex with the most recent observation occurring in 2017. For the entirety of Conception Coast BPG, 64% (n=27) of all adult observations occurred in Mission Creek, primarily from 1998-2008. However, from 2018-2022, Department redd and snorkel surveys documented zero adult steelhead in Mission Creek (K. Evans, CDFW, unpublished data). Three adults were observed opportunistically in Carpinteria Creek in 2008 (Dagit et al. 2020); however, from 2008-2019, zero adult steelhead were observed based on recent monitoring conducted by the Department (Boughton et al. 2022a).

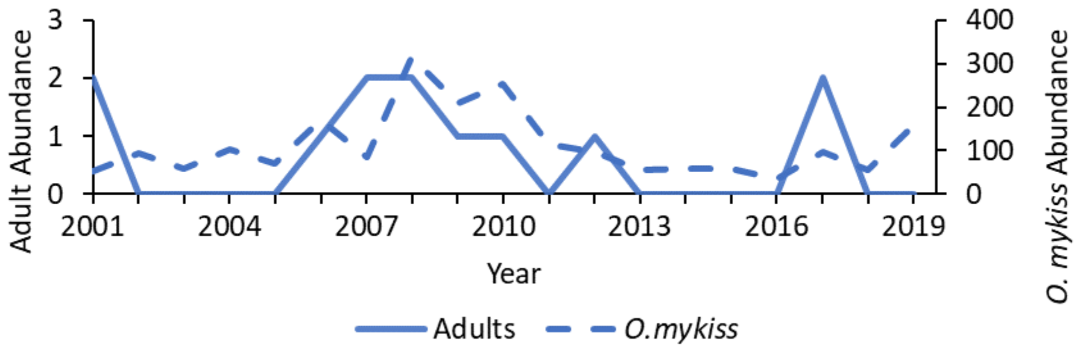
There is also limited data for *O. mykiss* in the Conception Coast BPG. No *O. mykiss* have been documented in Carpinteria Creek since 2016. In Mission Creek, no *O. mykiss* were observed from bankside surveys during the 2018-2019 spawning season (Carmody et al. 2019). In recent years, the largest number of *O. mykiss* observations in this BPG have occurred on Arroyo Hondo Creek, indicating that despite being a small watershed, the creek contains suitable habitat that is relatively undisturbed due to its inclusion in a natural reserve system (NMFS 2012a). Snorkel surveys have documented a total of 2,363 *O. mykiss* in Arroyo Hondo Creek from 2017-2019 (Carmody et al. 2019), while bankside *O. mykiss* observations have documented a total of 12,090 *O. mykiss* from 2015-2022 (K. Evans, CDFW, unpublished data).

4.4.1.3 Santa Monica Mountains BPG

A. Arroyo Sequit Creek



B. Topanga Creek



C. Malibu Creek

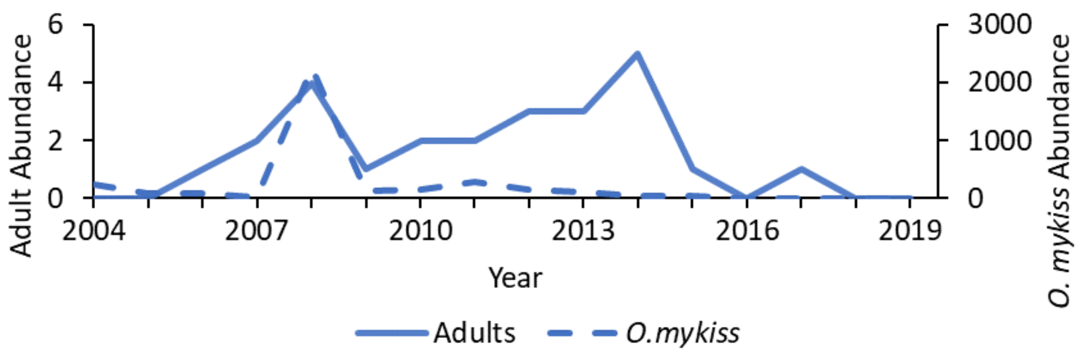


Figure 13. Adult steelhead (Adults) and other O. mykiss (O. mykiss) abundances for the Santa Monica Mountains BPG. A) Arroyo Sequit Creek. B) Topanga Creek. C) Malibu Creek. Adult abundance is indicated on the left -axis and delineated by the solid blue line and O. mykiss abundance is indicated on the right axis and delineated by the dashed blue line. Note different scales on the Y-axis.

4.4.1.4 Mojave Rim BPG

Abundance data is generally not available for this BPG; therefore, we were unable to create a full-time series of Southern SH/RT abundances for the San Gabriel River, Santa Ana River, and Los Angeles River watersheds.

A total of 3 adult steelhead were observed opportunistically in the Mojave Rim BPG from 2000-2018. Two observations occurred on Ballona Creek in 2007, and one observation occurred on the San Gabriel River in 2016 (Dagit et al. 2020). It is generally accepted that all over-summering, rearing, and spawning habitat occurring upstream is no longer accessible to Southern SH/RT due to the presence of extensive physical and velocity related passage barriers located within the lower reaches of each of the three major rivers; therefore, steelhead are not expected to be present in the lower reaches of these watersheds (NMFS 2012a).

4.4.1.5 Santa Catalina Gulf Coast BPG

We were unable to construct a full-time series of Southern SH/RT abundance for these populations because no data series were available to analyze the Santa Catalina Gulf Coast BPG. A total of 15 adult steelhead have been observed in the Santa Catalina Gulf Coast BPG from 2001-2018. Ten of these steelhead observations occurred on either San Juan or San Mateo creeks, and the remainder of observations were distributed throughout the Santa Margarita and San Luis Rey rivers and Los Penasquitos Creek (Dagit et al. 2020).

4.4.2 Geometric Mean Abundance

We calculated the geometric mean of abundance for Southern SH/RT populations (Na) with at least 3-4 generations of data for three time periods. The long-term calculation represents the total available time series. The medium-term calculation represents 12 years or three generations of data, while the short-term calculation is for the most recent 5 years of data. Missing data are noted in the following tables and there was no effort to interpolate or otherwise fill in missing data. Furthermore, we did not substitute values for years in which zero individuals were observed; instead, these values were omitted from the calculation in order to obtain an informative result.

The geometric mean is a useful metric for evaluating species' status because it calculates the central tendency of abundance while minimizing the effect of outliers in the data. Furthermore, the geometric mean is thought to more effectively characterize time series data of abundance based on counts than the arithmetic mean (Good et al. 2005; Spence et al. 2008). We did not calculate arithmetic mean because of its tendency to be overly sensitive to outlier data to a few large counts and can result in the incorrect depiction of central tendency. A range of minimum and maximum abundances were also calculated to provide scale.

Using methods from Spence et al. (2008), we defined the geometric mean of Southern SH/RT abundance as:

$$Na\ (geom) = \left(\prod Na(i)\right)^{1/n}$$

where $Na(i)$ is the total number of adult steelhead in year *i*, and *n* is the number of years of data available.

4.4.2.1 Monte Arido Highlands BPG

Maximum abundance of adult steelhead in the Monte Arido Highlands BPG has remained consistently low since the mid-1990s and early 2000s (Table 2a-2c). For each population examined, maximum counts from the most recent 5-year period are less than either the medium or long-term time frames. For all three watersheds, years in which zero adults were observed have occurred more frequently than years in which at least one fish was observed.

The highest average abundance in this BPG was during the 12-year time frame (2010-2021) on the Santa Ynez River. Both the Santa Clara and Santa Ynez rivers have higher 12-year averages compared to the long-term average. Overall, all three populations have lower 5-year averages when compared to the long-term average and geometric mean abundances remain low across all time frames (Table 3).

Table 2a. Minimum and maximum adult steelhead abundance for the Santa Ynez River over three-time frames: 1995 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year). No data for 2013. Biological Opinion Incidental Take provisions have been required since 2014.

Abundance	Minimum	Maximum
Long-term	0	16
12-year	0	9
5-year	0	0

Table 2b. Minimum and maximum adult steelhead abundance for the Ventura River over three-time frames: 2006 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year).

Abundance	Minimum	Maximum
Long-term	0	6
12-year	0	1
5-year	0	1

Table 2c. Minimum and maximum adult steelhead abundance for the Santa Clara River over three-time frames: 1994 to 2018 (long-term), 2007 to 2018 (12-year), and 2014 to 2018 (5-year).

Abundance	Minimum	Maximum
Long-term	0	3
12-year	0	3
5-year	0	0

Table 3. Long-term, medium-term, and short-term geometric mean abundance of adult steelhead in the Monte Arido Highlands BPG.

Population	Years	Long-term Mean	Years	12-year mean	Years	5-year mean
Santa Ynez River[1]	1995-2021	2.1	2010-2021	3.0	2017-2021	0.0
Ventura River	2006-2021	2.1	2010-2021	1.0	2017-2021	1.0
Santa Clara River	1994-2018	1.7	2007-2018	2.3	2014-2018	0

[1] No data long-term 2013; Biological Opinion Incidental Take provisions have been required since 2014.

Maximum abundances of *O. mykiss* for all populations in the Monte Arido BPG are considerably less when comparing the 5-year time frame to the long-term time frame (Table 4a-4c). On the Ventura River, a maximum of 807 *O. mykiss* were observed during the long-term time frame compared to just nine individuals being observed during the most recent 5-year time frame. Minimum abundances range from zero to five *O. mykiss* for all three time-periods and populations. All three *O. mykiss* populations have lower 5-year averages compared to the 12-year and long-term time frames (Table 5). The Santa Ynez River has the highest average abundance of the three populations for each time frame. Overall, mean abundances of *O. mykiss* in this BPG have declined to low numbers, especially in the last five years.

Table 4a. Minimum and maximum O. mykiss (Other O. mykiss) abundance for the Santa Ynez River over three-time frames: 2001 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year). No data for 2013. Biological Opinion Incidental Take provisions have been required since 2014.

Abundance	Minimum	Maximum
Long-term	5	665
12-year	5	484
5-year	5	205

Table 4b. Minimum and maximum O. mykiss abundance (Other O. mykiss) for the Ventura River over three-time frames: 2005 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year).

Abundance	Minimum	Maximum
Long-term	0	807
12-year	0	640
5-year	0	9

Table 4c. Minimum and maximum other O. mykiss abundance for the Santa Clara River over three-time frames: 1994 to 2014 (long-term), 2003 to 2014 (12-year), and 2010 to 2014 (5-year). No data for 2005.

Abundance	Minimum	Maximum
Long-term	1	876
12-year	1	170
5-year	1	100

Table 5. Long-term, medium-term, and short-term geometric mean abundance of O. mykiss (Other O. mykiss) in the Monte Arido Highlands BPG.

Population	Years	Long-term Mean	Years	12-year mean	Years	5-year mean
Santa Ynez River[1]	2001-2021	166.4	2010-2021	100.5	2017-2021	43.7
Ventura River	2005-2021	44.7	2010-2021	34.5	2017-2021	3.0
Santa Clara River[2]	1994-2014	39.5	2003-2014	30.5	2010-2014	21

[1] No data long-term 2013; Biological Opinion Incidental Take provisions have been required since 2014.
[2] No data long-term 2005

4.4.2.2 Conception Coast BPG

We were unable to calculate geometric mean abundance estimates for the Conception Coast BPG aside from the Arroyo Hondo Creek *O. mykiss* population due to the lack of long-term data. Based on bankside *O. mykiss* observations as part of spawner redd surveys, the geometric mean abundance was 581 individuals from 2015-2022, the maximum abundance of 8,614 individuals was observed in 2021, and the minimum abundance of zero individuals was observed in 2022 (K. Evans, CDFW, unpublished data).

4.4.2.3 Santa Monica Mountains BPG

Maximum abundance counts of adult steelhead in the Santa Monica Mountains BPG have remained consistently low since the early 2000s (Table 6a-6c). A total of two adult steelhead were observed in Arroyo Sequit Creek in 2017, coinciding with the removal of all instream barriers on the creek below the Mulholland culvert in 2016; however, no adult steelhead have been observed in this creek since 2017. The maximum abundance of adult steelhead in Topanga and Malibu creeks has not been greater than five individuals for any given year during all time periods. For adult steelhead populations in both Topanga and Malibu creeks, the 5-year average is lower than the long-term average (Table 7). Overall, average abundances of adult steelhead for all three populations remain low across all time frames.

Table 6a. Minimum and maximum adult steelhead abundance for Arroyo Sequit Creek over three-time frames: 2005 to 2018 (long-term), 2007 to 2018 (12-year), and 2014 to 2018 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	2
12-year	0	2
5-year	0	2

Table 6b. Minimum and maximum adult steelhead abundance for Malibu Creek over three-time frames: 2004 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	5
12-year	0	5
5-year	0	1

Table 6c. Minimum and maximum adult steelhead abundance for Topanga Creek over three-time frames: 2001 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	2
12-year	0	2
5-year	0	2

Table 7. Long-term, medium-term, and short-term geometric mean abundance of adult steelhead in the Santa Monica Mountains BPG.

Population	Years	Long-term mean	Years	12-year mean	Years	5-year mean
Arroyo Sequit Creek[1]	2005-2019	NA	2008-2019	NA	2015-2019	NA
Topanga Creek	2001-2019	1.4	2008-2019	1.3	2015-2019	1
Malibu Creek	2004-2019	1.9	2008-2019	2.1	2015-2019	1

[1] Insufficient data to produce meaningful results.

For all populations in this BPG, maximum abundances of *O. mykiss* for the 5-year time frame are considerably lower compared to the long-term time frame (Table 8a-8c). Since 2005, a total of four *O. mykiss* were observed in Arroyo Sequit Creek with most years recording zero observations (Table 8a). For the Malibu Creek population, a maximum abundance of 2,245 *O. mykiss* was observed from 2004-2019 compared to just 32 individuals during the 5-year time frame (Table 8b). Topanga Creek appears to support a small but consistent population of *O. mykiss* with a long-term maximum and minimum abundance of 316 and 34 individuals, respectively (Table 8c). Topanga Creek *O. mykiss* have also declined in abundance over the three time periods, but this difference is less pronounced than the decline observed for the Malibu Creek population (Table 9).

Table 8a. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Arroyo Sequit Creek over three-time frames: 2005 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	Minimum	Maximum
Long-term	0	3
12-year	0	1
5-year	0	0

Table 8b. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Malibu Creek over three-time frames: 2004 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	Minimum	Maximum
Long-term	0	2,245
12-year	0	2,245
5-year	0	32

Table 8c. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Topanga Creek over three-time frames: 2001 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	Minimum	Maximum
Long-term	34	316
12-year	34	316
5-year	34	160

Table 9. Long-term, medium-term, and short-term geometric mean abundance of O. mykiss (Other O. mykiss) in the Santa Monica Mountains BPG. Data used are the sum of the average number of O. mykiss observed per month.

Population	Years	Long-term geometric Mean	Years	12-year geometric mean	Years	5-year geometric mean
Arroyo Sequit Creek[1]	2005-2019	NA	2008-2019	NA	2015-2019	NA
Malibu Creek	2004-2019	55.9	2008-2019	52.6	2015-2019	6.1
Topanga Creek	2001-2019	94.2	2008-2019	100.1	2015-2019	70

[1] Insufficient data to produce meaningful results.

4.4.2.4 Mojave Rim and Santa Catalina Gulf Coast BPG

We were unable to calculate geometric mean abundance estimates for either the Mojave Rim or Santa Catalina Gulf Coast BPG due to the lack of long-term data. See Sections 4.3.4, 4.4.1.4, 3.3.5 and 3.4.1.5 for more information on adult steelhead and *O. mykiss* distribution and abundances in these two BPG.

4.4.3 Trend Analysis

Trends were calculated as the slope (β_1) of the regression of log-transformed abundance against years. A value of one was added to the number of Southern SH/RT before the log-transformation to address any zero values if they were present in the dataset [i.e., $ln\ (\bar{N}_a + 1)$]. Using methods from Good et al. (2005), the linear regression can be expressed as:

$$ln\ (\bar{N}_a + 1) = \beta_0 + \beta_1 X + \in$$

Where $\bar{N}_a$ is annual adult steelhead abundance, β_0 is the intercept, β_1 is the slope of the equation, and $\in$ represents the random error term. Population trend, *T*, for the specified time series was expressed as the exponentiated slope from the regression above:

$$\exp(\beta_1)$$

with 95% confidence intervals calculated as:

$$\exp(\beta_1) \pm t_{0.05(2),df} s_{b_1}$$

where b_1 is the estimate of the true slope, β_1, $t_{0.05(2),df}$ is the two-sided t-value for a confidence level of 0.95, *df* is equal to *n*-2, *n* is the number of data points in the time series, and s_{b_1} is the standard error of the estimate of the slope, b_1 (Good et al. 2005). We converted the slope to percent annual change (Busby et al. 1996), calculated as:

$$100 * (\exp(\beta_1) - 1)$$

Negative trend values indicate declining abundances over time, whereas positive values indicate growth of the population. Slopes significantly different from zero (P<.05) were noted.

4.4.3.1 Monte Arido Highlands BPG

We calculated adult steelhead and *O. mykiss* population trends for the Santa Ynez, Ventura, and Santa Clara rivers; however, due to lack of monitoring data we were unable to calculate trends for the Santa Maria River adult steelhead and *O. mykiss* populations (Tables 10 and 11). All three adult steelhead populations have declining trends in abundance for their respective data series and the decline in the Ventura River population is statistically significant (p=0.03). Our trend estimates are consistent with other recently reported trend estimates for the Monte Arido Highlands BPG (Boughton et al. 2022a). Similarly, all three *O. mykiss* populations have declining trends in abundance with significant declines observed on the Santa Ynez (p=0.03) and Ventura (p=0.05) rivers (Table 11).

Table 10. Trends in adult steelhead abundance using slope of ln-transformed time series counts for three Monte Arido Highland BPG populations. Missing years of data were eliminated and not interpolated in any way. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)[1]	Lower 95% CI	Upper 95% CI
Santa Ynez River[1]	1995-2021	-2.24	-6.12	1.59
Ventura River	2006-2021	**-7.54**	-13.77	-0.86
Santa Clara River	1994-2018	-2.29	-4.99	0.49

[1] No data 2013, Biological Opinion Incidental Take provisions have been required since 2014.

Table 11. Trends in O. mykiss (Other O. mykiss) abundance using slope of ln-transformed time series counts for three Monte Arido Highland BPG populations. Missing years of data were eliminated and not interpolated in any way. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)[1]	Lower 95% CI	Upper 95% CI
Santa Ynez River[1]	1995-2021	**-8.81**	-15.98	-1.03
Ventura River	2006-2021	**-19.39**	-34.89	-0.20
Santa Clara River[2]	1994-2018	-6.09	-18.03	7.58

[1] No data 2013, Biological Opinion Incidental Take provisions have been required since 2014.
[2] No data 2005

4.4.3.2 Santa Monica Mountains BPG

Both Topanga and Malibu Creek populations have a declining but non-significant trend in adult abundance (Table 12). The trend estimates reported here are consistent with recently reported trend estimates for Topanga and Malibu creeks (Boughton et al. 2022a).

The Malibu Creek *O. mykiss* population has experienced a statistically significant (p=0.002) average declining trend in abundance of approximately 26% per year from 2004-2019 (Table 13). The average trend in adult *O. mykiss* abundance for the Topanga Creek population also suggests a decline from 2001-2019; however, the trend is not statistically significant.

Table 12. Trends in adult steelhead abundance using slope of ln-transformed time series counts for the Santa Monica Mountains BPG populations. Missing years of data were not included. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)	Lower 95% CI	Upper 95% CI
Arroyo Sequit[1]	2001-2019	NA	NA	NA
Topanga Creek	2001-2019	-1.70	-5.76	2.54
Malibu Creek	2004-2019	-1.41	-8.49	6.22

[1] Insufficient data to produce meaningful results.

Table 13. Trends in O. mykiss (Other O. mykiss) abundance using slope of ln-transformed time series counts for the Santa Monica Mountains BPG populations. Missing years of data were not included. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)	Lower 95% CI	Upper 95% CI
Arroyo Sequit [1]	2005-2019	NA	NA	NA
Malibu Creek	2004-2019	**-25.56**	-37.19	-11.79
Topanga Creek	2001-2019	-1.24	-6.44	4.25

[1] Insufficient data to produce meaningful results.

4.4.3.3 Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs

We were unable to calculate trends for populations of Southern SH/RT in the Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs due to lack of available data, with the exception of Arroyo Hondo Creek *O. mykiss*. The analysis of the Arroyo Hondo Creek *O. mykiss* population counts from seven years of bankside observations conducted during winter redd surveys indicate a declining trend in *O. mykiss* abundance, but the trend is not statistically significant (p=0.71).

Many watersheds in the Mojave Rim and Santa Catalina Gulf Coast BPGs likely supported intermittent Southern SH/RT populations characterized by repeated local extinctions and recolonization events in dry and wet years, respectively (NMFS 2012a). The sporadic and intermittent nature of these populations preclude the ability to effectively analyze trends in abundance. Furthermore, many adult steelhead populations occurring south of the Santa Monica Mountains are considered severely reduced and, in many instances, extirpated (Boughton et al. 2005).

4.5 Productivity

Productivity or population growth rate provides important information on how well a population is "performing" in the habitat it occupies throughout its life cycle. Productivity is a key indicator of a population's viability in terms of its long-term trends in abundance and the ability for it to recover after short-term disturbances (Boughton et al. 2022b). Productivity and abundance are closely linked metrics as a population's growth rate should be sufficient to maintain its abundance above viable levels (McElhany et al. 2000).

A population's cohort replacement rate (CRR) is defined as the rate at which each subsequent cohort or generation replaces the previous one (NOAA 2006). Data for adult steelhead in southern California contain too many years of zero observations to effectively calculate a CRR; therefore, we did not attempt to estimate this ratio. We calculated the CRR for *O. mykiss* populations in the Santa Ynez, Ventura, and Santa Clara rivers, as well as Malibu and Topanga creeks to account for the possibility of some individuals from these populations contributing to the anadromous life-history form. These watersheds were also selected because there was sufficient data (i.e., years with nonzero data) to produce CRR estimates.

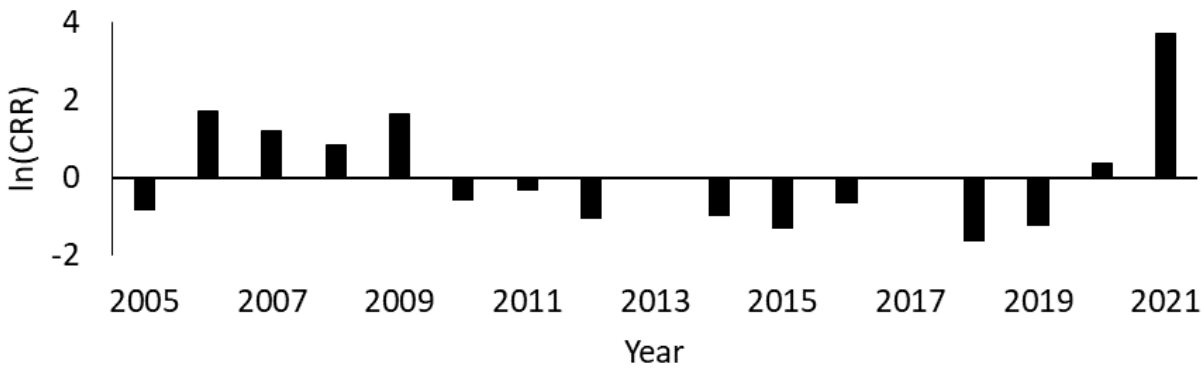
The CRR is defined as:

$$CRR = \ln\left(N_{t+4}/N_t\right)$$

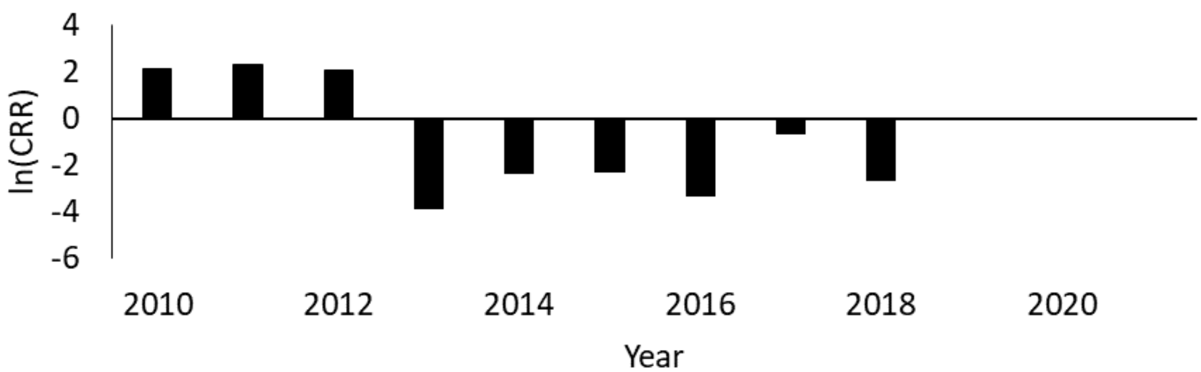
Natural log transformed CRRs greater than zero indicate that the cohort increased in size that year in relation to the brood year three years earlier, whereas a CRR less than zero indicates that the cohort decreased in size. This analysis assumes a generation time of four years, which has been determined to be reasonable based off our best understanding of the Pacific steelhead fluvial-anadromous life-history (NMFS 2012a; Shapovalov and Taft 1954). However, it is important to note that not all Southern SH/RT will return and spawn at age 4, and there is likely considerable variation in age structure (1-4 years) within individual populations (Boughton et al. 2022b).

Over the entire time series, CRR values for the Santa Ynez, Ventura, and Santa Clara River *O. mykiss* populations were more negative than positive (Figure 13). Negative CRRs most frequently occurred from 2013-2018, which coincide with the most recent extreme drought period and associated drought-related low flow conditions. The Santa Ynez River population may be rebounding, as indicated by a high CRR in 2021. Topanga Creek had more positive CRRs than negative, however, 89% of the years with positive values occurred prior to 2012. The CRRs on Topanga Creek are consistent with a recent study that found a significant decline of the abundance of all life stages of *O. mykiss* due to the 2012-2017 drought (Dagit et al. 2017). Population growth rates on Malibu Creek appear to be declining as CRR values have been negative since 2012.

A.



B.



C.

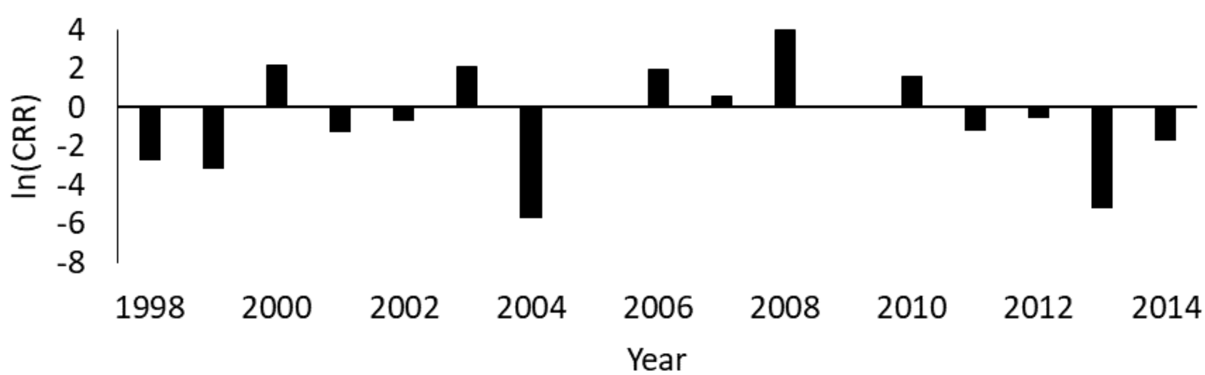
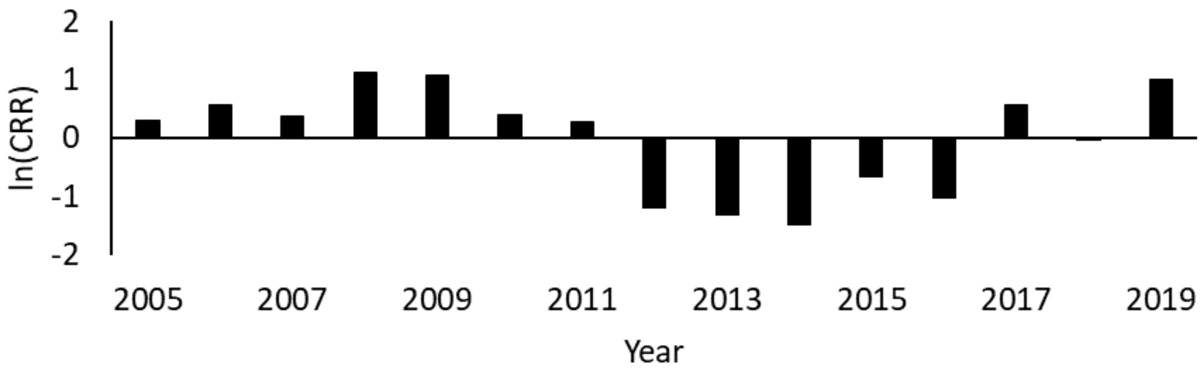


Figure 14a. Ln-Cohort Replacement Rates for O. mykiss (Other O. mykiss) populations, A) Santa Ynez River, B) Ventura River, and C) Santa Clara River; Biological Opinion Incidental Take provisions have been required since 2014. Gaps are a result of missing years of data. Note different scales on the Y-axis.

D.



E.

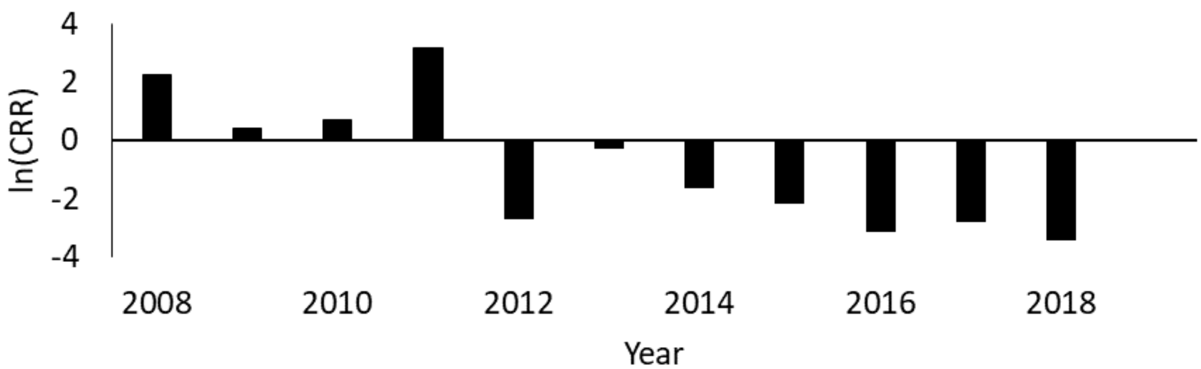


Figure 14b. Ln-Cohort Replacement Rates for O. mykiss (Other O. mykiss) populations, D) Topanga Creek, and E) Malibu Creek. Gaps are a result of missing years of data. Note different scales on the Y-axis.

4.6 Population Spatial Structure

Population spatial structure refers to the spatial distribution of individuals in the population and the processes that generate that distribution. Population spatial structure is a function of habitat quality, spatial configuration, and dispersal rates of individuals within different habitat types. Spatial structure reflects the extent to which a population’s abundance is distributed among available or potentially available habitats at any life stage. All else being equal, a population with low abundance is likely to be less evenly distributed within and among watersheds and is more likely to experience extinction from catastrophic events. Furthermore, populations with low abundance have a reduced potential to recolonize extirpated populations.

Numerous discrete and spatially dispersed but connected populations are required to achieve long-term persistence of Southern SH/RT (NMFS 2012a). Though we cannot specifically classify the spatial structure necessary to maintain Southern SH/RT viability with certainty, examining similarities and differences between their historical and current spatial distribution can provide a better understanding of their present extinction risk. Southern SH/RT historically occupied at least 46 watersheds in southern California, but currently, only 37-43% of these watersheds are thought to still be occupied (NMFS 2012a). This finding not only highlights the severe contraction of the distribution and abundance of Southern SH/RT in their range, but also indicates that they are prone to range-wide extinction due to several factors such as low population growth rate, loss of genetic diversity, and the limited number of sparsely distributed individuals that may be necessary to recolonize extirpated neighboring populations.

The truncated Southern SH/RT spatial structure observed today can be attributed to the presence of numerous dams, artificial barriers, other instream structures, and groundwater extraction that have long impeded migration and access to high quality upstream habitat throughout southern California (NMFS 2012a). Dams and other barriers not only restrict access to upstream spawning and rearing habitat, but also prevent important ecological and genetic interactions with *O. mykiss* from occurring both upstream and downstream of the total barrier. Isolated *O. mykiss* populations containing ancestry of native Southern SH/RT continue to persist above barriers in approximately 77% of watersheds where the anadromous component has been lost below the barrier (Nielsen et al. 1997; Boughton et al. 2005; Clemento et al. 2009). The impact of dams and other artificial barriers is especially notable on the large rivers and small coastal streams in the northern portion of Southern SH/RT's range. For example, Cachuma, Gibraltar, and Juncal dams on the Santa Ynez River block access to at least 70% of historical spawning and rearing habitat within the watershed. Matilija and Casitas dams located on Matilija and Coyote creeks, respectively, restrict access to 90% of the available spawning habitat in Ventura River watershed. Similarly, Santa Felicia and Pyramid dams on Piru Creek block access to all upstream spawning habitat on this major tributary of the Santa Clara River. On Malibu Creek, the Rindge Dam and Malibu Lake dam blocks access to over 90% of historical anadromous spawning and rearing habitat within the watershed (NMFS 2012a).

Historically, the lower and middle reaches of streams in southern California were used as both migration corridors to higher quality upstream habitat and juvenile rearing habitat in stream reaches that maintained perennial surface flows (Moore 1980). Today, these reaches are the only remaining accessible spawning habitat for Southern SH/RT and are characterized by high urban densities, channelization, impaired stream flows, instream diversions, groundwater extraction, and habitat that generally favors non-native fishes (NMFS 2012a). Furthermore, habitat loss and fragmentation has led to the loss of habitat diversity (i.e., riparian cover, instream habitat structure), which has prevented fish from utilizing these once connected and intact habitats.

The current distribution of Southern SH/RT across its range is inadequate for their long-term persistence and viability (NMFS 2012a). The majority of watersheds in southern California contain dams and artificial barriers that restrict access to high quality upstream spawning and rearing habitat. Barriers to migration isolate and prevent ecological interactions with upstream native *O. mykiss* that would otherwise have the potential to be anadromous. Population level impacts include increased susceptibility to local extirpation due to natural demographic and environmental variation and the loss of genetic and life-history diversity (NMFS 2012a). Range-wide, the historically widespread Southern SH/RT are now sparsely distributed across the landscape with significant reductions in abundance. The degraded spatial structure of Southern SH/RT threatens the viability of the population because extinction rates of individual sub-basin populations are likely much higher than the rate of the formation of new populations from recolonization (McElhany et al. 2000). This is especially relevant for populations occurring in watersheds south of the Santa Monica Mountains; originally, these watersheds supported infrequent Southern SH/RT populations that were likely characterized by repeated local extinction and recolonization events by either neighboring watersheds or from resident populations in upstream drought refugia in dry and wet cycles.

4.7 Diversity

Diversity refers to the phenotypic (e.g., life-history diversity) and genetic characteristics of a population. Life-history diversity allows populations to utilize a wide array of habitats and confers resilience against short-term spatial-temporal variation in the environment. Genetic diversity affects a population's ability to persist during long-term changes in the environment due to both natural and anthropogenic influences. The variation in the life history characteristics in any given population are typically the result of its genetic diversity interacting with environmental conditions. Populations lacking genetic diversity may not have as many genetic "options" to generate new or modified life history types in the face of changing environmental conditions, since natural selection may favor new or different genetic variants. As such, a genetically depauperate population that may be well adapted to the current steady state could be maladapted to new environmental conditions. The combination of both diversity types in a natural environment provides populations with the ability to adapt to long-term changes and be more resilient to these changes over both short- and long-term time scales (McElhany et al. 2000).

Our analysis in Section 4.4 demonstrates declines in *O. mykiss* populations across much of its southern California coast range and preserving Southern SH/RT life-history strategies and adaptations is a critical component for the recovery of the Southern California Steelhead DPS (NMFS 2012a). Ideally, all three Southern SH/RT life-history types (i.e., fluvial-anadromous, freshwater-resident, lagoon-anadromous) would be expressed within a single population, or the population would harbor the underlying genetic variation to express those life-history types when environmental conditions allow. The freshwater-resident life-history type is still present in many populations of Southern SH/RT; however, this form frequently occurs in the isolated upper reaches of the watershed where opportunities for gene flow with anadromous fish are prevented by barriers to migration. Bond (2006) demonstrated accelerated growth rates of juvenile *O. mykiss* expressing the lagoon-anadromous life-history form. Larger size at ocean entry is thought to enhance marine survival and improve adult returns (Bond 2006); however, it is unlikely that this life-history form is currently viable, because approximately 75% of estuarine habitat in southern California has been lost, and the remaining intact habitats are constrained by agricultural and urban development, highways, and railroads, and threatened by sea level rise and invasive species (NMFS 2012a). The artificial breaching of lagoons also poses a significant threat to the lagoon-anadromous life-history form as a recent study observed considerable mortality of Southern SH/RT directly after artificial breaching (Swift et al. 2018). As presented in Section 4.4, the anadromous form of Southern SH/RT still occurs in very low abundances in a limited portion of their historical range. The preservation of this life-history component will require substantial habitat restoration and modifications or removal of the numerous artificial barriers that currently restrict access to upstream high-quality spawning habitat (NMFS 2012a).

Several recent studies highlight the important role that genetic factors have in determining the life-history expression of coastal steelhead. Pearse et al. (2014) identified two Omy5 haplotypes linked to the anadromous ("A") and resident ("R") life-history forms whereby "AA" and "AR" genotype are more likely to be anadromous than the "RR" genotype (Pearse et al. 2019). Rundio et al. (2021) found that age 1+ juveniles with "RR" and "AR" genotypes experienced higher growth rates than fish with the "AA" genotype, and that overall condition was slightly higher in future resident fish than in future smolts, particularly among resident males. The divergence of the "A" and "R" haplotypes in Southern SH/RT populations is influenced by the presence of numerous artificial barriers in southern California, which act as a strong selection pressure against the "A" haplotype in above-barrier populations. For example, on the Santa Clara River, the Vern Freeman Diversion Dam and other instream diversions have limited upstream fish passage to spawning and rearing habitat on its tributaries, Sespe and Santa Paula creeks (NMFS 2012a). Populations of *O. mykiss* from both tributaries were found to display moderately high frequencies of the "R" haplotype (Pearse et al. 2019). Relative frequencies of the "R" and "A" haplotypes can also be altered in populations that have become introgressed with other strains of Rainbow Trout that may have much different haplotype frequencies.

The recognition of the "A" and "R" haplotypes provide insight on the genetic integrity and viability of Southern SH/RT. The frequency of the anadromous haplotype may substantially decline during periods of adverse conditions due to the low predicted survival of migrating smolts (i.e., “AA” and “AR” individuals). Likewise, “RR” and “AR” residents may be favored during adverse conditions, which could eventually lead to declines of the “A” haplotype over time and the gradual loss of the “AA” genotype from the population. Without considerable restoration of habitat connectivity through the removal of artificial barriers, the “A” haplotype in “AR” individuals in isolated populations above barriers is expected to be slowly lost over time (Apgar et al. 2017). While “AR” smolts may produce “AA” individuals when favorable migration conditions continue and retain the “A” haplotype in resident populations, it is unclear that the resident component can reliably produce anadromous fish after prolonged periods of unfavorable conditions in the long term (Boughton et al. 2022a). Furthermore, climate change projections for Southern SH/RT range predict an intensification of typical climate patterns such as more intense cyclic storms, drought, and extreme heat (NMFS 2012a). These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form.

4.8 Conclusions

This section summarizes the abundance, trends, and productivity analyses. Because quantitative analyses were not conducted for population spatial structure and diversity, we do not provide conclusions for these metrics as the qualitative discussions in Sections 4.6 and 4.7 provide sufficient detail and information.

4.8.1 Abundance and Trends

The data evaluated indicate an overall long-term declining trend of Southern SH/RT with critically low range-wide abundances. In the past decade, adult abundance counts have not been greater than ten for any watershed examined, and most streams have observed no adult returns during this time period. For the Monte Arido Highlands BPG, which is thought to be a potential source population for smaller coastal watersheds such as the Conception Coast BPG, only a single adult has been observed returning in the past five years. For each of the three populations analyzed, the data for this BPG shows a long-term declining trend in adult abundance. The steepest decline occurred in the Ventura River population, for which a statistically significant -7.54% per year was observed.

The data evaluated for the Santa Monica Mountains BPG indicate that these watersheds support small but consistent runs of adult steelhead ranging from zero to five individuals per year. However, like other salmonid-supporting streams in the Southern SH/RT range, few adults have been observed in the past five years, and it is unlikely that these streams historically supported large runs of Southern SH/RT due to their small size. The data also show declining but not statistically significant trends in adult abundance for Malibu and Topanga creeks. The Department's South Coast Region staff have not observed any *O. mykiss* in Malibu Creek since before the Woosley fire in 2018, which suggests that Southern SH/RT have been effectively extirpated below Rindge Dam (D. St. George, CDFW, personal communication). A combined total of five adults have been observed for the Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs since 2017 (Dagit et al. 2020). Our finding of generally declining trends in the abundance of adult steelhead is consistent with the results of a recent viability assessment for the southern California Coast Domain produced by Boughton et al. (2022a).

O. mykiss trends also demonstrate measurable declines in overall abundance. Maximum abundance and long-term averages of *O. mykiss* have declined in all three Monte Arido Highland populations. Similarly, all populations in this BPG show declining trends in O. *mykiss* abundance with statistically significant declines of -8.81% and -19.39% per year on the Santa Ynez and Ventura rivers, and a non-statistically significant decline of -6.09% on the Santa Clara River. Within the Santa Monica Mountains BPG, both Malibu and Topanga creek *O. mykiss* populations have experienced a long-term decline. The *O. mykiss* population in Topanga Creek appears to be more viable than Malibu Creek as our results indicate only a small long-term decline. Our results indicate a trend of -25.56% per year on Malibu Creek, which is the steepest average annual decline for any of the Southern SH/RT populations that we analyzed.

The most recent prolonged drought from 2012-2017 correlates with significant reductions of all life-history forms and stages of Southern SH/RT. Drought conditions are associated with the loss of suitable spawning and rearing habitat, insufficient instream flows required for migration, diminished water quality, reductions in available food supply, and increases in direct mortality due to predation and stranding (Dagit et al. 2017). Our analyses show a relatively consistent range-wide pattern of higher abundances prior to 2012, followed by consecutive years of lower abundances starting at the onset of the drought. It appears that few populations have rebounded from the drought as current abundance estimates remain low relative to pre-drought conditions. The recovery of Southern SH/RT will likely depend on the successful recruitment of downstream migrants from upstream resident populations in refugia habitats. However, virtually all refugia populations are currently above impassable barriers. Furthermore, many southern California watersheds do not contain upstream drought refugia. In these instances, recolonization from source populations in other watersheds is likely the only mechanism for these populations to rebound (Boughton et al. 2022a).

Boughton et al. (2007) established a precautionary run size criteria for the southern California Coast Domain of 4,150 spawners per year to provide a 95% chance of persistence of the watershed's population over the next 100 years. While this goal may not be feasible for many of the smaller coastal watersheds in southern California, NMFS (2012) speculated that this target may be more feasible for the larger watersheds (i.e., Monte Arido Highland BPG). Even if we applied a lower criterion of 834 spawners (Boughton et al. 2022a), the results of our analyses demonstrate that no population is near the criteria necessary to provide resilience from extinction.

It is important to highlight limitations of our analyses. First, our analysis may underestimate the true abundance of adult steelhead because data analyzed for this effort are usually collected during periods of high stream flows and turbidity, making monitoring difficult to conduct (Dagit et al. 2020). Second, the data used in this effort are derived from various single-basin monitoring efforts, each of which utilize different survey designs and approaches. Thus, we were required to interpret the data as reported, while recognizing the potential limitations in making inter-watershed comparisons in instances where the data were from various monitoring efforts that did not necessarily meet standards established by the Department's California Coastal Monitoring Program (CMP). Third, the lack of any monitoring of most watersheds occurring south of the Santa Monica Mountains inhibited our ability to make definitive and comprehensive range wide conclusions on Southern SH/RT abundance and trends. However, it is likely that abundance estimates for many watersheds in the southern portion of the range are so low that obtaining accurate estimates would remain difficult even with increased monitoring.

4.8.2 Productivity

The results of our CRR analysis for *O. mykiss* on the Santa Ynez, Ventura, and Santa Clara rivers show more years of negative than positive CRR values. Negative CRR values were observed during the 2012-2017 drought period for all populations. However, the most recent 2021 estimate for the Santa Ynez population was positive, which may suggest a rebounding population. CRR values for Topanga Creek were more positive than negative; however, most positive values occurred prior to the onset of 2012 drought conditions. In recent years, Malibu Creek CRR values have been negative, particularly during the 2012-2017 drought period.

While the CRR values for *O. mykiss* do not necessarily reflect true spawner to spawner ratios due to the high likelihood that many observed fish were not actually part of the spawning cohort during that year, our results demonstrate that *O. mykiss* populations occurring below the barrier to anadromy in these watersheds do not appear to be viable because abundances are too low to sustain positive population growth rate on a yearly basis. This result is especially concerning given that the long-term resilience of the anadromous component of Southern SH/RT likely depends on the production of anadromous juveniles from the freshwater-resident life-history form.

5. HABITAT THAT MAY BE ESSENTIAL TO THE CONTINUED EXISTENCE OF SOUTHERN SH/RT

5.1 Migration

Southern SH/RT migration into freshwater is linked with seasonal winter and spring high flows that establish connectivity between the ocean and freshwater spawning areas (NMFS 2012a). Adult steelhead require water depths of at least 18 cm depth for upstream movement; however, 21 cm is considered to be more suitable for upstream passage of all possible sizes of individual fish, because it allows sufficient clearance so that contact with the streambed is minimized (Bjornn and Reiser 1991; SWRCB 2014). Low dissolved oxygen (<5 mg/L) and high turbidity can deter migrating salmonids such as steelhead (Bjornn and Reiser 1991). Delayed migration may also occur when stream temperatures are too high or low (Bjornn and Reiser 1991). Disease outbreaks can occur as a result of extreme high temperatures (Bjornn and Reiser 1991; Spence et al. 1996). Salmonids usually migrate when water temperatures are below 14°C (Spence et al. 1996); however, salmonids can adapt to higher thermal limits when slowly exposed to increased water temperatures over time (Threader and Houston 1983).

Instream structure, like waterfalls, sandbars, and debris jams can act as impediments to upstream fish migration. Steelhead are able to jump a maximum of 3.4 m (Spence et al. 1996) and typically, pool depth must be at least 25% greater than barrier height to achieve the required swimming velocity to pass the barrier (Spence et al. 1996). Pool shape can also influence if a barrier is passable by steelhead. For example, water flow over a steep waterfall into a plunge pool may increase jump height capacity due to upward thrust created by the hydrodynamics within the pool (Bjornn and Reiser 1991). Physical structures such as large woody debris and boulders within streams can offer flow and temperature refuge for resting fish during migration to upstream spawning areas (Spence et al. 1996). Wood structures, overhanging banks, and riparian flora can provide cover to steelhead for protection from terrestrial and avian predators. Deep pools provide important holding habitats for migrating adult salmonids (Chubb 1997).

5.2 Spawning

Habitat attributes necessary for successful spawning include cover, appropriate substrate, cool stream temperatures, and adequate streamflow (Reiser and Bjornn 1979). Salmonids select spawning sites in pool-riffle transitional areas where downwelling or upwelling currents occur that create loose gravel with minimal sediment and litter (Bjornn and Reiser 1991). Rainbow Trout can spawn in a relatively wide range of temperatures, from 2 – 22°C, but may respond to abrupt temperature declines with decreased spawning activity and production (Reiser and Bjornn 1979). Steelhead and Rainbow Trout require gravel substrate of 0.5 – 10.2 cm in diameter to construct their redds and a high proportion of the redd substrate must be comprised of smaller-sized gravel within this range (Reiser and Bjornn 1979). Cover habitat, which offers protection from predation, can include overhanging banks, riparian or aquatic vegetation, large and small woody debris, rocks, boulders, and other instream features. Having access to cover close to a redd is advantageous for Southern SH/RT and may influence spawning site selection (Reiser and Bjornn 1979). Minimum water depth must be sufficient to cover the spawning fish and, depending on individual fish size, is likely to range from 6-35cm (Bjornn and Reiser 1991).

Steelhead and Rainbow Trout have been documented to spawn in water velocities ranging from 21-117 cm/s (Reiser and Bjornn 1979; Bovee and Milhous 1978). Under moderate water velocities, increasing streamflow leads to a greater amount of covered gravel substrate for spawning; however, if water velocities and associated stream flows are too high, the additional suitable spawning habitat becomes unusable for salmonids and stream spawning capacity declines (Reiser and Bjornn 1979; Bjornn and Reiser 1991). Total suitable spawning area within a stream is dependent on the density and size of spawning fish, water depth and velocity, and amount of appropriately sized gravel substrate available (Bjornn and Reiser 1991). These factors combined drive habitat suitability for steelhead and other salmonids (Bjornn and Reiser 1991).

5.3 Instream Residency

Temperature, dissolved oxygen, salinity, water flow, and water depth are all factors that determine stream habitat suitability for *O. mykiss*. Water temperature is especially critical for survival in southern California, as stream temperature can vary drastically within the span of a single day, sometimes peaking at over 30°C during summer months (Sloat and Osterback 2013). For Southern SH/RT, changes in behavior occur above 25°C, such as decreased feeding or movement into refugia (Ebersole et al. 2001; Sloat and Osterback 2013) and the estimated mortality threshold is 31.5°C (Sloat and Osterback 2013), which is marginally higher than that of more northern steelhead populations (Rodnick et al. 2004; Werner et al. 2005). This increased temperature tolerance indicates that Southern SH/RT may have acclimated to higher temperature conditions; however, it does not necessarily suggest that they have undergone local adaptation with genetic underpinnings (Sloat and Osterback 2013). Dissolved oxygen levels should generally be at or above 5 mg/L for Southern SH/RT survival (Reiser and Bjornn 1979; Bjornn and Reiser 1991; Moyle et al. 2017) but concentrations greater than 7 mg/L are ideal (Moyle et al. 2017). In cooler temperatures, Rainbow Trout can survive in minimal dissolved oxygen levels of 1.5-2.0 mg/L (Moyle 2002).

Adult Rainbow Trout preferentially select habitat in deeper water and can be found in runs or pools close to swift water (Moyle 2002). In such habitats, fish can move into fast water habitat for feeding and then return to hold and rest in slower water (Moyle 2002). Tobias (2006) found that Southern SH/RT in Topanga Creek exhibited a preference for pools over other habitat types. Trench pools were strongly favored and mid-channel pools and step pools were also selected; however, fish avoided plunge pools, corner pools, and lateral scour pools as well as riffles and cascades. Glides and step runs were neither avoided nor strongly selected.

Resident Rainbow Trout prey on aquatic and terrestrial invertebrates that drift by, both in the water column or on the surface, as well as benthic invertebrates and sometimes smaller fishes (Moyle 2002). Larger stream-dwelling salmonids (>270 mm) often exhibit an ontogenetic niche shift, moving away from consuming invertebrates and depending more on piscivory to achieve efficient growth (Keeley and Grant 2001). Size of invertebrate and fish prey increased with body length (Keeley and Grant 2001). Stomach contents of *O. mykiss* in Topanga Creek revealed that aquatic and terrestrial insects, other invertebrates, and fish comprised most of their diet during fall and spring. Consumption of introduced Arroyo Chub (*Gila orcutti*) by Topanga Creek *O. mykiss* suggests that chub may be an important component of their diet in this stream, particularly during the late fall when aquatic macroinvertebrates may be less available (Krug et al. 2012; Swift et al. 1993).

5.4 Egg and Larval Development and Fry Emergence

Many environmental factors influence salmonid embryo incubation success, including dissolved oxygen, temperature, substrate size and porosity, and extra-gravel and inter-gravel hydrodynamics (Bjornn and Reiser 1991). Inter-gravel dissolved oxygen is particularly important to egg development and insufficient oxygen can lead to high mortality. Dissolved oxygen requirements increase as embryos grow and peaks just prior to hatching (Quinn 2018). Intra-gravel oxygen allows for embryo respiration, and oxygen concentrations of 8 mg/l or more contribute to high survival of steelhead embryos (Reiser and Bjornn 1979).

Water velocity is correlated with the amount of dissolved oxygen available to incubating eggs, and lower water velocity leads to higher embryo mortality (Bjornn and Reiser 1991). Reduced flows can also cause redd dewatering, which may result in egg mortality if there is no subsurface flow (Reiser and White 1983). The settling of fine sediment within gravels used to construct redds can prevent the interstitial flow of water and oxygen, and thus smother and kill embryos and post-hatch alevins (Bjornn and Reiser 1991). Finer sediment particles such as ash from wildfires or dust, are most effective at filling interstitial spaces within the redd substrate and can be a contributor to egg asphyxiation and recruitment failure (Beschta and Jackson 1979; Chapman 1988; Bjornn and Reiser 1991).

In addition to negative impacts from sediment deposition, unsuitable temperatures can have negative effects on embryonic development and survival (Bjornn and Reiser 1991). Higher temperatures are correlated with faster embryonic growth and development (Kwain 1975; Bjornn and Reiser 1991); however, if temperatures exceed upper suitability thresholds, mortality increases (Kwain 1975; Rombough 1988; Melendez and Mueller 2021). The ideal temperature range for incubation is 7-10°C (Kwain 1975) and incubation temperatures surpassing 15°C can result in considerable embryo mortality (Kwain 1975; Rombough 1988). Faster development and early hatching resulting from elevated temperatures can manifest in substantial reductions in body mass and length of newly hatched alevin (Melendez and Mueller 2021). These environmentally driven developmental changes could have negative implications for predation response and survival (Hale 1996; Porter and Bailey 2007). Alternatively, extremely cold water can induce mortality (Reiser and Bjornn 1979), although water temperatures that are below steelhead tolerances are likely a rare occurrence in southern California streams. Fry emerge in late spring or early summer and incubation time is dependent on water temperature (Moyle et al. 2017; Quinn 2018). Cold water temperatures, or those above 21.1°C, can decrease survival of emerging fry by restricting their ability to obtain oxygen from the water (McEwan and Jackson 1996).

5.5 Rearing and Emigration

Suitable rearing habitats for juvenile *O. mykiss* require adequate water temperature, flow velocity, water depth, dissolved oxygen concentrations, and availability of prey items. Juveniles generally occupy cool, clear, higher velocity riffles which provide cover from predators (Moyle 2002). Rearing juveniles require habitat with sufficient food production such as riffles with gravel substrate (Reiser and Bjornn 1979). Juvenile *O. mykiss* in southern California have been found to rear in both perennial and intermittent streams (Boughton et al. 2009). Intermittent streams are common in the southern California region and can in some cases benefit native fishes and other aquatic organisms that have evolved within these conditions. By seasonally fragmenting watersheds and disconnecting populations of introduced warm-water tolerant species, intermittent stream desiccation can reduce potential predation and competition from invasives. However, these same conditions can also negatively affect steelhead survival through loss of wetted habitat or degraded water quality conditions, prevent adult spawning migrations or juvenile/smolt emigration, and otherwise isolate subpopulations (Boughton et al. 2009).

Preferred water temperatures for juvenile *O. mykiss* range between 15 and 18°C (Moyle 2002), although they can tolerate temperatures up to 29°C if dissolved oxygen concentrations are high and there is an abundant food supply (Dressler et al. 2023; Sloat and Osterback 2013). Southern SH/RT have been observed functioning in stream temperatures outside of the preferred range up to the mid to high twenties (Dressler et al. 2023; Moyle et al. 2017; SYRTAC 2000). For example, the Santa Ynez River was determined to be thermally suitable, albeit thermally stressful, for Southern SH/RT in both normal and warm years, with thermal suitability characterized as a maximum daily temperature below 29°C and a mean daily temperature below 25°C (Boughton et al. 2015). Temporary or intermittent exposure to temperatures above the upper tolerance limit for salmonids can be tolerated in some populations (Dressler et al. 2023; Johnstone and Rahel 2003), whereas chronic or long-term exposure to high temperatures is typically lethal (Dickerson and Vinyard 1999; Johnstone and Rahel 2003). Additionally, feeding behavior and activity level are generally reduced when fish are temporarily exposed to warmer temperatures that cause thermal stress (Johnstone and Rahel 2003). However, Spina (2007) found that in Topanga Creek, there were no available daytime thermal refugia available for juvenile *O. mykiss,* yet they were able to tolerate temperatures up to 24.5°C without changes in behavior or activity level. These findings may indicate that Southern SH/RT are acclimated to higher daily stream temperatures than more northern *O. mykiss* populations. Juvenile salmonids acclimated to higher water temperatures, such as those in many Southern SH/RT streams, can sustain higher maximum thermal tolerances than those acclimated at lower temperatures (Lohr et al. 1996).

Metabolic demand increases with higher environmental temperatures. Warmer waters can result in faster growth rates where the forage base is abundant or may slow if food is scarce (Noakes et al 1983.; Brett 1971). Thus, freshwater growth is strongly dependent on primary productivity and food accessibility within the stream (NMFS 2012a). In Topanga Creek, juvenile Southern SH/RT had high growth rates during the summer despite temperatures that frequently surpassed known high temperature tolerances (Bell et al. 2011a).

Thermal refugia are especially important for summer rearing, when Southern SH/RT juveniles must find stream reaches that are sufficiently cool (NMFS 2012a). In southern California streams, higher altitude can provide thermal refuge as well as near-coastal areas that benefit from the ocean acting as a temperature sink (NMFS 2012a). Riparian cover is also important for moderating stream temperatures, as exposed or non-shaded streams are generally warmer than those shaded by riparian canopy (Li et al. 1994). These types of shaded, cool-water stream habitats are most frequently found in headwater reaches within the range of Southern SH/RT (NMFS 2012a).

In Sespe Creek, juvenile Southern SH/RT were observed to occupy the coolest areas of pools during daytime hours in summer months (Matthews and Berg 1997). Fish were consistently found congregating in a seep area that provided cool groundwater during the hottest times of day. The juvenile Southern SH/RT appeared to experience a trade-off between dissolved oxygen and water temperature but chose cooler temperatures, deeper within the temperature stratified pools, over higher levels of dissolved oxygen which were closer to the stream surface. In the spring, *O. mykiss* have been found to emigrate downstream into lower mainstem areas when tributaries may become warmer and/or drier (Spina et al. 2005). As flows increase in the fall and winter, fish may move upstream into tributary habitat to overwinter (Bramblett et al. 2002); however, this behavior has not been confirmed for Southern SH/RT (Spina et al. 2005).

Cover is also an important habitat component for juvenile Southern SH/RT survival, particularly during the winter months. Riparian cover, such as canopy and undercut banks, as well as instream cover like large woody debris (LWD) and deep pools, are important in providing shelter to rearing salmonids (Bjornn and Reiser 1991). Cover quality and availability have been correlated with local instream fish abundance for multiple salmonid species (Bjornn and Reiser 1991). In the mainstem Ventura River, juvenile Southern SH/RT densities were found to be positively correlated with velocity and cover (Allen 2015 p. 133). In western Oregon and Washington streams, juvenile steelhead were found in higher densities in reaches treated with LWD during the winter (Roni and Quinn 2001). Pool formation and enhancement can result from presence of live hardwood or LWD in a stream (Thompson et al. 2008). Instream tree roots can produce scour in high flow conditions leading to long-lasting pools. Trees in the stream channel can also anchor dead LWD and create wood jams. Jams constructed around standing trees are more durable and will last longer in watersheds dominated by hardwood species (Thompson et al. 2008).

Certain substrate types can also provide cover habitat for rearing salmonids. Larger substrate offers interstitial spaces for fish to avoid visual detection from predators. Boulders may be particularly important features in southern California streams, due to the paucity of LWD in these watersheds (Boughton et al. 2009; Tsai 2015). Boulders can assist in the formation of pools and create habitat complexity, which increases habitat suitability for Southern SH/RT (Roni et al. 2006; Tsai 2015). The presence of boulders in streams can also have a significant positive effect on *O. mykiss* survival and abundance due to their role in providing hiding areas and refuge from winter storms and associated flows (Tsai 2015). In contrast, areas with increased stream substrate embeddedness (more compacted stream bottoms) have been associated with lower juvenile salmonid densities (Bjornn and Reiser 1991).

Some Southern SH/RT will remain in freshwater through their life cycle, while those expressing the anadromous life history strategy will begin migrating downstream towards the ocean after two to three years of rearing in freshwater (NMFS 2012a). It is common in southern California for seasonal lagoons to be formed during the summer due to decreased stream flows and the natural accumulation of a sand berm at the point where the stream meets the ocean. Some juveniles take advantage of rearing in the warmer lagoon environment to achieve greater size prior to entering the ocean, which allows them a greater chance of survival (Bond et al. 2008; Hayes et al. 2008).

In Scott Creek (central California), during years when a seasonal lagoon formed, growth rates were 2-6 times greater for steelhead rearing in the estuary-lagoon than those in the cooler, less productive upstream habitat (Hayes et al. 2008). Juvenile *O. mykiss* in central California streams have been observed to exhibit a lagoon-anadromous, or “smolting” twice, life history strategy. These life history variants travel downstream to the closed estuary to rear during the summer, then migrate back upstream into more suitable conditions when the estuary starts to become less hospitable (Hayes et al. 2011; Huber and Carlson 2020). Juvenile *O. mykiss* also preferentially seek out areas with higher water quality when confined within a seasonally closed estuary (Matsubu et al. 2017). However, estuaries in poor condition, including lagoons with poor water quality, may lead to mortality of rearing juveniles if they do not have access to suitable habitat upstream. Seasonal lagoons in southern California typically do not reconnect to the ocean until the first rainfall occurs in the fall or winter (Booth 2020). Juvenile *O. mykiss* benefit from pulse flows initiated by storms and successful emigration is largely dependent on storm flow events matching the timing of *O. mykiss* smolt outmigration (Booth 2020). Smolts in southern California streams, such as the Santa Clara River are largely unable to take advantage of lagoon rearing and its associated benefits due to poor water quality in the estuary and dry reaches upstream (Booth 2020).

5.6 Ocean Growth

Little information exists specific to ocean growth of anadromous Southern SH/RT, but data from other west coast steelhead populations can provide some insight into habitat requirements of this life stage. Steelhead exhibit early ocean migratory behavior that is thought to maximize bioenergetic efficiency (Atcheson et al. 2012). In contrast to other Pacific salmon species, which typically remain relatively close to shore and feed in coastal waters along the continental shelf during their first summer at sea, steelhead quickly leave these productive coastal habitats for the open ocean (Atcheson et al. 2012; Daly et al. 2014). Many California steelhead juveniles spend only a few months feeding in the California Current Ecosystem (CCE) before they migrate northwest to cooler waters offshore (Daly et al. 2014). In the open ocean, steelhead maximize their energy intake by consuming high-energy prey items like fish and squid at moderate rates rather than consuming lower-energy food resources at high rates (Atcheson et al. 2012). Fish and squid make up a substantial portion of the juvenile steelhead diet for those rearing in the Gulf of Alaska, which serves as an important rearing location for west coast steelhead (Atcheson et al. 2012).

While feeding and growing in the ocean, steelhead typically occupy waters within the temperature range of 6-14°C (Hayes et al. 2016; Quinn 2018). Steelhead exhibit strong thermal avoidance, remaining within a narrow range of suitable sea surface temperatures (SSTs) during their ocean foraging and migrations, generally within 20 meters of the surface (Burgner et al.

1992 in Atcheson et al. 2012; Nielsen et al. 2010). Deviations outside of their thermal tolerance have negative consequences for growth and survival in the ocean (Atcheson et al. 2012) and generally poor ocean conditions can negatively affect survival especially during early ocean residence (Kendall et al. 2017). For example, warm SSTs were associated with lower post-smolt survival of Keogh River steelhead off the coast of Alaska (Friedland et al. 2014). In recent years, the CCE experienced a severe marine heatwave (Di Lorenzo and Mantua 2016), which impacted species abundance and distribution at multiple trophic levels, including the prey base for Pacific salmon (Daly et al. 2017; Peterson et al. 2017). During years with anomalously warm ocean conditions, young Chinook Salmon were observed to be much thinner, and their survival rates were depressed compared to years with cooler ocean temperatures, likely resulting from this shift in availability of prey species (Daly and Brodeur 2015; Daly et al. 2017).

Steelhead average a travel distance in the ocean of 2,013 km but have been tracked traveling up to 5,106 km (Quinn 2018). Steelhead are not typically captured in commercial fisheries possibly resulting from their swift movement offshore, and most catches of steelhead in research trawls are in the upper 30 meters of the water column (Moyle et al. 2017; Quinn 2018).

6. FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

6.1 Changes in Ocean Conditions

The long-term relationship between ocean conditions, food web structure, and Southern SH/RT productivity is not well understood; however, these relationships have been examined for steelhead populations in the Pacific Northwest. While the Pacific Northwest coastal rivers are distant from the coastal rivers of southern California in terms of both geography and ecology, these findings still improve our understanding of the relationship between ocean temperatures and the dietary composition and morphology of west coast steelhead populations. Comparisons may also offer insights into similar mechanisms that may potentially influence Southern SH/RT ocean diet compositions. Thalmann et al. (2020) detected significant differences in the prey items consumed by juvenile steelhead during warm ocean years compared to average or cold ocean years. They also found significant interannual variability in stomach fullness, with significantly lower than average stomach fullness associated with warm ocean years. Steelhead sampled during warmer years were thinner, on average, than those sampled during cooler years. In 2015 and 2016, when ocean conditions were anomalously warm, there was limited availability of cold-water prey species with higher energetic and lipid content. Although some level of plasticity was demonstrated in the juvenile steelhead diet, consumption of lower-quality prey items likely led to reduced growth and poorer body condition during those years (Thalmann et al. 2020).

In the North Pacific, the 2013–2020 period was characterized by exceptionally high sea surface temperatures coupled with widespread declines and low abundances for many west coast salmon and steelhead populations (Boughton et al. 2022a). For example, the abundance of southern Chinook salmon and steelhead populations reached very low counts between 2014 and 2019, leading to the designation of many stocks as overfished (PFMC 2020). Increased sea temperatures and associated impacts have resulted in a significant biological response at all trophic levels, from primary producers to marine mammals and birds.

6.2 Effects of Climate Change

The climate of the United States is strongly connected to the changing global climate (USGCRP 2017), and temperatures are projected to continue to rise another 2°F (1.11°C) to 4°F (2.22°C) in most areas of the United States over the next few decades (Melillo et al. 2014). The waters of the United States are projected to lose between 4 and 20% of their capacity to support cold water-dependent fish by the year 2030 and as much as 60% by 2100 due to climate change and its impacts (Eaton and Scheller 1996). The greatest loss of this important aquatic habitat capacity is projected for California, owing to its naturally warm and dry summer climate (O'Neal 2002; Preston 2006; Mote et al. 2018). The recent multidecadal (2000–2021) "megadrought" in the southwestern U.S., including California, has been the driest 22-year period over the past 1,000 years in this region (OEHHA 2022). Severe drought was documented across much of the southwest during this period, with record-breaking low soil moisture, extended heat waves, reduced precipitation, and intensifying weather extremes (Garfin et al. 2013; OEHHA 2022; Williams et al. 2022). These conditions are expected to continue or increase in the region (Gershunov et al. 2013), with predicted outcomes dependent upon the level and extent of human efforts to address and offset CO_2-driven climate change impacts, both within the United States and across the globe (Overpeck et al. 2013; NMFS 2016; USGCRP 2017; OEHHA 2022).

Since 1895, California has warmed more than both the North American and global temperature averages (NOAA 2021; OEHHA 2022). As such, the state is considered one of the most "climate-challenged" areas in North America (Bedsworth et al. 2018), facing increasingly extreme weather patterns and comparatively rapid shifts in regional climate- and local weather-based averages and trends (e.g., Overpeck et al. 2013; Pierce et al. 2018). California's temperatures have paralleled global trends in terms of increasing at an even faster rate since the 1980s (Figure 15; OEHHA 2022). The past decade has been especially warm; eight of the ten warmest years on record for California occurred between 2012 and 2022 (OEHHA 2022). In general, the portions of California with lower latitudes and elevations will be subject to the greatest increase in duration and intensity of higher air and water temperatures due to climate change (Wade et al. 2013). Thus, the southwestern part of California, which includes the range of Southern SH/RT, will likely face disproportionate climate change-related impacts when compared to other regions of the state. Southern SH/RT are, therefore, likely to face more severe and challenging conditions than their northern salmonid relatives.

The broad-scale climatic factors that appear to primarily shape the habitat suitability and population distribution of Southern SH/RT are summer air temperatures, annual precipitation, and severity of winter storms (NMFS 2012a). These factors and their influences on the landscape are predicted to intensify under long-term, synergistically driven conditions brought about by climate change. They are also expected to exacerbate existing stressors for Southern SH/RT and other cold water-dependent native aquatic organisms in stream and river systems in southern California (NMFS 2012b). In a comprehensive rating of California native fish species, Moyle et al. (2013) determined southern California steelhead to be "critically vulnerable" to climate change and likely to go extinct by 2100 without strong conservation measures. This was reaffirmed by an analysis conducted by Moyle et al. (2017).

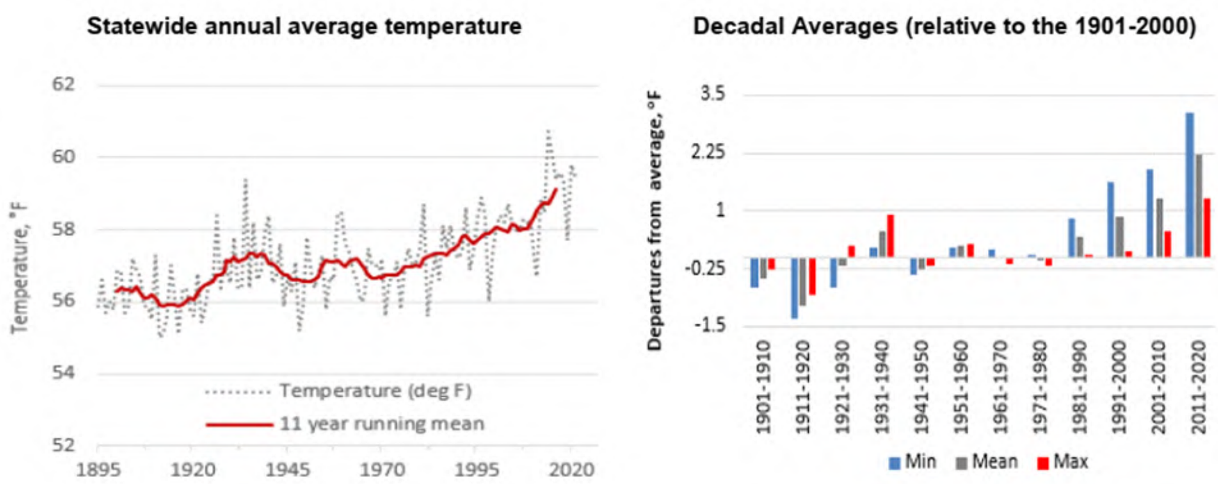


Figure 15. Temperature trend (left) and departure from average (right) graphs for California, from about 1900-2020 (source: OEHHA 2022).

6.2.1 Rising Temperatures

Extreme heat events in California have become more frequent, dating back to the 1950s; however, they have become especially pronounced in the past decade (OEHHA 2022). Heat waves, defined as two or more consecutive heat events (which are characterized by temperatures at or above the highest 5% of historical values), have also become more frequent during this period (OEHHA 2022). For context, over the past 70 years, extreme heat events increased at a rate of about 1 to 3 events per decade at 10 of a set of 14 statewide long-term monitoring sites across California (OEHHA 2022). Further, at several monitoring sites, daytime heat waves increased to as many as 6 events per year, and nighttime heat waves similarly increased to as many as 10 events per year (OEHHA 2022). Long-term regional climate observations for southern California also follow this pattern of long-term, steady temperature increases. Based on analyses of California South Coast National Oceanic and Atmospheric Administration (NOAA) Climate Division temperature records from 1896–2015, He and Gautam (2016) found significant upward trends in annual average, maximum, and minimum temperatures, with an increase of about 0.29°F (0.16°C) per decade. Likewise, every month of the year has experienced significant positive trends in monthly average, maximum, and minimum temperatures, across the same 100-year period (Hall et al. 2018).

Importantly, nighttime temperatures in California, which are reflected as minimum daily temperatures, have increased by almost three times more than daytime temperatures since 2012 (OEHHA 2022). Gershunov et al. (2009) showed that heat waves over California and Nevada are increasing in frequency and intensity while simultaneously changing in character and becoming more humid. This shift toward humid heat waves in the southwestern U.S. is primarily expressed through disproportionate increases in nighttime air temperatures (Garfin et al. 2013). These changes started in the 1980s and appear to have accelerated since the early 2000s (Garfin et al. 2013). Nighttime warming has been more pronounced in the summer and fall, increasing by about 3.5°F (1.94°C) over the last century, and southern California has warmed faster than Northern California (OEHHA 2022). These long-term regional changes will have disproportionate impacts on aquatic habitats due to elevated atmospheric humidity levels and diminished nighttime cooling effects on southern California waterways (Garfin et al. 2013).

In fact, water temperatures in many streams across California have risen for some time and are continuing to do so (Kaushal et al. 2010). Stream temperatures across the state have increased by an average of approximately 0.9–1.8°F (0.5–1.0°C) in the past 20+ years (e.g., Bartholow 2005 in Moyle et al. 2013). While such increases may seem small, they can push already marginal waters over thresholds for supporting cold water-dependent fishes (Moyle et al. 2015; Sloat and Osterback 2013). Summer water temperatures already frequently exceed 68°F (20°C) in many California streams and are expected to keep increasing under all climate change scenarios (Hayhoe et al. 2004; Cayan et al. 2008 in Moyle et al. 2015). Organisms that are adapted to California's traditional nighttime cooling influence on their habitats, including Southern SH/RT, are less prone to recover from extreme and extended periods of excessive daytime heat, particularly when humidity and temperatures remain high at night (Garfin et al. 2013; OEHHA 2022).

6.2.2 Drought

Overall, California has been getting warmer and drier since 1895; as part of this long-term climatic shift, droughts are becoming more frequent, extended, and severe in their impacts (OEHHA 2022). As noted, 2000–2021 was the driest 22-year period in the last millennium in the southwestern United States, including California (Williams et al. 2022). The 2012–2016 drought was one of the warmest and driest on record in California, negatively affecting both aquatic and terrestrial environments across the state (Figure 16; CDFW 2018a). Notable statewide aquatic habitat impacts from this and other prolonged droughts include seasonal shifts in stream hydrographs to earlier peaks with extended summer and fall low flow periods, contraction and desiccation of typically perennial aquatic habitats (Figure 18), poor water quality, elevated water temperatures, changes in migratory cues, spawn timing, and other fish behaviors, stranding, and both direct and indirect mortality of fish, along with estuary and lagoon habitat degradation, among other ecological impacts (CDFW 2018a; Bedsworth et al. 2018).

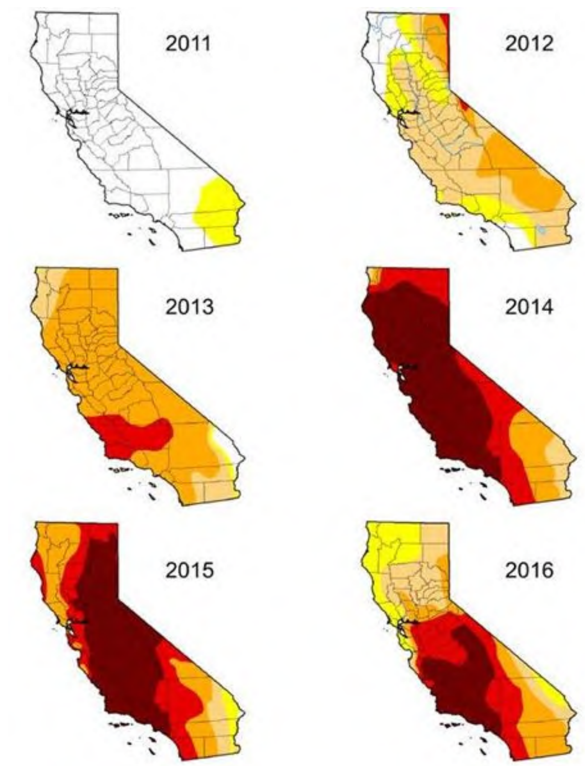


Figure 16. The distribution and progression of drought conditions in California from 2011 to 2016, depicting the level of drought at the beginning of each Water Year (October 1). White indicates no drought conditions, whereas yellow to dark red indicates increasing drought conditions, including duration and intensity (CDFW 2018a, based on U.S. Drought Monitor).

No part of the state has been more impacted by drought than southern California, with significant reductions in precipitation compared to long-term averages, along with record high temperatures, exceptionally dry soils, and low regional snowpack in surrounding mountain ranges in the past decade (Hall et al. 2018). Southern California is naturally arid and already prone to periods of extremely dry conditions (MacDonald 2007; Woodhouse et al. 2010), so increasing drought conditions have amplified many existing ecological stressors while also creating new ones. As an example, during normal water years, many streams in California's south-coastal region maintain perennial flows in their headwaters but become intermittent or dry in lower portions of their watersheds, especially in areas of concentrated urbanization or agriculture. The 2012–2016 drought dramatically exacerbated these conditions, leading to widespread stream drying in this region, even outside of areas that typically experience annual desiccation (Figure 17; CDFW 2018a). Not surprisingly, CDFW (2018a) noted that the two most common causes of fish kills in southern California during the 2012–2016 drought were stream drying and reduced dissolved oxygen levels (impaired water quality).

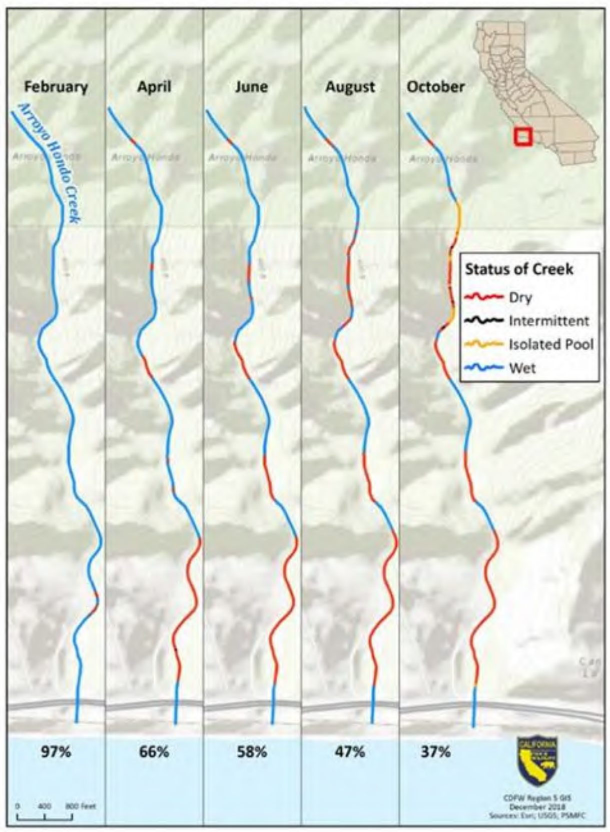


Figure 17. Example southern California stream (Arroyo Hondo Creek, Santa Barbara County), showing seasonal desiccation across 60% of its study area wetted length during February-October 2015 (source: CDFW 2018a). 2015 was a notably bad drought year in California, but the large extent of stream drying in this creek may be an indicator of future climate change-driven conditions in this and other southern California regional streams.

Further desiccation of Southern SH/RT habitats is expected due to climate change, leading to reduced natural spawning, rearing, and migratory habitats for already small and fragmented Southern SH/RT populations. This undesirable future state includes the increasing probability that low-precipitation years continue to align and coincide with warm years, further amplifying the risk of future severe droughts and low snowpack in California, especially in southern latitudes (Difenbaugh et al. 2015; Berg and Hall 2017; Williams et al. 2015).

In their five-year status reviews, NMFS (2016; 2023) concluded that ongoing “hot drought” conditions, among other negative factors, likely reduced salmonid survival across DPSs and ESUs for listed steelhead and salmon in California, including Southern SH/RT. It is likely that these same Southern SH/RT populations, already impacted and diminished in abundance and distribution, will face more frequent and severe drought periods in the future, along with more intense and destructive (albeit less frequent) winter storms, under all predicted scenarios. Both stressors, in combination, will further negatively affect the remaining suitable habitats for Southern SH/RT in California.

6.2.3 Reduced Snowpack

As air temperatures have warmed, more precipitation has been falling as rain instead of snow at high elevations in the western United States, where widespread snowpack declines of 15-30% have been documented since the 1950s (Mote et al. 2018; Siirla-Woodburn et al. 2021). Since 1950, California’s statewide snow-water content has been highly variable, ranging from more than 200% of the average in 1952, 1969, and 1983 to 5% in 2015 in the midst of the 2012–2016 drought (OEHHA 2022). The past decade included years that were among the lowest (2013, 2014, 2015, and 2022) and the highest (2011, 2017, 2019) on record for snowpack (OEHHA 2022). These patterns demonstrate increasing variability in the amount of overall precipitation the state receives, the frequency and intensity of storm systems, and the amount of precipitation received as rainfall versus snowfall. Annual snowpack in the Peninsular Ranges of southern California (e.g., Santa Ana Mountains, San Jacinto Mountains, and Laguna Mountains) is expected to continue to diminish, so future stream flows in the range of Southern SH/RT will be increasingly driven by rainfall events (Mote et al. 2018).

Snowmelt attenuates stream flows in basins that usually receive annual snowpack at higher elevations. An increase in the ratio of rain to snow and rain-on-snow events will result in more peak flows during winter and early spring, along with an increasing frequency of high flow events and damaging flooding. With earlier seasonal peak hydrographs, many southern California streams will experience diminished spring pulses and protracted periods of low flows through the summer and fall seasons (Moyle et al. 2015). These conditions will translate into warmer water temperatures at most elevations, reflecting both increases in air temperatures and reduced base flows (Moyle et al. 2017). Future shifts from snow to rain may also negatively impact overwintering rearing habitat for juvenile Southern SH/RT and reduce the availability of cold-water holding habitats as refuges in rivers and streams during the summer and fall months (Williams et al. 2016). Such abiotic shifts will affect the physical habitat availability and suitability for Southern SH/RT and are also anticipated to change species interactions, generally favoring introduced species with broader environmental tolerances (Moyle et al. 2013).

6.2.4 Increasing Hydrologic Variability – Reduced Stream Flows to Catastrophic Flooding

Climate change is likely to increase the impacts of El Niño and La Niña events, which are predicted to become more frequent and intense by the end of the century (OEHHA 2022). Increasingly dramatic swings between extreme dry years (or series of years) and extreme wet years are already occurring in California and are expected to escalate under various climate change scenarios (Swain et al. 2018; Hall et al. 2018). California's recent rapid shifts from drought periods (2012-2016, 2020-2022) to heavy precipitation and flooding (winter 2016-2017, winter 2022-23) exemplify "precipitation whiplash" and its potential for widespread natural habitat and human infrastructure damage and destruction (OEHHA 2022). California's river and stream systems will bear the brunt of these impacts since they are the natural conduits for water conveyance on the state's landscape.

Such precipitation variability and intensity in California is now increasingly influenced by "atmospheric rivers," or long, narrow bands of precipitation originating over ocean bodies from the tropics to the poles that transport large amounts of water vapor (USGCRP 2017; Hall et al. 2018). During the winter months, heavy precipitation associated with landfalling atmospheric rivers can produce widespread flooding in most of the southwestern U.S. states (Garfin et al. 2013). California is especially vulnerable to this source of destructive flooding because of its proximity to the Pacific Ocean, where atmospheric rivers are generated (USGCRP 2017). As a result of these changes, southern California stream flows will almost certainly become more variable and "flashy" on an annual basis. Predictions include likely extreme fluctuations in precipitation, with intermittent heavy winters producing high stream flows, coastal impacts, and extensive flooding during otherwise prolonged periods of drought, with low to no flows in many streams. Changes in seasonal flow regimes (especially flooding and low flow events) may also affect salmonid behavior. Expected behavioral responses include shifts in the seasonal timing of important life history events such as adult migration, spawning, fry emergence, and juvenile migration (NMFS 2016). The outmigration of juvenile steelhead from headwater tributaries to mainstem rivers and their estuaries may be disrupted by changes in the seasonality or extremity of stream hydrographs (NMFS 2016; Figure 18). Flood events can also disrupt incubation and rearing habitats due to increased bed mobility (Fahey 2006). Conversely, low flow periods with elevated water temperatures and impaired water quality can cause direct mortality to steelhead across wide portions of southern California's mountain desert streams (CDFW 2018a). Stream drying can also further isolate and restrict subpopulations, potentially leading to genetic drift, interfering with gene flow and genetic mixing at the larger population/ESU level, and potentially further reducing overall fitness.

6.2.5 Sea Level Rise

Along California's coast, mean sea levels have increased over the past century by about 8 inches (203 mm) at monitoring sites in San Francisco and La Jolla (OEHHA 2022). For the southern California coast, roughly 1-2 feet (0.3 m – 0.6 m) of sea level rise is projected by the mid-century, and the most extreme projections indicate 8–10 feet (2.4 m – 3.0 m) of sea level rise by the end of the century (Hall et al. 2018). Sea level rise is predicted to further alter the ecological functions and dynamics of estuaries and near-shore environments. Rising sea levels may impact estuary hydrodynamics with increased saltwater intrusion, potentially increasing salinity levels in estuaries and shifting the saltwater/freshwater interface upstream (Glick et al. 2007). Loss or degradation of already scarce estuary habitats in southern California's coastal areas due to sea level rise may negatively affect Southern SH/RT survival and productivity, since estuaries and lagoons serve as important nursery habitats for juvenile steelhead (Moyle et al. 2017). Alternatively, sea level rise may potentially increase the amount of available estuary habitat by inundating previously dry areas or creating additional brackish, tidal marsh, or lagoon habitats, which serve as important rearing habitats for juvenile salmonids (NMFS 2016). Overall, however, predictions indicate substantial reductions in southern California's coastal lagoon and estuary habitats, which may reduce steelhead smolt survival and numbers of outmigrants to the ocean, further constraining populations of Southern SH/RT (Moyle et al. 2017).

6.2.6 Ocean Acidification

Ocean acidification occurs when excess carbon dioxide (CO2) is absorbed from the atmosphere, acidifying or lowering the pH of sea water (CDFW 2021b). Ocean acidification is becoming evident along California's central coast, where increases in CO2 and acidity levels in seawater have been measured since 2010 (OEHHA 2022). Coupled with warming ocean waters and reduced dissolved oxygen levels, ocean acidification poses a serious threat to global marine ecosystems (OEHHA 2022). If left unchecked, ocean acidification could dramatically alter the Pacific Ocean's marine food webs and reduce the forage base for California's salmonids. Forage fish, which are a primary prey source for steelhead in the ocean (LeBrasseur 1966; Quinn 2018), may suffer declines in abundance due to reduced biomass of copepods and other small crustaceans resulting from ocean acidification (Busch et al. 2014). Ocean acidification makes it harder for the shells of ecologically and economically important species, including krill, oysters, mussels, and crabs, to form and potentially causes them to dissolve. Reduced seawater pH has also been shown to adversely affect olfactory discrimination in marine fish (Munday et al. 2009), which could result in impaired homing of Southern SH/RT to their natal streams.

6.2.7 Wildfires

Wildfires are a natural and fundamental part of California's ecological history in many parts of the state. Wildfires are an essential ecological process for the periodic renewal of chaparral vegetation communities (Sugihara et al. 2006), which dominate much of the south-coastal part of California. Historical fires were, therefore, important episodic ecological events with generally lower intensity impacts, at smaller geographic scales, and generally positive long-term outcomes for fish habitats (Boughton et al. 2007).

Euro-American influences and activities on the western landscapes of the U.S., coupled with climate change, have made modern western fires more frequent, severe, and catastrophic in nature (e.g., Gresswell 1999; Noss et al. 2006; and Moyle et al. 2017). Future frequency and size of wildfires in the range of Southern SH/RT is expected to increase, driven by rising atmospheric temperatures and prolonged droughts associated with climate change (NMFS 2012a, OEHHA 2022). Potter (2017) examined satellite data for the 20 largest fires that have burned since 1984 in the central and southern coastal portions of California and found that climate and weather conditions at times of ignition were significant controllers of the size and complexity of high-burn severity fire areas. Since 1950, half of California's largest wildfires (10 of 20) occurred between 2020 and 2021 (OEHHA 2022). One study predicted a nearly 70% increase in the area burned in southern California by the mid-21st century, due to warmer and drier climatic conditions (Jin et al. 2015). This study also evaluated southern California's wildfires in terms of their impacts in the presence or absence of regionally prominent Santa Ana winds. This research found that non-Santa Ana fires which occur mostly in June through August affected higher-elevation forests, while Santa Ana-driven fires which occur mostly from September through December spread three times faster and occurred closer to urban areas (Jin et al. 2015). Recent examples of devastating Santa Ana wind-driven fires include the destructive Thomas Fire (approximately 282,000 acres) in Ventura and Santa Barbara counties (December 2017) and the Woolsey Fire (approximately 97,000 acres) in Los Angeles and Ventura counties (November 2018), both of which were also influenced by preceding record-breaking heatwaves and extremely dry fall conditions (Hulley et al. 2020).

Projected increases in precipitation extremes will lead to increased potential for floods, mudslides, and debris flows (Hall et al. 2018). Wildfires and subsequent debris torrents in southern California were demonstrated to have destroyed Southern SH/RT habitats in 2004, 2006, and 2008 (Moyle et al. 2015). More recent events, including mass wasting and debris flows, such as those in Santa Barbara County in early 2018, resulted from heavy rains preceded by wildfires (Livingston et al. 2018). High-intensity wildfires can accelerate the delivery of sediments to streams (Boughton et al. 2007) by stripping the land of vegetative cover and eliminating stabilizing root structure, thereby degrading spawning habitats for salmonids and other fishes. Increased soil friability greatly increases rates of fine soil mobilization, erosion, transport, and deposition into watercourses affected by fire due to the elimination of vegetation, the input of large amounts of dry ash and charcoal, the lack of soil shading, and the associated increased solar warming and drying of soils (NMFS 2012a). These fine materials often become so dry after a fire that they become hydrophobic, making it much easier for runoff water to mobilize and transport. Fine sediments delivered to streams in large amounts have been shown to cover and smother coarser-grained spawning gravels, which are required for salmonid spawning success (Moyle et al. 2015). Largescale sediment mobilization events can also change the channel characteristics of streams, destroy instream and riparian vegetation, and possibly cause direct or indirect mortality to multiple life history stages of Southern SH/RT, while also facilitating the rapid spread of non-native plant and animal species. High flows and floods in fire scars can also scour redds, depending on their seasonal timing, possibly nearly eliminating a Southern SH/RT subpopulation's cohort post-spawn if gravels are mobilized and eggs or juveniles are washed downstream.

6.3 Disease

Numerous diseases caused by bacteria, protozoa, viruses, and parasitic organisms can infect Southern SH/RT in both juvenile and adult life stages. These diseases include bacterial kidney disease (BKD), *Ceratomyxosis*, *Columnaris*, *Furunculosis*, infectious hematopoietic necrosis virus, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, and whirling disease (NMFS 2012a). Water quality and chemistry, along with warm stream temperatures, influence infection rates. As water temperatures rise and fish become thermally stressed, lower host resistance aligns with higher pathogen growth rates due to shorter generation times and can lead to a sharp increase in infection rates and associated mortality (Belchik et al. 2004; Stocking and Bartholomew 2004; Crozier et al. 2008). There is little current information available to evaluate the potential impacts of these kinds of infections on Southern SH/RT populations.

6.4 Hatcheries

Extensive stocking of hatchery-origin *O. mykiss* has occurred throughout the southern California region to support recreational fisheries, but no efforts have specifically targeted the conservation and supplementation of Southern SH/RT. Historical stocking records dating back to the 1930s occasionally reference the stocking of "steelhead"; however, it appears that these references represent nomenclature being used interchangeably rather than identification of fish from native migratory populations. Hatchery-origin *O. mykiss* were stocked widely for recreational fisheries up until the late 1990s. Stocking was ceased in the anadromous waters of southern California as a protective conservation measure starting in 1999 (J. O'Brien, CDFW, personal communication).

While restricted stocking of *O. mykiss* has continued in the region above barriers to anadromy, potential remains for the inadvertent introduction of hatchery stocks into anadromous waters due to downstream movement or during reservoir spill events. To mitigate the risk of hatchery-origin fish interbreeding with wild fish, the Department shifted to stocking only triploid hatchery-origin *O. mykiss* in waters above anadromous barriers following the adoption of the Hatchery and Stocking Program Environmental Impact Report (EIR) in 2010 (Jones and Stokes 2010). Triploid *O. mykiss* have been used across the western United States to reduce the risks of introgression and hybridization associated with stocking programs that support recreational fisheries. The application of heat- or pressure-induced "triploiding" on salmonid eggs, including *O. mykiss*, has a proven 91-100% sterilization rate, often at the upper end of that range (Kozfkay et al. 2011). Using triploid hatchery-origin *O. mykiss* for recreational fisheries has mitigated some of the inherent risk of potential hybridization and introgression with native and wild stocks, although some risks to Southern SH/RT may still exist. Competition and predation from hatchery stocks remain of concern since the degree to which triploid *O. mykiss* may compete with or prey upon native *O. mykiss* is not well understood.

Hatchery-origin *O. mykiss* have been tagged prior to stocking into select regional reservoirs to attempt to evaluate if and the extent to which they may be escaping these impoundments and entering anadromous waters below dams. No reservoir spills have occurred across the region since tagging began due to the predominance of drought conditions, except for during the winter and spring of 2023. To date, downstream monitoring has not been conducted since the inception of the tagging study (J. O'Brien, CDFW, personal communication). Due to climate change impacts and the decreased frequency with which many southern California reservoirs are filling or overspilling, it is expected that threats from interactions between hatchery-stocked *O. mykiss* and remaining native stocks of Southern SH/RT will be considerably reduced in the future. However, the large number of atmospheric rivers that impacted much of California during the recent winter of 2022–2023, causing some southern California reservoirs to fill and overspill, is a reminder that such events remain possible.

While exclusively triploid hatchery-origin *O. mykiss* are stocked above barriers to anadromy in southern California, historical regional stocking practices of non-triploid fish have led to introgression, or hybridization with hatchery stocks, in some Southern SH/RT populations. Levels of introgression appear to vary across the landscape, differing between populations and watersheds. Some populations retain high levels of native southern California steelhead ancestry, while others are highly introgressed and exhibit high levels of hatchery-origin genetics (primarily Central Valley *O. mykiss* genetics), while some are in between, with genetic signatures from both native and hatchery origins (Clemento et al. 2008; NMFS 2016; Jacobson et al. 2014). See Section 6.7 in this Status Review for more information.

6.5 Predation

6.5.1 Predation in Freshwater Environments

California's salmonids have evolved under selective pressure from a variety of natural predators, including many species of fish, birds, and mammals; however, a growing number of non-native aquatic species have also become established within the range of Southern SH/RT (Busby et al. 1996; NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022). Established populations of non-native fishes, amphibians, and invertebrates, combined with anthropogenic habitat alterations that often favor non-native species, have led to increased impacts from predation, competition, and other stressors on Southern SH/RT across much of its range (NMFS 1996b). Stream habitat alteration can also directly affect predation rates by reducing available cover for prey species, creating flow and velocity regimes that favor non-native predators, and creating obstructions to passage that can lead to migration delays and increased exposure to predators (Moyle et al. 2013; Dagit et al. 2017). Further, stream habitat alterations can influence water temperatures, often increasing them, which may then lead to higher metabolic rates for piscivorous fishes and increased predation pressure (Michel et al. 2020). In addition to physical habitat alterations, chemical habitat alterations in the form of contaminants known to alter fish behavior and reduce avoidance or cover-seeking activities are also likely to increase predation rates, particularly from avian predators (Grossman 2016).

Established populations of non-native catfish and centrarchids occur in the lower reaches of many watersheds throughout the range of Southern SH/RT, leading to widespread predation risk (NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022). Grossman (2016) found that non-native Channel Catfish (*Ictalurus punctatus*) may be a primary predator of Central Valley steelhead in the San Joaquin River, suggesting they may pose the same level of risk to Southern SH/RT. Non-native centrarchids have been demonstrated to negatively impact salmonid populations through direct predation on rearing juveniles and resident adult *O. mykiss* (Dill and Cordone 1997; Marks et al. 2010; NMFS 2012a; Bonar et al. 2005).

Abundant populations of non-native fish have been documented in many southern California coastal watersheds, including Malibu Creek, lower Arroyo Trabuco, Santa Margarita, and San Luis Rey rivers. These species include largemouth and redeye bass, green sunfish, mosquito fish, and black bullhead (C. Swift, Emeritus, Section of Fishes, Natural History Museum of Los Angeles County, personal communication; O'Brien et al. 2022).

In addition to piscivorous fishes, non-native invertebrates and amphibians have also been introduced and spread across the Southern SH/RT range. American bullfrogs (*Lithobates catesbeianus*) have become widely established and can prey upon rearing juvenile steelhead (COMB 2022; Cucherousset and Olden 2011; Dagit et al. 2019; Stillwater Sciences 2019). Non-native Red Swamp Crayfish (*Procambarus clarkia*) populations have also increased in some Southern SH/RT waters (Garcia et al. 2015; Dagit et al. 2019). Direct observations of YOY Southern SH/RT being attacked by crayfish in shallow riffle-run habitat suggest that predation poses a threat to the survival of juvenile steelhead (Dagit et al. 2019).

6.5.2 Predation in Marine Environments

Marine predation influences on Southern SH/RT are not well documented or understood. Primary predators of salmonids in the marine environment are pinnipeds, such as harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) (Cooper and Johnson 1992; Spence et al. 1996). Although fish are a major dietary component of marine pinnipeds, their predation on Southern SH/RT may be minimal at present, given the very low relative abundances of Southern SH/RT.

6.6 Competition

Competition is the interaction between individuals of the same or different species that compete for a limited supply of a common resource (Holomuzki et al. 2010). The extent to which competition impacts the distribution, abundance, and productivity of Southern SH/RT populations is not well understood. Pacific steelhead typically compete with other salmonid species like Coho and Chinook salmon in freshwater; however, unlike northern populations of steelhead that typically co-occur with other salmonid species, Southern SH/RT are the only salmonids that occur in their range. While inter-specific competition with other salmonids is unlikely to occur, intraspecific competition among Southern SH/RT may be prevalent in southern California watersheds, especially those that are highly degraded. Poor and degrading habitat conditions can contribute to increased competition, which, in turn, can adversely affect fish during the juvenile life-history stage and lead to reduced recruitment and reproductive performance over the entire life cycle (Chilcote et al. 2011; Tatara et al. 2012). Limited habitat space, coupled with high juvenile densities, is associated with reduced growth, premature emigration, increased competition for food, decreased feeding territory sizes, and increased mortality (Kostow 2009).

Juvenile steelhead are habitat generalists, occupying a variety of microhabitat types in streams depending on the size and age of individuals (Spina et al. 2005). Non-native fish species can competitively restrict the spatial distribution of juvenile steelhead to suboptimal habitats such as shallower, higher-velocity rifles, where the energetic cost to forage is higher (Rosenfeld and

Boss 2001). Non-native fish species may also exclude juvenile steelhead from areas of suitable habitat. For example, recent watershed-wide surveys in Sespe Creek, a large and unregulated tributary to the Santa Clara River, documented the absence of Southern SH/RT in several stream reaches with suitable steelhead habitat (i.e., cool water with deep pools) that were dominated by multiple species of non-native juvenile fishes (Stillwater Sciences 2019). According to Krug et al. (2012), Arroyo Chub may also compete with Southern SH/RT juveniles for food resources. Like juvenile steelhead, Arroyo Chub are opportunistic feeders and consume benthic and drift invertebrates, sometimes switching preferences depending on food abundance. Southern SH/RT and Arroyo Chub are frequently part of the same native southern California fish assemblages and generally habitat partition, with juvenile steelhead mostly feeding on drift invertebrates while chub have a more benthic diet. However, periods of diet overlap may lead to strong interspecific competition between the two species. While other native fishes may impose some level of competitive threat to Southern SH/RT, it remains likely that non-native competitors pose the greater threat, especially with these species continued expansion and proliferation (O'Brien and Barabe 2022).

6.7 Genetic Diversity

West coast steelhead have considerable genetic diversity, both within and across populations, including variation in traits linked to anadromy, morphology, fecundity, spawning, and run timing, as well as age at smolting and maturation (McElhany et al. 2000). While some traits are entirely genetically based, the expression of most traits usually varies, due to a combination of both genetic and environmental factors. Species with high genetic diversity typically occupy a wider range of habitats than those with lower diversity and are more resilient to both short-and long-term spatial-temporal fluctuations in the environment such as ecological disturbances (i.e., wildfires, floods, and landslides) and human-caused impacts. Generally, populations need to be large enough to maintain long-term genetic diversity and avoid genetic problems, such as loss of variation, inbreeding depression, bottlenecks, and the accumulation of deleterious mutations, all of which occur more frequently in smaller populations.

A range-wide genetic analysis demonstrated that populations in the southernmost portions of the Southern SH/RT range are dominated by hatchery ancestry, indicating genetic introgression of native lineages with hatchery strains (Jacobson et al. 2014; Abadia-Cardoso et al. 2016). Most of these hybridized wild populations occur above barriers in the upper reaches of the Los Angeles, San Gabriel, Santa Ana, San Juan, San Diego, and Sweetwater rivers. It is unclear whether introgression will decrease the viability of these southern populations, since the introduction of small amounts of novel genetic material, even from hatchery stocks, can lead to increased diversity and the phenomenon known as "hybrid vigor," conferring adaptive resilience to changing environments and the negative impacts of inbreeding. This study also confirmed that the northernmost populations of Southern SH/RT, including all watersheds in the Monte Arido Highlands BPG, contain native steelhead ancestry and generally higher genetic diversity than more southern populations (Clemento et al. 2009; Abadia-Cardoso et al. 2016).

As with other salmonids, natural straying and the resultant gene flow between populations maintain the genetic diversity of Southern SH/RT. A recent study, which examined the otoliths of seven adult steelhead from a small basin on the Big Sur coast of California, revealed that all adults were strays, coming from at least six different source populations, including neighboring ones on the Big Sur coast as well as distant populations such as the Klamath River (Donohoe et al. 2021). As is the case for many coastal steelhead populations, the genetic diversity of Southern SH/RT has been compromised by human impacts on their habitats, such as the blocking of migration corridors by artificial dams and widespread reductions in streamflow, at least partially due to locally and regionally intensive water diversions for municipal, agricultural, and other human consumptive uses (NMFS 2012a).

Measures of genetic diversity, such as heterozygosity and allelic richness, indicate that Southern SH/RT populations have lower diversity than northern coastal populations. Within the range of Southern SH/RT, the northernmost populations in the Santa Maria, Santa Ynez, Ventura, and Santa Clara rivers have higher genetic diversity than the southernmost populations (Abadia-Cardoso et al. 2016). Previous genetic studies have revealed that populations occurring downstream of modern artificial barriers are genetically more similar to above-barrier populations in the same basin than they are to populations below barriers in neighboring basins (Clemento et al. 2009). While above- and below-barrier populations within the same drainage are usually each other's closest relatives, they appear divergent in respect to the frequencies of the anadromous (A) and resident (R) haplotypes found in each subpopulation (see Section 4.7). The A haplotype is more common below dams, while the R haplotype is found more frequently above dams. This evidence of selection against the anadromous genotype is likely a product of artificial dams or other barriers blocking anadromous adults from returning to these upstream areas to reproduce and provide A haplotype genetic influx to the above-barrier population (Pearse et al. 2014; Pearse et al. 2019). Apgar et al. (2017) found that the frequency of the A haplotype is strongly associated with several factors, including the extent of migration barriers present, barrier type (complete, partial, artificial, or natural), barrier age (recent or longstanding), and migration distance. Genetic diversity in above-barrier populations is an important repository of genetic material, serving a similar function as conservation hatcheries do in other parts of the Southern SH/RT range (D. Boughton, NOAA, personal communication; NMFS 2012a)

Because migratory phenotypes are primarily genetically based, variation in the reproductive success of anadromous and resident individuals can influence the tendency of populations to produce anadromous offspring, corresponding to changes in the frequency of the A haplotype. Moreover, environmental factors, such as intra-and inter-annual climate variation, food availability, and water temperature, also influence the expression of anadromy in Southern SH/RT populations (Satterthwaite et al. 2009; Ohms et al. 2014; Kendall et al. 2015). Furthermore, climate change projections for Southern SH/RT range predict an intensification of climate patterns, such as more intense cyclic storms, droughts, and extreme heat (NMFS 2012a). These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form.

6.8 Habitat Conditions

The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions, particularly in the lower and middle reaches of most watersheds in the Southern SH/RT range (NMFS 2012a). Southern California is home to over 20 million people and 1.8 million acres of metropolitan, urban, and suburban areas (DWR 2021) which has resulted in highly urbanized watersheds that are impacted by surface and groundwater diversions and associated agricultural, residential, and industrial uses. Major rim dams, instream diversion dams, and other water conveyance infrastructure have significantly reduced or eliminated access to the majority of historical upstream rearing and spawning habitat for southern steelhead. While some of these human activities have been reduced, eliminated, or mitigated, the cumulative impacts of these activities remain throughout most of the Southern SH/RT range, particularly in larger systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, and Santa Margarita watersheds, as well as in smaller coastal systems such as Malibu Creek.

6.8.1 Roads

High human population densities in southern California have led to the development of an extensive network of transportation corridors throughout the range of Southern SH/RT. The extensive road and highway networks across much of the Southern SH/RT range, especially in areas proximate to rivers and streams, are attributed to increases in a number of negative habitat impacts. Among these are: non-point pollution (e.g., oil, grease, and copper from braking systems); sedimentation; channel incision due to bankside erosion; substrate embeddedness; floodplain encroachment and loss of floodplain connectivity; loss of channel heterogeneity (e.g., filling of pool habitats); and higher frequencies of flood flows (NMFS 2012a). Additionally, extensive road and highway networks require many road crossings (e.g., culverts and bridges) that are often improperly designed for the volitional passage of aquatic organisms (CalTrans 2007; NMFS 2012a).

NMFS (2012) assessed the impacts of roads and transportation corridors on Southern SH/RT using roads per square mile of watershed and the density of roads within 300 feet of streams per square mile of watershed as metrics. The results of their analysis demonstrated that roads and associated passage barriers have the highest impact on rivers and streams in the Santa Monica Mountains and Conception Coast BPG regions: 60% of watersheds in the Conception Coast BPG ranked “very high” or “high” in severity for roads as a stressor, while 100% of the watersheds that drain the Santa Monica Mountains received the same ranking. Highway 101 and the Union Pacific Railroad cross the mainstem of each watershed along the Conception Coast BPG region (as well as the Monte Arido Highlands BPG region) near their river mouths. At each major transportation crossing, culverts were constructed to allow stream flows to pass through to the Pacific Ocean, but they were not necessarily engineered to allow upstream fish passage. For example, the Highway 101 culvert on Rincon Creek serves as a total barrier to upstream migration, preventing Southern SH/RT from reaching any of its historical habitats upstream of the barrier. Road development, bridges, and other transportation corridors are also partly responsible for the significant (70-90%) reduction of estuarine habitat across all BPGs (Hunt and Associates 2008).

The Mojave Rim and Santa Catalina Gulf Coast BPG regions are home to the highest urban densities across the Southern SH/RT range, and both BPGs are impacted by high road densities. For example, in the Santa Catalina Gulf Coast BPG region, the Rancho Viejo Bridge, Interstate-5 Bridge array, and the Metrolink drop structure are all recognized as total fish passage barriers on Arroyo Trabuco Creek, a tributary to San Juan Creek. On the Santa Margarita River, an outdated box culvert at the Sandia Creek Bridge serves as a significant fish passage barrier on the river (Dudek 2001). Recently, efforts have been undertaken to repair and modify these barriers to provide upstream steelhead passage and again allow access to many miles of historical habitat in these watersheds (see Chapter 6: Influence of Existing Management Efforts).

6.8.2 Dams, Diversions, and Artificial Barriers

A number of anthropogenic impacts, including water diversions, dams, and other artificial barriers, influence stream flows in most Southern SH/RT-supporting watersheds. Municipal and agricultural beneficial uses comprise the majority of water demand in the South Coast region (Mount and Hanak 2019). Surface water diversions can lead to reduced downstream flows, as well as changes to the natural flow regime (e.g., magnitude, timing, and duration of flow events), stream hydrodynamics (e.g., velocity, water depth), and degradation of both habitat quality and quantity needed to support Southern SH/RT (NMFS 2012a; Yarnell et al. 2015). Changes to the natural flow regime can result in elevated downstream water temperatures, reduced water quality, shifts in fish community composition and structure, increased travel times for migrating fish, increased susceptibility of native aquatic organisms to predation, and reduced gravel recruitment from upstream areas of watersheds to the lower reaches of rivers (NMFS 1996b; Axness and Clarkin 2013; Kondolf 1997). Dams physically separate fish populations into upstream and downstream components, leading to population and habitat fragmentation, along with potential changes to population spatial and genetic structure over time (NMFS 2012a). Large dams often trap upstream sediments, which naturally would be transported downstream and deposited, augmenting substrates and improving spawning habitats for salmonids and other fish. It is common for rivers and streams with large dams to exhibit more scouring and streambed degradation downstream of the impoundment (Kondolf 1997; Yarnell et al. 2015). Stream flow reductions also interfere with the downstream transport and influx of freshwater to estuaries. The consequences of reduced inflows to estuaries include wetland and edge habitat loss, changes to the amount and location(s) of suitable habitat for aquatic organisms and accelerated coastal erosion (Nixon et al. 2004).

Many types of artificial stream barriers exist throughout the range of Southern SH/RT, including dams, concrete channels for flood control, gravel and borrow pits, roads and utility crossings, fish passage facilities, and other non-structural features such as velocity barriers. In the South Coast hydrologic region, a total of 164 known total migration barriers were identified as part of a larger effort to inventory fish passage barriers across California's coastal watersheds (California Coastal Conservancy 2004). Of the 164 total barriers, 11 were identified as requiring modification or removal to improve fish passage. Dams were identified as the most numerous barrier type, followed by stream crossings and non-structural barriers. The Santa Maria River, San Antonio Creek, Cuyama River, Santa Ynez River, and Santa Barbara coastal watersheds, which all belong to the Central Coast hydrologic region, also contain hundreds of known barriers scattered throughout the area, with the highest number found along the Santa Barbara coastal area (California Coastal Conservancy 2004).

Artificial barriers act as physical impediments but may also contribute to, or enhance, non-structural barriers to steelhead spawning migrations. For example, the three major watersheds of the Los Angeles basin have channelized concrete aqueducts in their lower reaches, with some extending from their mouths upstream for miles. As a result, adult Southern SH/RT can no longer access the lower reaches of these three major regional rivers (Titus et al. 2010). Furthermore, if Southern SH/RT were to successfully enter into the channelized reaches of these rivers, migration success would be limited because individuals would encounter non-structural velocity barriers that would require greater swimming speeds than could be sustained (Castro-Santos 2004). Other non-structural barriers may exist in the form of low flows, disconnected wetted habitat, and poor or lethal water quality in these largely metropolitan lower river aqueduct reaches.

Most of the large rivers in the Monte Arido Highlands BPG region contain multiple large, impassable dams. Twitchell Dam on the Cuyama River is primarily managed for groundwater recharge in the Santa Maria Valley. Operations of Twitchell Dam limit downstream surface flows into the mainstem Santa Maria River (NMFS 2012a). Cachuma, Gibraltar, and Juncal dams on the mainstem Santa Ynez River prevent upstream migratory access to approximately 70% of historical spawning and rearing habitat in the watershed (NMFS 2012a). In the Ventura River watershed, Matilija and Casitas dams on Matilija Creek and Coyote Creek, respectively, block access to 90% of historical Southern SH/RT spawning and rearing habitat. However, the recent Matilija Dam Ecosystem Restoration Project is aimed at restoring over 20 miles of perennial Southern SH/RT habitat in the Matilija Creek watershed through the removal of Matilija Dam. Santa Felicia Dam and Pyramid Dam on Piru Creek, as well as Castaic Dam on Castaic Creek, block access to historical habitat in the tributaries of the mainstream Santa Clara River. Several of these large dams are operated along with smaller downstream diversion dams: primarily the Robles Diversion Dam on the Ventura River and the Vern Freeman Diversion Dam on the Santa Clara River. The Robles Diversion Dam diverts water from the upper Ventura River into storage at Lake Casitas, while the Vern Freeman Diversion diverts water for groundwater recharge purposes in the Santa Clara Valley.

Two major dams impair habitat connectivity and hydrologic function in the Malibu Creek watershed: Rindge Dam and Malibu Lake Dam. Both dams have created favorable habitat conditions for non-native species, including crayfish, snails, fish, and bullfrogs. As a result, invasive aquatic species have been documented in high abundance in Malibu Creek (NMFS 2012a). Rindge Dam is located only 2 miles upstream of the mouth and is no longer functional, so it is targeted for future removal. The removal of this dam alone would allow Southern SH/RT access to 18 miles of high-quality spawning and rearing habitat in the Malibu Creek watershed.

Dams are ranked “high” or “very high” as a threat in 88% of the component watersheds that comprise the Mojave Rim BPG region (NMFS 2012a). There are also at least 20 jurisdictional-sized dams (i.e., a dam under the regulatory powers of the State of California) within each of the three major watersheds of the Los Angeles basin, owned by federal, state, local, and/or private entities and operated for multiple purposes, including: irrigation, flood control, storm water management, and recreation. The principal impoundments in the San Gabriel River watershed are Whittier Narrows, Santa Fe, Morris, San Gabriel, and Cogswell dams. Sepulveda Dam on the Los Angeles River is operated as a flood control structure approximately 8 miles downstream from the river’s source. Big Tujunga Dam on Big Tujunga Creek, a tributary to the Los Angeles River, is also operated as a flood control structure. Prado Dam on the Santa Ana

River is also primarily operated as a flood risk management project. These dams alter the physical, hydrological, and habitat characteristics of the lower and middle reaches of the mainstem rivers in this BPG. They also create favorable habitat for non-native species such as crayfish, largemouth bass, and bullfrogs, which have all been documented in the Los Angeles, San Gabriel, and Santa Ana rivers. Periodic removal of sediments accumulated behind dams on the San Gabriel River also degrades downstream riparian and instream habitat conditions (Hunt and Associates 2008).

In the Santa Catalina Gulf Coast BPG, dams also ranked “high” or “very high” as a threat in 90% of constituent watersheds. At least 20 major dams and diversions without fish passage facilities occur throughout the BPG’s distribution. Prominent dams in this BPG include Agua Tibia, Henshaw, and Eagles Nest dams in the San Luis Rey watershed; and the O’Neill Diversion and Vail dams in the Santa Margarita River watershed. Dams in this BPG are generally not operated with fish passage as a consideration in flow release schedules, and many of these facilities lack fish passage provisions (NMFS 2012a).

Groundwater extraction for agricultural, industrial, municipal, and private use from coastal aquifers has increased with population growth in southern California since the mid-1850s (Hanson et al. 2009). Currently, around 1.57 million acre-feet of groundwater are used on an annual basis in southern California to meet both urban and agricultural water demands (DWR 2021). Groundwater is an important input for surface flows during the summer low flow period in many southern California watersheds (Hanson et al. 2009). Groundwater contributions can help sustain suitable over-summering Southern SH/RT juvenile rearing habitat in both mainstem and tributary habitats (Tobias 2006). Unsustainable groundwater water diversions have led to the depletion of several large aquifers in the region (NMFS 2012a). Offsite pumping can impact the surface-water to groundwater interactions by intercepting water that would have otherwise discharged to a stream or by lowering the water table, causing a reduction of baseflow derived from groundwater during the summer low flow period. While some riparian species can tolerate reduced groundwater contributions to streams, for many other species, such as Southern SH/RT, adequate surface water depth, velocity, and water quality characteristics must be maintained in order to survive (Tobias 2006). The combination of surface water diversions and groundwater extractions can lead to the complete drying of streams, which can lead to the stranding of Southern SH/RT in isolated pools and direct mortality. On average, 57% of watersheds across the five BPGs ranked “high” or “very high” for groundwater extraction as a threat (NMFS 2012a).

Recently, the Sustainable Groundwater Management Act priority process identified several groundwater basins across the South Coast hydrologic region as either critically over drafted (i.e., Santa Clara River Valley, Cuyama River Valley, and Pleasant Valley) or medium-to-high priority basins for water conservation (e.g., the Coastal Plain of Orange County) based on several metrics such as population growth rates, the total number of wells, and the number of irrigated acres (DWR 2020). Groundwater sustainability agencies overseeing critically overdrafted and medium-to-high priority basins are responsible for developing and realizing groundwater sustainability plans (GSPs) to achieve basin sustainability within a 20-year implementation horizon. However, the benefits provided by SGMA for Southern SH/RT and their habitats are uncertain, as the most commonly cited goal for GSPs thus far has been to increase groundwater storage and not the restoration of interconnected surface water flows (Ulibarri et al. 2021).

6.8.3 Estuarine Habitat

The estuaries of many coastal watersheds in southern California form freshwater lagoons that are seasonally closed to the ocean. Lagoons form when low summer baseflows are unable to displace sand deposition at the mouth of the estuary, which results in the formation of a sandbar that blocks connectivity with the ocean. This closure creates an environment characterized by warmer and slower-moving (i.e., longer residence times) freshwater that is relatively deep (Bond et al. 2008). These habitat characteristics provide important, high-quality nursery conditions for rearing juveniles and transition areas for smolts acclimating to the ocean environment. Adult steelhead also acclimate in these areas prior to upstream migration during the winter months when the estuary is fully open (NMFS 2012a). The importance of such habitats was demonstrated by the observed doubling of growth in juvenile *O. mykiss,* which reared throughout the summer in a typical northern California coastal watershed (Bond et al. 2008). The same study examined scales from returning adult steelhead and found that estuary-reared individuals dominated adult returns, despite comprising only a small part of the annual outmigrating population. Another study conducted in the same watershed also reported higher growth rates for estuary-reared juvenile steelhead than for their cohorts reared in the upper watershed (Hayes et al. 2011). Hayes et al. (2011) also found that the lagoon environment provided warmer water temperatures and a diverse abundance of invertebrate prey resources for rearing juvenile *O. mykiss* to consume. Trade-offs between accelerated growth and survival likely exist in lagoon habitats because they represent a relatively high-risk yet high-reward environment in which accelerated growth may come at the cost of increased metabolic demand and potentially increased predation risk, exposure to poor water quality, and episodic artificial breaching (Osterback et al. 2013; Satterthwaite et al. 2012; Swift et al. 2018).

The southern California Bight, which encompasses the entire southern California coastline, from Point Conception to San Diego, historically supported around 20,000 hectares of estuary habitat (Stein et al. 2014). Over half of all historical estuaries were found in San Diego County (e.g., Mission Bay and San Diego Bay), while Los Angeles and Orange counties contained about 15%

each of the total estimated historical area. Estimates of the amount of estuarine habitat loss from historical levels, based on wetland acreage, range from 48-75% (Brophy et al. 2019; NMFS 2012a; Stein et al. 2014). The magnitude of the loss varies depending on the watershed. For example, the estuaries of the Santa Maria and Santa Ynez rivers in the northern portion of the Southern SH/RT range remain almost entirely intact, while the estuaries of the Los Angeles, San Gabriel, and Santa Ana rivers have been reduced to 0-2% of their historical extent (NMFS 2012a). Overall, estuary habitat loss in southern California is likely underestimated because early landscape modifications (e.g., housing and transportation development and associated filling of wetlands with sediment) had substantially altered the landscape before attempts were made to quantify the extent of historical habitat (Brophy et al. 2019).

The primary cause of estuarine loss in southern California is the conversion of habitat to other land use practices such as agriculture, grazing, and urban development activities, which require the construction of infrastructure and the subsequent filling, diking, and draining of coastal wetlands (NMFS 2012a). Currently, estuary habitats in the range of Southern SH/RT remain highly degraded and prone to further degradation by urban impacts such as point and nonpoint source pollution, coastal development, and dams. These environmental stressors can cause declines in water quality and the proliferation of harmful algal blooms that can lead to the rapid die-off of both aquatic and terrestrial organisms (Lewitus et al. 2012; Smith et al. 2020). Artificial breaching of estuaries also poses a mortality risk to Southern SH/RT. Seven moribund juvenile steelhead were observed in the lagoon at the mouth of the Santa Clara River shortly after the sandbar was artificially breached in 2010 (Swift et al. 2018). The authors of this study noted that the Santa Clara River, upstream of the lagoon, was dry during this time and that the observed fish were relatively large and in robust condition, indicating that favorable rearing conditions existed prior to the artificial breaching.

6.8.4 Water Quality and Temperature

Contaminants and pollutants are well-documented to alter water quality parameters that affect the growth and survival of Pacific salmonids in both freshwater and estuarine environments (Arkoosh et al. 1998; Baldwin et al. 2009; Laetz et al. 2008; Sommer et al. 2007; Sullivan et al. 2000). Both are generally introduced into southern California rivers and streams by urban runoff, agricultural and industrial discharges, wastewater treatment effluent, and other anthropogenic activities. Recent monitoring conducted by the USGS measured between 20 and 22 current-use pesticides in samples collected from urban sites at Salt Creek and the Sweetwater River in Orange and San Diego counties (Sanders et al. 2018). Diminished water quality conditions, including contaminants and associated toxicity, elevated nutrients, low dissolved oxygen, increased temperature, and increased turbidity, can all adversely affect Southern SH/RT as well as other native fish and aquatic organisms. The effects of individual pollutants and combinations thereof can impact populations by altering growth, reproduction, and mortality rates of individual fish (Sommer et al. 2007). These impacts can ultimately manifest in direct mortality due to acute and long-term physiological stress or may act through indirect pathways such as changes to food webs, ecosystem dynamics, increased susceptibility to disease and predation, and more frequent occurrences of harmful algal blooms. Aquatic stressors that impair water quality can also interact with each other in an additive or synergistic fashion, such that they are generally interdependent and can greatly amplify negative impacts on aquatic ecosystems (Sommer et al. 2007). Dissolved oxygen concentrations, turbidity, and water temperatures are all parameters directly influenced by flow management. Lower flows can lead to warmer water temperatures that hold less dissolved oxygen than cold water. Higher water temperatures also increase the metabolic and oxygen consumption rates of aquatic organisms, making these conditions particularly stressful for aquatic life (Myrick and Cech 2000). See Section 6.2.1 in this Status Review for a full description of air and water temperature influences and trends.

Many watersheds that support Southern SH/RT are listed under Section 303(d) of the federal Clean Water Act (CWA). Section 303(d) requires states to maintain a list of waters that do not meet prescribed water quality standards. For waters on this list, states are required to develop TMDLs that account for all sources (i.e., point and non-point sources) of the pollutants that caused the water to be listed as impaired under the CWA. In southern California, there are many impaired water bodies and pollutant combinations listed under Section 303(d). While contaminant and discharge sources have changed over the years and there have been significant improvements in controlling many of these sources, many 303(d)-listed waters do not yet have approved TMDLs (SWRCB 2020). All four of the major rivers in the Monte Arido Highlands BPG region are listed as 303(d)-impaired, and each system contains over five sources of pollutants. Seven Southern SH/RT-supporting watersheds in the Conception Coast BPG region and three in the Santa Monica Mountains BPG region are 303 (d) listed, including Jalama, Gaviota, Mission, Carpinteria, Rincon, Big Sycamore Canyon, Malibu, and Topanga creeks. All three of the major watersheds in the Mojave Rim BPG region, as well as eight out of ten in the Santa Catalina Gulf Coast BPG region, are 303(d)-listed, including the Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Diego, and Sweetwater rivers and the San Juan, San Mateo, San Luis Rey, and San Dieguito creeks. Essentially, all rivers and streams supporting Southern SH/RT that are 303(d)-listed are impaired by multiple pollutants, including water temperature, benthic community effects, indicator bacteria, trash, toxicity, and invasive species. Furthermore, southern California's coastal and bay shorelines, estuary environments, and tidal wetlands are also frequently 303(d)-listed as impaired. As examples, the estuaries of Malibu, Aliso, San Juan, and Los Penasquitos creeks; the entirety of Santa Monica Bay; and the estuaries of the Los Angeles, Santa Clara, Santa Margarita, and Tijuana rivers are all listed as 303(d)-impaired waterbodies.

6.8.5 Agricultural Impacts

The impacts of agricultural development have lessened over time as farm and pasturelands continue to be converted to urban development in southern California (NMFS 2012a). Historically, the loss of riparian and floodplain habitat was due first to conversion by livestock ranching, followed by irrigated row-crop agriculture, and then urban development. For example, interior portions of the Santa Clara River floodplain were originally converted to agriculture but are now dominated by urban growth and major human population centers, such as the cities of Santa Paula and Fillmore. Today, the South Coast hydrologic region supports approximately 159,000 acres of agricultural land, with avocados, citrus, truck crops, and strawberries comprising the highest agricultural production by acreage (DWR 2021). Approximately 530,000 acre-feet of groundwater are annually pumped from underlying basins to support agricultural production in southern California (DWR 2021). Agricultural activities produce wastewater effluent containing nutrients that can either directly or indirectly be introduced into the rivers, streams, and estuaries that support Southern SH/RT, particularly when agricultural best management practices and water quality objectives have not been established. Agricultural production is prevalent in several watersheds, including the lower Santa Maria and Santa Ynez rivers; many of the smaller coastal watersheds along the Santa Barbara coast, such as the Goleta Slough complex and Rincon Creek; the upper Ventura River and the Ojai basin; and portions of the San Mateo Creek, San Luis Rey, and San Dieguito River tributaries in the southernmost portion of the range. Statewide, the counties of Ventura, Santa Barbara, and San Diego are each ranked in the top fifteen for total value of agricultural production (CDFA 2021).

While the impacts of agricultural development on Southern SH/RT and their habitats have decreased over time due to land use conversion, both activities have resulted in considerable cumulative regional habitat loss and degradation. These changes have led to greatly reduced habitat complexity and connectivity in the lower and middle reaches of many southern California watersheds. Currently, agricultural impacts on Southern SH/RT are most evident during the summer dry season, when agricultural and residential water demands are the highest. This period coincides with the juvenile *O. mykiss* rearing life-history stage, which is dependent on adequate summer base flows to maintain suitable habitat conditions for growth and survival (Grantham et al. 2012). Agricultural groundwater diversions can lead to rapid stream drying by depleting aquifer groundwater that contributes to stream base flows, which limits the extent of summer rearing habitat for fish (Moyle et al. 2017). Naturally occurring surface waters supported only by groundwater recharge can be rapidly dewatered due to excessive groundwater pumping or diversions. These areas have been shown to provide adequate depth, surface area, and habitat for steelhead in streams lacking cold-water refuges (Tobias 2006).

The cultivation, manufacturing, and distribution of cannabis products have increased since recreational use became legal in California in 2016 (Butsic et al. 2018). Threats and stressors on aquatic ecosystems associated with the cultivation of cannabis include stream flow and bank modifications, water pollution, habitat degradation, and species invasions (CDFW 2018b). Cannabis is a water-and nutrient-intensive crop that requires an average of up to 6 gallons of water per day, per plant, during the growing season, which usually spans a total of 150 days from June to October (Zheng et al. 2021). Water diversions can lead to changes in flow regimes, the creation of fish passage barriers, the loss of suitable spawning and foraging habitat, and the rerouting and dewatering of streams, especially during drought years or during the dry season (CDFW 2018b; see Section 6.8.2).

6.8.6 Invasive Species

Invasive and non-native species are abundant and widely distributed in many watersheds that support Southern SH/RT. Non-native species frequently occur in both anadromous and non-anadromous waters that have been extensively stocked by a variety of public and private entities (NMFS 2012a). Most reservoirs contain non-native species, such as largemouth and smallmouth bass, carp, sunfish, bullfrogs, and bullhead catfish, that can all establish reproducing populations in the river and stream reaches above and below the dams. Range-wide habitat alteration has also facilitated the widespread distribution and increased abundance of non-native fish species, which typically favor slower-moving, warmer-water habitats with lower dissolved oxygen concentrations and higher sediment loads (Moyle et al. 2017). While the introduction of non-native game species has historically been viewed as a fishery enhancement, these species can have negative impacts on Southern SH/RT due to predation, competition, disease, habitat displacement and alteration, as well as behavior modifications (Cucherousset and Olden 2011).

Non-native species have recently been documented in high densities in Sespe Creek, an unregulated tributary to the Santa Clara River and a Department-designated Wild Trout Water (Stillwater Sciences 2019). High abundances of invasive species are due to the historic and ongoing stocking of non-native fish in the Rose Valley Lakes on Howard Creek, a tributary to Sespe Creek. In both Malibu and Topanga creeks, red swamp crayfish abundances have increased with recent warmer stream temperatures and lower flow conditions despite regular removal efforts (Dagit et al. 2019). High densities of crayfish likely have a direct (predation) and indirect (competition) effect on Southern SH/RT in both creeks. A variety of warm-water, non-native fish species are frequently observed in the lower Santa Ynez River, including multiple species of sunfish and catfish, carp, and largemouth bass, all of which are known predators of Southern SH/RT early life stages. In the lower Ventura River, annual monitoring efforts have consistently detected higher numbers of non-native fish species than Southern SH/RT in recent years (CMWD 2021).

Non-native plant and amphibian species also occur in several watersheds that support Southern SH/RT. Invasive plants such as giant reed and tamarisk have displaced extensive areas of native riparian vegetation in major drainages, such as the Santa Clara and San Luis Rey rivers (NMFS 2012a). These water-intensive plant species both reduce instream flows through groundwater uptake and severely reduce the extent of riparian cover and shading. These habitat changes often affect stream flow and thermal regimes, potentially increasing susceptibility of Southern SH/RT to predation, disease, and competitive exclusion. Other non-native plant species, such as water primrose and hyacinth, both of which form dense, sprawling mats on the water's surface, can alter the structure and function of aquatic ecosystems by outcompeting native aquatic plants, reducing the amount of open water habitat, altering the composition of invertebrate communities, physically blocking fish movement, and inducing anoxic conditions detrimental to fish (Khanna et al. 2018). In the Santa Clara River watershed, bullfrogs and African clawed frogs are abundant and widespread throughout the mainstem reaches, from the estuary upstream to Fillmore, including tributaries such as Santa Paula Creek and Hopper Canyon Creek (NMFS 2012a). Both species represent a threat to native aquatic communities because they opportunistically consume a variety of native prey, and eradication of either species is unlikely (Wishtoyo Foundation 2008).

6.9 Fishing and Illegal Harvest

Southern SH/RT traditionally supported important recreational fisheries for both winter adults and summer juveniles in coastal streams and lagoons (NMFS 2012a, Swift et al. 1993). Angling-related mortality may have contributed to the decline of some small populations but is generally not considered a leading cause of the decline of the Southern California Steelhead DPS as a whole (Good et al. 2005; Busby et al. 1996; NMFS 1996b). After the southern California steelhead DPS was federally listed as endangered in 1997, Department fishing regulation modifications led to the closure of recreational fisheries for Southern SH/RT in marine and anadromous waters with few exceptions. That closure continues, and there is currently no legal recreational fishery for Southern SH/RT (CDFW 2023).

Southern SH/RT take is primarily from poaching rather than legal commercial and recreational fishing. While illegal harvest rates appear to be very low, the removal of even a few individuals in some years could be a threat to the population because of such low adult abundance in most populations (Moyle et al. 2017). Southern SH/RT are especially vulnerable to poaching due to their high visibility in shallow streams. Estimates of fishing effort from self-report cards for 1993–2014 suggest extremely low levels of angling effort for Southern SH/RT, primarily due to the statewide prohibition of angling in anadromous waters starting in 1998 (NMFS 2016; Jackson 2007). Historic commercial driftnet fisheries may have contributed slightly to localized declines; however, Southern SH/RT are targeted in commercial fisheries, and reports of incidental catch are rare. Commercial fisheries are not thought to be a leading cause of the widespread declines of Southern SH/RT over the past several decades (NMFS 2012a).

7. INFLUENCE OF EXISTING MANAGEMENT EFFORTS

7.1 Federal and State Laws and Regulations

Several state and federal environmental laws apply to activities undertaken in California that provide some level of protection for Southern SH/RT and their habitat. There are also restoration, recovery, and management plans, along with management measures specific to habitat restoration, recreational fishing, research, and monitoring that may benefit Southern SH/RT. The following list of existing management measures is not exhaustive.

7.1.1 National Environmental Policy Act and California Environmental Quality Act

The National Environmental Policy Act (NEPA) was enacted in 1970 to evaluate the environmental impacts of proposed federal actions. The NEPA process begins when a federal agency proposes a major federal action. The process involves three levels of analysis: 1) Categorical Exclusion determination (CATEX); 2) Environmental Assessment (EA) or Finding of No Significant Impact (FONSI); and 3) Environmental Impact Statement (EIS). A CATEX applies when the proposed federal action is categorically excluded from an environmental analysis because it is not deemed to have a significant impact on the environment. If a CATEX does not apply, the lead federal agency for the proposed action will prepare an EA, which concludes whether the action will result in significant environmental impacts. A lead agency will issue a FONSI document if significant impacts are not expected. Alternatively, if the action is determined to have a potentially significant effect on the environment, an EIS containing an explanation of the purpose and need for the proposed action, a reasonable range of alternatives that can achieve the same purpose and need, a description of the affected environment, and a discussion of environmental consequences of the proposed action is required (EPA 2017). The United States Environmental Protection Agency is responsible for reviewing all EIS documents from other federal agencies and must provide NEPA documentation for its own proposed actions. Because the Southern California DPS is listed as endangered under the federal ESA, proposed actions that may impact this population are evaluated as biological resources in the project area concurrently and interdependently with the federal ESA Section 7 consultation process.

The California Environmental Quality Act (CEQA) is similar to NEPA in that it requires environmental review of discretionary projects proposed by state and local public agencies unless an exemption applies (Pub. Resources Code, § 21080). Under CEQA, the lead agency is responsible for determining whether an EIR, Negative Declaration, or Mitigated Negative Declaration is required for a project (Cal. Code Regs., tit. 14, § 15051). When there is substantial evidence that a project may have a significant effect on the environment and adverse impacts cannot be mitigated to a point where no significant effects would occur, an EIR must be prepared that identifies and analyzes environmental impacts and alternatives (Pub. Resources Code, § 21082.2, subds. (a) & (d)). Significant effects for a proposed project may occur if project activities have the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species (Cal. Code Regs., tit. 14, §§ 15065, subd. (a)(1) & 15380). CEQA requires public agencies to avoid or minimize significant effects where feasible (Cal. Code Regs., tit. 14, § 15021); NEPA does not include this requirement. Further, CEQA requires that when a lead agency approves a project which will result in significant effects which are identified in the final EIR but are not avoided or substantially lessened, the agency shall make a statement of overriding considerations in which the agency states in writing the specific reasons to support its action based on the final EIR and/or other information in the record (Cal. Code Regs., tit. 14, § 15093).

7.1.2 Federal Endangered Species Act

The ESA was established in 1973 to conserve and protect fish, wildlife, and plants that are listed as threatened or endangered. The ESA provides a mechanism to add or remove federally listed species, cooperate with states for financial assistance, and develop and implement species recovery. The ESA also provides a framework for interagency coordination to avoid take of listed species and for issuing permits for otherwise prohibited activities. The lead federal agencies for implementing the ESA are the USFWS and NMFS. Federal agencies are required to consult with either the USFWS or NMFS to ensure that actions they undertake, fund, or authorize are not likely to jeopardize the continued existence of any listed species or their designated critical habitat. The federal ESA prohibits the take, import, export, or trade in interstate or foreign commerce of ESA-listed species.

NMFS listed the Southern California Steelhead DPS as endangered under the federal ESA in 1997 as part of the South-Central/Southern California Coast recovery domain and designated critical habitat for that DPS in 2005 (NMFS 2012a). The scope of the DPS is naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the

Santa Maria River to the U.S.-Mexico border. NMFS's West Coast Region manages recovery planning and implementation for this domain, and in 2012 the region adopted a Recovery Plan for the Southern California Steelhead DPS, which provides the foundation for recovering populations to healthy levels. The listing of the DPS afforded the DPS ESA protections through the consultation provisions of ESA Section 7(a)(2); habitat protection and enhancement provisions of ESA Section 4 and 5; take prohibitions through ESA Sections 4(d) and 9; cooperation with the State of California through ESA Section 6; and research, enhancement, and species conservation by non-federal actions through ESA Section 10.

Section 7(a)(2) of the ESA requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of the species or adversely modify designated critical habitat. The agency requesting consultation will typically produce and submit a biological assessment that documents potential effects on listed species or their habitats to either the USFWS or NMFS. USFWS or NMFS then produces and submits a Biological Opinion to the requesting agency that contains conservation recommendations and actions to minimize any harmful effects of the proposed action. Currently, NMFS spends a significant amount of its resources and time fulfilling Section 7 consultation requirements for federal actions that may impact the Southern California Steelhead DPS (NMFS 2012a). This includes working with agencies to avoid and minimize the potential impacts of proposed actions and to ensure project activities do not jeopardize the species or destroy critical habitat. NMFS has issued Biological Opinions for several large federally owned and operated projects, including the Santa Felicia Hydroelectric Project on Piru Creek (2008), USBR's operation and maintenance of the Cachuma Project on the Santa Ynez River (2000), USBR's construction and operation of the Robles Diversion Fish Passage Facility on the Ventura River (2003), the U.S Army Corp of Engineer's (USACE) Matilija Dam Removal and Ecosystem Restoration Project on Matilija Creek (2007), USACE's Santa Paula Creek Flood Control Project (2013). However, the application of Section 7(a)(2) is limited in scope because it applies only to federal actions and areas under federal ownership, and without a related federal action it does not apply to the significant areas of public and private ownership in southern California (NMFS 2012a).

7.1.3 Clean Water Act and Porter-Cologne Water Quality Act

The CWA was established in 1972 to regulate the discharge of pollutants into the waters of the United States and create surface water quality standards. Section 401 of the CWA requires any party applying for a federal permit or license for a project that may result in the discharge of pollutants into the waters of the United States to obtain a state water quality certification. This certification affirms that the project adheres to all applicable water quality standards and other requirements of state law. Section 404 of the CWA prohibits the discharge of dredged or fill material into the waters of the United States without a permit from the USACE. Activities regulated under this program include fill for development, water resource projects, infrastructure development, and mining projects. Applicants for a 404 permit must demonstrate that all steps have been taken to avoid impacts to wetlands, streams, and aquatic resources and that compensation is provided for unavoidable impacts prior to permit issuance from the USACE.

Since 1969, the Porter-Cologne Water Quality Act (Porter-Cologne Act) has been the principal law governing water quality in California. The Porter-Cologne Act includes goals and objectives that align with those of the federal CWA, such as water quality standards and discharge regulations. The SWRCB and nine regional water quality control boards share responsibility for the implementation and enforcement of the Porter-Cologne Act. These entities are required to formulate and adopt water quality control plans that describe beneficial uses, water quality objectives, and a program of implementation that includes actions necessary to achieve objectives, a time schedule for the actions to be taken, and monitoring to determine compliance with water quality objectives and the protection of beneficial uses of water.

Under Section 401 of the CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certification is issued or certification is waived. The SWRCB and the regional water quality control boards administer Section 401 water quality certifications in California.

In accordance with Section 303(d) of the CWA, the U.S. Environmental Protection Agency (EPA) assists the SWRCB and the regional water boards in listing impaired waters and developing TMDLs for waterbodies within the state. TMDLs establish the maximum concentration of pollutants allowed in a waterbody and serve as the starting point for restoring water quality. The primary purpose of the TMDL program is to assure that beneficial uses of water, such as cold freshwater and estuarine habitat, are protected from detrimental increases in sediment, water temperature, and other pollutants defined in Section 502 of the CWA. TMDLs are developed by either the regional water quality control boards or the EPA. TMDLs developed by the regional water quality control boards are included as water quality control plan amendments and include implementation provisions, while those developed by the EPA contain the total load and load allocations required by Section 303(d) but do not contain comprehensive implementation provisions. The EPA is required to review and approve the list of impaired waters and each TMDL. If the EPA cannot approve the list or a TMDL, it is required to develop its own. There can be multiple TMDLs on a particular waterbody, or there can be one TMDL that addresses numerous pollutants. TMDLs must consider and include allocations to both point and non-point sources of the listed pollutants.

Approved TMDLs and their implementation plans are incorporated into water quality control plans required by the Porter-Cologne Act of 1969. For a specified area, a water quality control plan designates the beneficial uses and water quality objectives established for the reasonable protection of those beneficial uses. Such beneficial uses may include warm freshwater habitat; cold freshwater habitat; rare, threatened, or endangered species; and migration of aquatic organisms. The beneficial uses, together with the water quality objectives that are contained in a water quality control plan and state and federal antidegradation requirements, constitute California's water quality standards for purposes of the CWA.

Waters within the range of the Southern SH/RT are under the jurisdiction of the Central, Los Angeles, Santa Ana, and San Diego regional water quality control boards. There are many 303(d)-listed impaired waterbodies within the jurisdiction of each of these regional boards, and most waterbodies have more than one pollutant that exceeds water quality standards designed to protect beneficial uses of water, water quality criteria, or objectives. More information on 303(d) listed waters in southern California can be found at: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2018_integrated_report.html

The National Pollution Discharge Elimination System (NPDES) delegated implementation responsibility for the regulation of wastewater discharges to the State of California through the SWRCB and the regional water quality control boards. In southern California, tertiary wastewater treatment plants commonly discharge treated water into the rivers, streams, and estuaries that support Southern SH/RT. For example, the Tapia Water Reclamation Facility discharges tertiary treated effluent into Malibu, Las Virgenes, and Arroyo Calabasas creeks. While wastewater effluent is often the primary source of streamflow for southern California rivers and streams during the summer months, the potential impacts of wastewater effluent on adult and juvenile life stages are not well understood (NMFS 2012a). The review, assessment, and potential modification of NPDES wastewater discharge permits is a key recovery action in the federal recovery plan for the Southern California DPS to address the threat of urban effluents (NMFS 2016).

7.1.4 Federal and California Wild and Scenic Rivers Act

In 1968, Congress enacted the National Wild and Scenic Rivers Act (WSRA) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing state. Under the National Wild and Scenic Rivers System, rivers are classified as either wild, scenic, or recreational. Designation neither prohibits development nor gives the government control over private property; recreation, agricultural practices, residential development, and other land uses may continue. However, the WSRA does prevent the federal government from licensing, funding, or otherwise assisting in dam construction or other projects on designated rivers or river segments. Designation does not impact existing water rights or the existing jurisdiction of states and the federal government over waters. In California, approximately 2,000 miles of river are designated as wild and scenic, which comprises about one percent of the state's total river miles. The California Wild and Scenic Rivers Act was passed by the California Legislature in 1972. The state act mandates that "certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state." (Pub. Res. Code, § 5093.50). Designated waterways are codified in Public Resources Code Sections 5093.50-5093.70.

The designated state and federal wild and scenic rivers within the range of Southern SH/RT are the Sisquoc River, Piru Creek, and Sespe Creek. The Sisquoc River, which is a tributary of the Santa Maria River, contains 33 miles of designated water from its origin in the Sierra Madre Mountains downstream to the Los Padres National Forest boundary. Piru and Sespe creeks are both tributaries of the Santa Clara River and encompass a combined 38 miles of designated waters. The downstream end of Pyramid Dam and the boundary between Los Angeles and Ventura counties constitute the start and end points of the designated reach for Piru Creek. The designated reach for Sespe Creek is the main stem from its confluence with Rock Creek and Howard Creek downstream, near its confluence with Tar Creek. Both Sespe Creek and the Sisquoc River have comprehensive river management plans that address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of the WSRA (USDA 2003a; USDA 2003b).

7.1.5 Lake and Stream Bed Alteration Agreements

Fish and Game Code Section 1602 requires entities to notify the Department prior to beginning any activity that may "divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake." The requirement applies to both intermittent and perennial waterbodies. If an activity will adversely affect an existing fish and wildlife resource, the Department's Lake and Streambed Alteration Program is responsible for issuing a Lake or Streambed Alteration (LSA) Agreement that includes reasonable measures necessary to protect the resource (Fish & G. Code, §1602, subd. (a)(4)(B)). There are several types of LSA agreements that entities can request from the Department, including standard; general cannabis; gravel, sand, or rock extraction; routine maintenance; timber harvest; and master.

Recently, severe storms during the winter of 2023 in southern California caused flooding, landslides, and mudslides within the watersheds that Southern SH/RT occupy. As a result, multiple emergency actions were conducted to protect life and property. In these circumstances, Fish and Game Code Section 1610 exempts entities that conduct certain emergency work from notification requirements prior to the start of any work activity and instead requires them to notify in writing within fourteen days after the work begins.

In the South Coast Region, legal cannabis cultivation is currently focused in Santa Barbara County, with a concentration of the larger notifications in the Santa Ynez River watershed. The Santa Ynez River and its tributaries are a high priority wildlife resource that supports *O. mykiss*, the Southern California Steelhead DPS listed as endangered under the federal ESA; southwestern willow flycatcher, which is listed as endangered under both the federal ESA and CESA; least Bell's vireo, which is listed as endangered under both the federal ESA and CESA; and California red-legged frog, which is listed as threatened under the federal ESA. There are currently about 453 acres of permitted cannabis in the Santa Ynez watershed. Project water use adjacent to the Santa Ynez River can have significant individual and/or cumulative impacts on Southern SH/RT and other species along this reach and adjacent up- and downstream areas. The predominant water source for these large grows along the Santa Ynez River and within the region are well diversions that can be located within or immediately adjacent to the stream. These diversions have the potential to substantially affect surface flows, hydrology, and vegetation within the Santa Ynez River. Where this situation occurs along the Santa Ynez River, Department staff have included appropriate measures to report on water use in any agreements that have been issued. Such measures include having an established protocol for monitoring and reporting water use throughout the season. Permittees must also abide by the SWRCB forbearance period for diversion of surface water during the dry season, from April 1 through October 1 of each calendar year.

7.1.6 Medicinal and Adult-Use Cannabis Regulation and Safety Act

Regulation of the commercial cannabis cultivation industry under the Medicinal and Adult-Use Cannabis Regulation and Safety Act requires that any entity applying for an annual cannabis cultivation license from the California Department of Food and Agriculture include "a copy of any final lake or streambed alteration agreement… or written verification from the California Department of Fish and Wildlife that a lake or streambed alteration agreement is not required" with their license application (Cal. Code Regs., tit. 3, § 8102, subd. (w)). Waste discharge and water diversions associated with cannabis cultivation are regulated by the SWRCB (Cal. Code Reg., tit. 3, § 8102, subd. (p)).

7.1.7 Federal Power Act

The Federal Energy Regulatory Commission (FERC) implements and enforces the Federal Power Act. FERC has the exclusive authority to license most non-federal hydropower projects that are located on navigable waterways, federal lands, or are connected to the interstate electric grid. The term for a hydropower license granted by FERC is typically 30-50 years. FERC must comply with federal environmental laws prior to issuing a new license or relicensing an existing hydropower project, including NEPA and ESA. Section 10(a) of the Federal Power Act instructs FERC to solicit recommendations from resource agencies and tribes (when applicable) on ways to make a project more consistent with federal or state comprehensive plans. Section 10(j) allows NMFS, USFWS, and the Department to submit recommendations to protect, mitigate damage to, and enhance fish and wildlife resources affected by a proposed project. FERC is not required to incorporate these recommendations into a hydropower license if it determines the recommendations are outside the scope of Section 10(j) or inconsistent with the Federal Power Act or any other applicable law.

Pursuant to Section 401 of the CWA, FERC may not issue a FERC license to a project unless a Section 401 water quality certification is issued to that project or that certification is waived. The SWRCB administers 401 water quality certifications for projects that involve a FERC license.

UWCD owns and operates Santa Felicia Dam, which is the main component of the Santa Felicia Project *(FERC Project Number 2153)*. The project is located on Piru Creek, a tributary of the Santa Clara River, in Ventura County. Santa Felicia Dam, which is located five miles north of the town of Piru, impounds Piru Creek to form Lake Piru Reservoir. Lake Piru has a usable storage capacity of 67,997 acre-feet, and the spillway of the Santa Felicia Dam has a capacity of 145,000 cfs. A small powerhouse located on the west embankment of the dam is capable of producing up to 1,420 kilowatts of energy. UWCD owns two appropriative water rights for the project for the purposes of power, domestic, industrial, municipal, irrigation, and recreational uses. The project currently operates under a 2014 water quality certification that contains provisions to protect fish and wildlife beneficial uses in lower Piru Creek, including a reservoir release schedule to protect Southern SH/RT migration flows each year from January 1 through May 31 (see https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/santafelicia_ferc2153.html for more information).

7.1.8 Sustainable Groundwater Management Act

In September 2014, the Governor signed legislation to strengthen the management and monitoring of groundwater basins. These laws, known collectively as the Sustainable Groundwater Management Act (SGMA), established a timeline and process for forming local

GSAs in designated groundwater basins. GSAs are responsible for developing and implementing GSPs to achieve basin sustainability within a 20-year implementation horizon. DWR is the agency responsible for reviewing and approving individual GSPs, while the SWRCB serves as the regulatory backstop for groundwater basins found to be out of compliance with SGMA. Since 2014, the Department's Groundwater Program has developed multiple documents to assist GSAs in developing and implementing effective GSPs, including a groundwater consideration planning document and a habitat-specific document for wetlands (CDFW 2019). These documents highlight scientific, management, legal, regulatory, and policy considerations that should be accounted for during GSP development. DWR is currently in the process of reviewing GSP plans for critically overdrafted and medium-to-high priority basins. Within the range of Southern SH/RT, there are over fifteen GSPs that are currently being reviewed by DWR. SGMA requires GSAs to submit annual reports to DWR each April 1 following the adoption of a GSP. Annual reports provide information on groundwater conditions and the implementation of the GSP for the prior water year (see https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Groundwater-Sustainability-Plans for more information).

7.1.9 State Water Resources Control Board Water Rights Administration

Water rights are a legal entitlement authorizing water to be diverted from a specified source and put to a beneficial, non-wasteful use. Riparian water rights are based on ownership of land bordering a waterway, while appropriative water rights are issued without regard to the relationship of land to water but rather the priority in which the water was first put to beneficial use. The exercise of most water rights (i.e., appropriative water rights) requires a permit or license from the SWRCB. The goal of the SWRCB in making water rights-related decisions is to develop water resources in an orderly manner, prevent waste and unreasonable use of water, and protect the environment. The SWRCB has several other major water rights - related duties, including but not limited to: participating in water rights adjudications; enhancing instream uses for fish and wildlife beneficial uses; approving temporary water transfers; investigating possible illegal, wasteful, or unreasonable uses of water; and revoking or terminating water rights. SWRCB-issued water right permits contain public trust provisions for the protection of instream aquatic resources. While these provisions (i.e., maximum diversion amounts and diversion seasons) are meant to protect aquatic resources, they do not have an explicit regulatory mechanism to implement protections required in other state statutes. Furthermore, prior to recent advancements in groundwater management, the SWRCB generally lacked the authority to regulate groundwater diversions and development. Overlying landowners may extract percolating groundwater without approval from the SWRCB as long as the extracted water is put to beneficial uses and the region in which the groundwater diversion occurs has not been formally adjudicated.

7.1.10 Fish and Game Code Section 5937

Fish and Game Code Section 5937 states "the owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around, or through the dam, to keep in good condition any fish that may be planted or exist below the dam."

7.2 Recovery Plans and Regional Management Plans

7.2.1 Southern California Steelhead Recovery Plan

The Southern California Steelhead Recovery Plan (Recovery Plan) was adopted in 2012 following the listing of the Southern California Steelhead DPS in 1997. The goal of the Recovery Plan is to prevent the extinction of Southern California Steelhead in the wild; ensure the long-term persistence of viable, self-sustaining populations of steelhead distributed across the DPS; and establish a sustainable sport fishery (NMFS 2012a). Generally, recovery of the DPS, which consists of naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Santa Maria River to the U.S.-Mexico Border, entails the protection, restoration, and maintenance of a range of habitats in the DPS to allow all life-history forms to be fully expressed (e.g., anadromous and resident). The Recovery Plan outlines key objectives that address factors limiting the DPS's ability to survive and naturally reproduce, including preventing extinction by protecting populations and habitats, maintaining the current distribution of steelhead and restoring distribution to historically occupied areas, increasing abundance, conserving existing genetic diversity, and maintaining and restoring habitat conditions to support all of its life-history stages. NMFS defines a viable population as a population that has a less than 5% risk of extinction due to threats from demographic variation, non-catastrophic environmental variation, and genetic diversity changes over a 100-year time frame (NMFS 2012a).

The Recovery Plan organizes the recovery plan area into five BPGs: Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast. The BPGs were initially divided based on whether individual watersheds within them are ocean-facing systems subject to marine-based climate inversion and orographic precipitation from ocean weather patterns. Secondarily, population groups were then organized based on similarity in physical geography and hydrology. The rationale for this approach is that steelhead populations utilizing unique individual watersheds have different life histories and genetic adaptations that enable the species to persist in a diversity of different habitat types represented by the BPGs. The Recovery Plan's strategy emphasizes larger watersheds in each BPG that are more capable of sustaining larger and more viable populations than smaller watersheds. Core 1 populations are identified as having the highest priority based on their intrinsic potential for meeting viable salmonid population criteria, the severity of the threats facing the populations, and the capacity of the watershed and population to respond to recovery actions (NMFS 2012a).

Like all federal recovery plans, the Recovery Plan for the Southern California Steelhead DPS contains recovery criteria, recovery actions, and estimates of the time and costs to achieve recovery goals. Recovery criteria are objective, measurable criteria that, when met, would result in a determination that the DPS be delisted. Recovery criteria for the Southern California Steelhead DPS Recovery are based on both DPS-level and population-level criteria. At the population level, criteria include characteristics such as mean annual run-size, spawner density, and anadromous fraction, while the DPS-level criteria are informed by the minimum number of populations that must be restored in each BPG. Recovery actions are site-specific management actions necessary to achieve recovery. Actions for the Southern California DPS are organized based on the BPG and core population approaches. High-priority recovery actions include, but are not limited to, physically modifying passage barriers such as dams to allow natural rates of migration to upstream spawning and rearing habitats, enhancing protection of natural in-channel and riparian habitats, reducing water pollutants, and conducting research to better understand the relationship between resident and anadromous forms (NMFS 2012a).

7.2.2. Forest Plans

Land Management, or Forest Plans, were developed by the United States Department of Agriculture for the southern California National Forests (the Angeles, Cleveland, Los Padres, and San Bernardino National Forests) in 2006 to provide a framework for guiding ongoing land and resource management operations. The southern California Forest Plans contain various protections for Southern SH/RT that occur within national forests. These include, but are not limited to, mitigating the effects of visitor use within watersheds occupied by steelhead, working collaboratively with federal and state agencies and water management entities to restore steelhead trout access to upstream habitat, reducing risks from wildland fires to maintain water quality, and eliminating and limiting the further spread of invasive nonnative species (USDA 2005). For example, in 2014, the Cleveland National Forest initiated an effort to restore Southern SH/RT migratory corridors in the San Juan and Santiago watersheds by removing numerous small, outdated, and non-functional concrete barriers constructed by Orange County to force groundwater to the surface (C. Swift, Emeritus, Section of Fishes Natural History Museum of Los Angeles County, personal communication; Donnell et al. 2017). Thus far, up to 81 passage barriers on Silverado, Holy Jim, Trabuco, and San Juan creeks have been removed. Forest Plans are required to be updated every 10 to 15 years. In recent years, several amendments to the Southern California National Forest Plans have been adopted in response to monitoring and evaluation, new information, and changes in conditions.

7.2.3 Habitat Conservation Plans and Natural Community Conservation Plans

A Habitat Conservation Plan (HCPs) is a planning document that authorizes the incidental take of a federally listed species when it occurs due to an otherwise lawful activity. HCPs are designed to accommodate both economic development and the permanent protection and management of habitat for species covered under the plan. At minimum, HCPs must include an assessment of the impacts likely to result from the proposed taking of one or more federally listed species, the measures that the permit applicant will undertake to monitor, minimize, and mitigate such impacts, the funding available to implement such measures, procedures to deal with unforeseen or extraordinary circumstances, alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives (USFWS 2021).

The Natural Community Conservation Planning Act authorized the Department to develop Natural Community Conservation Plans (NCCPs). NCCPs identify and provide for the regional protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The development of a NCCP by a local agency requires significant collaboration and coordination with landowners, environmental organizations, and state and federal agencies. Most approved HCP/NCCP documents are joint documents that fulfill the requirements of both Section 10 of the ESA and the Natural Community Conservation Planning Act.

Within the range of the Southern SH/RT, there are at least nine HCP or NCCPs that are either in the implementation phase or the planning phase. The majority of HCP and NCCP plans are for the southern portion of the Southern SH/RT range and include multiple plan subareas. For example, the San Diego County Multiple Species Conservation Program contains six subareas, including the City of San Diego, Poway, Santee, La Mesa, Chula Vista, and South San Diego County. Generally, rivers, streams, and riparian vegetation communities in HCP and NCCP plan areas are considered ecologically important areas that are targeted for conservation. HCP/NCCP plans typically contain provisions to conserve fish and wildlife habitat, including fire management, invasive species control, fencing, trash removal, and annual monitoring.

7.2.4 Other Management and Restoration Plans

The Steelhead Restoration and Management Plan for California is a Department-statewide steelhead management plan that provides guidelines for steelhead restoration and management that can be incorporated into stream-specific project planning (McEwan and Jackson 1996).

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3490

7.3 Habitat Restoration and Watershed Management

7.3.1 Fisheries Restoration Grant Program

The goal of the Department's Fisheries Restoration Grant Program (FRGP) is to recover and conserve salmon and steelhead trout populations through restoration activities that reestablish natural ecosystem functions. The FRGP annually funds projects and activities that provide a demonstrable and measurable benefit to anadromous salmonids and their habitat; restoration projects that address factors limiting productivity as specified in approved, interim, or proposed recovery plans; effectiveness monitoring of habitat restoration projects at the watershed or regional scales for anadromous salmonids; and other projects such as outreach, coordination, research, monitoring, and assessment projects that support the goal of the program. Uniquely, the FRGP provides CWA Section 401 certification and CWA Section 404 coverage for all eligible projects funded through the program. In recent years, several FRGP proposals have been funded to support conservation efforts for Southern SH/RT, including the Upper Gaviota Fish Passage Project (2022), Life Cycle Monitoring on Topanga Creek and the Ventura River (2021), Fish Passage Barrier Removal on San Jose Creek, Gaviota Creek, and Maria Ygnacio Creek (2021), and the South Coast Steelhead Coalition (2021) (see https://wildlife.ca.gov/Grants/FRGP for more information.)

7.3.2 Proposition 68 and Proposition 1

The Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) and the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018 (Proposition 68) authorized both the Wildlife Conservation Board and the Department to award significant grant funding to restoration projects that are intended to benefit Southern SH/RT. Both entities distribute Proposition 68 and Proposition 1 funds on a competitive basis to projects that specifically address river and stream restoration (Proposition 68; Proposition 1), Southern SH/RT habitat restoration (Proposition 68), fish and wildlife habitat restoration (Proposition 68; Proposition 1), or stream flow enhancements (Proposition 1). Proposition 68 funded projects that benefit Southern SH/RT and their habitat include the Harvey Diversion Fish Passage Restoration Project on Santa Paula Creek, the Matilija Dam Ecosystem Restoration Project on Matilija Creek, and the Santa Margarita River Fish Passage Project and Bridge Replacement. Proposition 1 funded projects include, but are not limited to, *Arundo donax* removal at the Sespe Cienega on the Santa Clara River, the Santa Clara River Riparian

Improvement, and the Integrated Water Strategies Project for Flow Enhancement in the Ventura River Watershed (WCB 2021).

7.3.3 Other Habitat Restoration Funding Sources

In addition to funding provided by the Department and Wildlife Conservation Board, Southern SH/RT conservation projects are also supported by numerous other funding sources. These sources include local, state, and federal sources such as the California Coastal Conservancy, Pacific Coastal Salmon Recovery Fund, the National Fish and Wildlife Foundation, the NOAA Restoration Center, the California Department of Water Resources Integrated Regional Water Management Plan grant program (Proposition 50), the California Natural Resources Agencies Parkways Program (Proposition 40), the CalTrans Environmental Enhancement and Mitigation Program, the Santa Barbara County Coastal Resource Enhancement Fund, and the San Diego Association of County Government TransNet Environmental Mitigation Program (NMFS 2016).

7.3.4 California Steelhead Report and Restoration Card

The California Steelhead Report and Restoration Card program has funded various types of conservation projects since 1993, including instream habitat improvement, species monitoring, outreach and education, and watershed assessment and planning. However, no restoration projects within the Southern SH/RT range were funded between 2015 and 2019, as most funds were granted to projects in more northern watersheds (CDFW 2021c).

7.3.5 Non-Governmental Organization (NGOs) Efforts

Several NGOs contribute funding and staff time to implement restoration projects for the benefit of Southern SH/RT, often with the support of federal, state, or local grants. For example, the South Coast Steelhead Coalition under the guidance of California Trout, has received grant funding from the Department's FRGP to implement several restoration projects that benefit Southern SH/RT, including the Harvey Diversion Fish Passage Project on Santa Paula Creek; the Interstate 5 Trabuco Fish Passage Project on San Juan Creek in Orange County, the Santa Margarita River Fish Passage Project on Sandia Creek in San Diego County; the Rose Valley Restoration Project on Sespe Creek; invasive vegetation removal in the Santa Clara River floodplain; and *O. mykiss* protection in the upper Santa Margarita River, West Fork San Luis Rey River, and upper tributaries to the Santa Clara and Ventura rivers (NMFS 2016). Other NGOs that promote funding and implementation of steelhead recovery actions include the Santa Clara River Steelhead Coalition under the direction of California Trout, the Tri-Counties Fish Team, the Environmental Defense Center, the San Gabriel and Lower Los Angeles Rivers Mountain Conservancy, the West Fork San Gabriel River Conservancy, and the Council for Watershed Health (San Gabriel and Los Angeles rivers). Additionally, there are many other groups or agencies that are also involved in Southern SH/RT conservation efforts: Concerned Resource and Environmental Workers; Heal the Ocean; Santa Barbara ChannelKeeper; Matilija Coalition; Ojai Valley Land Conservancy; Friends of the Ventura River; Friends of the Santa Clara River; Friends of the Los Angeles River; Friends of the Santa Monica Mountains; Heal the Bay; Friends of the Santa Margarita River; San Dieguito River Valley Conservancy; and the Endangered Habitat League (NMFS 2016).

7.3.6 Other Regional and Local Public Institution Efforts

The Southern California Wetlands Recovery Project (SCWRP) consists of directors and staff from 18 public agencies, which collectively coordinate to protect, restore, and enhance coastal wetlands and watersheds between Point Conception and the Mexican Border. The SCWRP, which was founded in 1997, is chaired by the California Natural Resources Agency with support from the California State Coastal Conservancy. The mission of the SCWRP is to expand, restore, and protect wetlands in southern California. The SCWRP is guided by long-term goals, specific implementation strategies, and quantitative objectives articulated in its 2018 regional strategy report (SCWRP 2018).

The Southern California Coastal Water Research Project (SCCWRP) is a public research and development agency whose mission is to enhance the scientific foundation for management of southern California's ocean and coastal watersheds. Since its creation in 1969, the focus of the SCCWRP has been to develop strategies, tools, and technologies to improve water quality management for the betterment of the ecological health of the region's coastal ocean and watersheds. SCCWRP research projects are guided by comprehensive annual plans for major research areas, including ecohydrology, climate change, eutrophication, microbial water quality, and stormwater best management practices (SCCWRP 2022). Currently, the SCCWRP, in cooperation with other local and state agencies, is leading the Los Angeles River Environmental Flows Project. The project's goals are to quantify the relationship between flow and aquatic life, account for flow reduction allowances to the river from multiple wastewater reclamation plants during the summer months and develop flow criteria for the Los Angeles River using the California Environmental Flows Framework.

The City of Santa Barbara supports a Creeks Restoration and Water Quality Improvement Division (Creeks Division), whose mission is to improve creek and ocean water quality and restore natural creek systems through storm water and urban runoff pollution reduction, creek restoration, and community education programs. The Creeks Division's goal for restoration includes increasing riparian vegetation and wildlife habitat, removing invasive plants, and improving water quality through shading, bank stabilization, and erosion control. The Division has completed several restoration projects in Santa Barbara County, including the Mission

Creek Fish Passage project, the Arroyo Burro Estuary and Mesa Creek restoration project, and the upper Las Positas Creek restoration project. The Creeks Division also conducts removal efforts of invasive giant reed from the Arroyo Burro, Mission, and Sycamore Creek watersheds and participates in water quality improvement projects, creek and beach cleanups, and education outreach efforts throughout Santa Barbara County.

The California Conservation Corps Fisheries Program gives U.S. military veterans opportunities to develop skills and work experience by restoring habitat for endangered salmon and steelhead and conducting fisheries research and monitoring. The program, which is a partnership between the California Conservation Corps, NMFS, and the Department, trains participants on a variety of fisheries monitoring techniques, including riparian restoration, dual-frequency identification sonar (DIDSON) techniques, adult and juvenile fish identification, downstream migrant trapping, and instream flow and habitat surveys.

7.4 Commercial and Recreational Fishing

California freshwater sport fishing regulations prohibits fishing in virtually all anadromous coastal rivers and streams in southern California that are accessible to adult steelhead. However, recreational angling for *O. mykiss* above impassable barriers is permitted in many coastal rivers and streams (CDFW 2023a). The Department has expanded its use of sterile "triploid" fish to prevent interbreeding of hatchery fish with native Southern SH/RT (NMFS 2016). The freshwater exploitation rates of Southern SH/RT are likely very low given the Department's prohibition of angling within the geographic range of the Southern California Steelhead DPS listed under the federal ESA (NMFS 2016). Additionally, sport and commercial harvest of Southern SH/RT greater than 16 inches in length in the Department's Southern Recreational Fishing Management Zone is prohibited (CDFW 2023b). All incidentally captured steelhead in the ocean must be released unharmed and should not be removed from the water.

7.5 Research and Monitoring Programs

7.5.1 California Coastal Monitoring Program

The purpose of the CMP is to gather statistically sound and biologically meaningful data on the status of California's coastal salmonid populations to inform salmon and steelhead recovery, conservation, and management activities. The CMP framework is based on four viable salmonid population metrics: abundance, productivity, spatial structure, and diversity (Adams et al. 2011; McElhany et al. 2000). Boughton et al. (2022b) updated the CMP approach for the southern coastal region to address the scientific uncertainty on Southern SH/RT ecology due to lower abundances and a more arid climate compared to more northern populations, for which the original CMP framework was designed.

Currently, the Department leads monitoring efforts in the southern coastal region, with most efforts focused on obtaining abundance estimates for anadromous adults in Core 1 and Core 2 populations (NMFS 2016). As of March 2023, Department CMP staff operate fixed-point counting stations and conduct summer-low flow juvenile surveys, redd surveys, and PIT tagging arrays on the Ventura River, Topanga Creek, and Carpinteria Creek, including the various tributaries to these watersheds. Fixed-point counting stations for anadromous adults are also operated on the Santa Ynez River and its primary tributary, Salsipuedes Creek. Redd surveys and juvenile low-flow surveys also occur in coastal watersheds of the Santa Monica Mountains, such as Big Sycamore Creek, Malibu Creek, Arroyo Sequit Creek, and Solstice Creek. Additionally, the Department conducts spawning surveys in the many watersheds of the Conception Coast, including Jalama, Gaviota, Glenn Annie, San Pedro, Maria Ygnacio, and Mission creeks. Department CMP staff anticipate expanding the number of southern coastal watersheds monitored as landowner agreements and available funding increase (K. Evans, CDFW, personal communication).

7.5.2 Other Monitoring Programs

Several special districts or local governments monitor Southern SH/RT on an annual basis in watersheds that contain federally owned or operated infrastructure. Such monitoring is often required for compliance with monitoring and reporting measures set forth in federal ESA Section 7 Biological Opinions. Although the level of monitoring effort and protocol methods vary between monitoring programs, the data produced by these special districts or local governments are often the longest time-series data available for Southern SH/RT.

The Cachuma Operation and Maintenance Board (COMB) has conducted monitoring within the Lower Santa Ynez River and its tributaries since 1994 as part of the assessment and compliance measures required in the Cachuma Project Biological Opinion. Redd and adult spawner surveys typically occur throughout the winter months, while juvenile snorkel surveys are conducted in the spring, summer, and fall months. Estuary monitoring is also periodically conducted to complement upstream trapping during the migration seasons.

Since 2005, the Casitas Mutual Water District (CMWD) has monitored fish migration at the Robles Fish Passage facility (14 miles upstream from the ocean) on the Ventura River using a VAKI Riverwatcher remote fish monitoring system. CMWD also conducts reach-specific spawner and redd surveys and snorkel surveys at index sites throughout the Ventura River watershed from the winter through late spring (Dagit et al. 2020).

The United Water Conservation District (UWCD) monitors both upstream and downstream migration at the Vern Freeman Diversion Dam (approximately 10 miles upstream from the ocean) using both video-based and motion detection surveillance systems. Monitoring occurs from January to June when streamflow in the Santa Clara River is high enough to maintain water levels at the passage facility (Booth 2016).

The Resource conservation District of the Santa Monica Mountains (RCDSMM) has monitored Arroyo Sequit, Malibu, and Topanga creeks since the early 2000s. Monitoring typically occurs from January through May and includes snorkel surveys, spawning and rearing surveys, instream habitat surveys, and periodic lagoon surveys (Dagit et al. 2019). Since 2016, the South Coast Steelhead Coalition, under the direction of California Trout, has conducted post-rain reconnaissance surveys in San Juan Creek, San Mateo Creek, the Santa Margarita River, and the San Luis Rey River (Dagit et al. 2020).

8. SUMMARY OF LISTING FACTORS

The Commission's CESA implementing regulations identify key factors relevant to the Department's analyses and the Commission's decision on whether to list a species as endangered or threatened. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)). This section provides summaries of information from the preceding sections of this Status Review, arranged under each of the factors to be considered by the Commission in determining whether listing is warranted.

8.1 Present or Threatened Modification or Destruction of Habitat

The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions, particularly in the lower and middle reaches of individual watersheds (see Section 6.8). Southern California is home to over 20 million people and 1.8 million acres of urban area (DWR 2021). As a result, the majority of watersheds, currently occupied by Southern SH/RT, are highly urbanized and impacted by surface and groundwater diversions and associated agricultural, residential, and industrial uses.

Although some deleterious activities have been eliminated or mitigated, habitat conditions for Southern SH/RT have continued to deteriorate over time due to numerous stressors associated with human population growth and climate change impacts. Water diversions, storage, and conveyance for agriculture, flood control, and domestic uses have significantly reduced much of their historical spawning and rearing habitat. Water storage facilities, reservoir operations, instream diversions and groundwater extractions have altered the natural flow regime of southern California rivers and streams and have led to warmer water temperatures, shifts in aquatic community structure and composition, and reduced downstream recruitment of gravel and sediments. High road densities and the presence of in-stream artificial barriers have reduced habitat connectivity by impeding and restricting volitional fish passage in many watersheds, especially in the lower reaches. Development activities associated with agriculture, urbanization, flood control, and recreation have also substantially altered Southern SH/RT habitat quantity and quality by increasing ambient water temperatures, increasing nutrient and pollutant loading, degrading water quality, eliminating riparian habitat, and creating favorable conditions for non-native species. Range-wide and coastal estuarine habitat conditions are highly degraded and are at risk of loss and further degradation. Legal cannabis cultivation is a relatively new yet potentially serious threat to Southern SH/RT watersheds if best management practices, instream flow requirements, and diversion season regulations are not complied with. Our review of habitat conditions in southern California supports the conclusions of other review efforts, which conclude that populations continue to be at risk of extinction unless significant restoration and recovery measures are implemented (Moyle et al. 2017; NMFS 2012a).

The Department considers present or threatened modification or destruction of habitat to be a significant threat to the continued existence of Southern SH/RT.

8.2 Overexploitation

Exploitation rates of Southern SH/RT are relatively low across its range (see Section 6.9). While angling-related mortality may have historically contributed to the decline of some small populations, it is generally not considered a leading cause of the decline of the Southern California Steelhead DPS as a whole (Good et al. 2005; Busby et al. 1996; NMFS 1996b). After southern California steelhead was first listed as endangered under the federal ESA as an ESU in 1997, the Commission closed recreational fisheries for Southern SH/RT in California marine and anadromous waters with few exceptions. The closure continues, and there is currently no recreational fishery for Southern SH/RT (CDFW 2023a; CDFW 2023b).

Marine commercial driftnet fisheries in the past may have contributed slightly to localized declines; however, Southern SH/RT are not targeted in commercial fisheries and reports of incidental catch are rare. Commercial fisheries are not thought to be a leading cause of the widespread declines over the past several decades (NMFS 2012a).

Illegal harvest is likely the leading source of exploitation. Southern SH/RT are especially vulnerable to poaching due to their visibility in shallow streams. Estimates of fishing effort from self-report cards for 1993-2014 suggest extremely low levels of angling effort for Southern SH/RT (NMFS 2016; Jackson 2007). Though illegal harvest rates appear to be very low, because of low adult abundance, the removal of even a few individuals in some years could be a threat to the population (Moyle et al. 2017).

The Department does not consider overexploitation to be a substantial threat to the continued existence of Southern SH/RT, but further directed study is warranted to confirm this threat level.

8.3 Predation

Southern SH/RT experience predation in both the freshwater and marine environments, but specific predation rates, particularly in marine environments, are not well understood (see Section 6.5). While Southern SH/RT have evolved to cope with a variety of natural predators, a suite of non-native predators has also become established within its watersheds (Busby et al. 1996; NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022). Established populations of non-native fishes, amphibians, and aquatic invertebrates combined with anthropogenic habitat alterations that provide favorable conditions for the persistence of these non-native species have led to increased predation rates in much of its range (NMFS 1996b). Habitat modification and degradation has also likely increased predation rates from terrestrial and avian predators (Grossman 2016; Osterback et al. 2013).

Further directed study is warranted to assess the level of impact of these predation threats on Southern SH/RT.

8.4 Competition

Southern SH/RT populations are subject to competitive forces across their range (see Section 6.6). The extent to which competition impacts the distribution, abundance, and productivity of Southern SH/RT populations is not well understood. Southern SH/RT are the only salmonid that occur in their range. Therefore, the potential for inter-specific competition with other salmonids is unlikely to occur. Interspecific competition with other non-salmonid fishes occurs to varying degrees across the Southern SH/RT range. In addition to competing with juvenile steelhead for food resources, juvenile non-native fish species can limit the distribution and abundance of juvenile steelhead. Non-native fish species can competitively exclude and confine the spatial distribution of juvenile steelhead to habitats such as shallower, higher velocity riffles, where the energetic cost to forage is higher (Rosenfeld and Boss 2001).

Further directed study is warranted to assess the level of impact of competition from non-native fish species.

8.5 Disease

Southern SH/RT survival is impacted by a variety of factors including infectious disease (see Section 6.3). A myriad of diseases caused by bacterial, protozoan, viral, and parasitic organisms can infect *O. mykiss* in both the juvenile and adult life stages (NMFS 2012a). Degraded water quality and chemistry in much of the Southern SH/RT range is likely to increase infection rates and severity (Belchik et al. 2004; Stocking and Bartholomew 2004; Crozier et al. 2008). There is very little current information available to quantify present infection and mortality rates in Southern SH/RT.

The Department does not consider disease to currently be a significant threat to the continued existence of Southern SH/RT, however further directed study is warranted to confirm the level of current and potential future impact.

8.6 Other Natural Occurrences or Human-related Activities

Southern SH/RT populations have evolved notably plastic and opportunistic survival strategies and are uniquely adapted to wide-ranging natural environmental variability, characterized by challenging and dynamic habitat conditions (Moyle et al. 2017). However, combined anthropogenic and climate change-driven impacts may ultimately outpace Southern SH/RT's capacity to adapt and persist, potentially leading to extirpation within the next 25–50-year time frame (Moyle et al. 2017; see Section 6.2). This prediction is underscored by the fact that Southern SH/RT already encounters water temperatures that approach and may, at times, exceed the upper limit of salmonid thermal tolerances, across portions of its current distribution (Moyle et al. 2017). Southern SH/RT has, therefore, been characterized as having potential for severe climate change impacts (Moyle et al. 2017). With increasing exposure to periods of higher water temperatures and flow variability, along with extended droughts, more frequent and intense wildfires, catastrophic flooding and associated sediment movement, sea level rise, and ever-increasing human demands for natural resources, the combined impacts to Southern SH/RT will be interdependent, synergistic, and are expected to intensify without intensive and timely human intervention (NMFS 2012b; Hall et al. 2018; OEHHA 2022).

Human-related activities are considered by the Department to be significant threats to the continued existence of Southern SH/RT.

9. SUMMARY OF KEY FINDINGS

Southern California steelhead (*Oncorhynchus mykiss*) inhabit coastal streams from the Santa Maria River system south to the U.S.-Mexico border. Non-anadromous resident *O. mykiss*, familiar to most as Rainbow Trout, reside in many of these same streams and interbreed with anadromous adults, contributing to the overall abundance and resilience of the populations. Southern SH/RT as defined in the Petition include both anadromous (ocean-going) and resident (stream-dwelling) forms of *O. mykiss* below complete barriers to anadromy in these streams.

Less than half of the watersheds historically occupied by Southern SH/RT remain occupied below complete barriers to anadromy, most commonly with individuals able to express only a freshwater-resident life-history strategy (NMFS et al. 2012). Adult steelhead runs have declined to precariously low levels, particularly over the past five to seven years, with declines in adult returns of 90% or more on major watersheds that historically supported the largest anadromous populations (e.g., the Santa Maria, Santa Ynez, Ventura, and Santa Clara rivers). Additionally, our analysis of resident populations indicates a sharp decline over this same time period.

While recent genetic findings suggest that the anadromous life-history form can be sustained and reconstituted from resident individuals residing in orographic drought refugia, in southern California, nearly all drought refugia habitats are currently above impassable barriers. Therefore, the anadromous phenotype is at an increasingly high risk of being entirely lost from the species within its southern California range, in large part due to the lack of migration corridors between drought refugia and the ocean, and the inability of resident progeny to successfully migrate downstream in years with sufficient rainfall and streamflow.

Southern SH/RT continues to be most at risk from habitat degradation, fragmentation, and destruction resulting from human-related activities. Specifically, dams, surface water diversions, and groundwater extraction activities restrict access to most historical spawning and rearing habitats and alter the natural flow regime of rivers and streams that sustain ecological, geomorphic, and biogeochemical functions and support the specific life history and habitat needs of Southern SH/RT. Agricultural and urban development negatively affect nearby rivers and streams through increased pollution and surface runoff, which degrade water quality and habitat conditions. Furthermore, the rapid rate of climate change and the increasing presence of non-native species present another challenge to the persistence of Southern SH/RT.

Based on the best scientific information available at the time of the preparation of this review, the Department concludes that the Southern SH/RT is in danger of extinction throughout all of its range. Intensive and timely human intervention, such as ecological restoration, dam removal, fish passage improvement projects, invasive species removal, and groundwater management, are required to prevent the further decline of Southern SH/RT. The extinction of Southern SH/RT would represent an insurmountable loss to the *O. mykiss* diversity component in California due to their unique adaptations, life histories, and genetics, which have allowed them to persist at the extreme southern end of the species' West Coast range.

10. RECOMMENDATION FOR THE COMMISSION

CESA requires the Department to prepare this report regarding the status of Southern SH/RT in California based upon the best scientific information available to the Department (Fish & G. Code, § 2074.6). CESA also requires the Department to indicate in this Status Review whether the petitioned action (i.e., listing as endangered) is warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

Under CESA, an endangered species is defined as “a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease” (Fish & G. Code, § 2062). A threatened species is defined as “a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]” (Fish and G. Code, § 2067).

Based on the criteria described above, the best scientific information available to the Department indicates that Southern SH/RT is in serious danger of becoming extinct in all of its range due to one or more causes including: 1. present or threatened modification or destruction of habitat; and 2. other natural occurrences or human-related activities. The Department recommends that the Commission find the petitioned action to list Southern SH/RT as an endangered species to be warranted.

11. PROTECTION AFFORDED BY LISTING

It is the policy of the State to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). The conservation, protection, and enhancement of listed species and their habitat is of statewide concern (Fish & G. Code, § 2051, subd. (c)). If listed, unauthorized take of Southern SH/RT would be prohibited under state law. CESA defines “take” as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86). Any person violating the take prohibition would be punishable under state law. The Fish and Game Code provides the Department with related authority to authorize “take” of species listed as threatened or endangered under certain circumstances (see, e.g., Fish & G. Code, §§ 2081, 2081.1, 2086, & 2835). If Southern SH/RT is listed under CESA, take resulting from activities authorized through incidental take permits must be minimized and fully mitigated according to state standards (Fish & G. Code, § 2081, subd. (b)). Take of Southern SH/RT for scientific, educational, or management purposes could be authorized through permits or memorandums of understanding pursuant to Fish and Game Code Section 2081(a).

Additional protection of Southern SH/RT following listing would also occur during required state and local agency environmental review under CEQA. CEQA requires affected public agencies to analyze and disclose project-related environmental effects, including potentially significant impacts on endangered, threatened, and rare special status species. Under CEQA's "substantive mandate," state and local agencies in California must avoid or substantially lessen significant environmental effects to the extent feasible. With that mandate, and the Department's regulatory jurisdiction generally, the Department expects related CEQA review will likely result in increased information regarding the status of Southern SH/RT in California as a result of pre-project biological surveys. Where significant impacts are identified under CEQA, the Department expects project-specific required avoidance, minimization, and mitigation measures will also benefit the species. While CEQA may require analysis of potential impacts to Southern SH/RT regardless of its listing status under CESA, the act contains specific requirements for analyzing and mitigating impacts to listed species. In common practice, potential impacts to listed species are scrutinized more in CEQA documents than are potential impacts to unlisted species. State listing, in this respect, and required consultation with the Department during state and local agency environmental review under CEQA, is expected to benefit the species by reducing impacts from individual projects to a greater degree than may occur absent listing.

CESA listing may prompt increased interagency coordination specific to Southern SH/RT conservation and protection. Listing may also increase the likelihood that state and federal land and resource management agencies will allocate additional funds toward protection and recovery actions.

12. MANAGEMENT RECOMMENDATIONS AND RECOVERY MEASURES

CESA directs the Department to include in its Status Review recommended management activities and other recommendations for recovery of Southern SH/RT (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)). Department staff generated the following list of recommended management actions and recovery measures.

1. Implement comprehensive monitoring in all streams with extant Southern SH/RT populations and produce statistically robust population estimates. Fully implement the California Coastal Monitoring Program and integrate the updated south coastal region monitoring strategy (Boughton et al. 2022b) to resolve the various ecological and methodological factors that currently impede monitoring. The main features of this updated strategy are:

- Estimates of average density for each BPG;
- Research on the location and extent of drought refugia in each BPG;

- Adult steelhead abundance estimates in selected populations that are robust enough to evaluate Southern SH/RT resilience to catastrophic events and the ability to adapt over time to long-term environmental changes;
- Adult *O. mykiss* abundance estimates that are sufficient to develop an estimate for total abundance in the region; and
- Greater emphasis on monitoring methods that are unbiased or can be corrected for bias (NMFS 2016).

2. Support and participate in the development of watershed-specific plans to effectively maintain and restore Southern SH/RT habitat by focusing on the combination of factors currently limiting their distribution and abundance, such as dams, agriculture, and water extraction. This includes continuing to coordinate and collaborate with NMFS, NGOs, state and local governments, landowners, and other interested entities to implement recovery actions identified in the 2012 Recovery Plan for the southern California Steelhead DPS and other management and conservation strategies. High priority actions include (NMFS 2012a):

- Remove manmade passage barriers in all population watersheds and re-establish access to upper watersheds in both small coastal streams and the larger interior rivers within each BPG identified in the federal Recovery Plan;
- Establish fishways or assisted migration practices at manmade passage barriers that cannot be removed in the near-term with an emphasis on re-establishing passage for above-barrier populations that still contain significant native ancestry;
- Complete planning and removal of Matilija Dam on Matilija Creek and Rindge Dam on Malibu Creek;
- Provide ecologically meaningful flows below major dams and diversions in all population watersheds by re-establishing adequate flow regimes and restoring groundwater aquifers in dewatered areas to sustain surface flows in both small coastal streams and large interior rivers;
- Reevaluate the efficacy of existing fish passage structures at instream surface water diversions, dams, culverts, weirs, canals, and other infrastructure in all watersheds historically and currently occupied by Southern SH/RT; and
- Minimize the adverse effects of exotic and non-native plant and animal species on aquatic ecosystems occupied by Southern SH/RT through direct removal and control efforts.

3. Improve and expand suitable and preferred habitat used by Southern SH/RT for summer holding, spawning, and juvenile rearing. Prioritize habitat restoration, protection, and enhancement in Southern SH/RT holding, spawning, and rearing areas. Habitat projects should focus on improving habitat complexity, riparian cover, fish passage, and sediment transport, as

well as enhancing essential deep, cold-water habitats for holding adults. Restoration should also be considered in potential habitats not currently occupied by Southern SH/RT.

4. Continue research on *Omy5* haplotypes and other relevant genomic regions to better understand: the mechanism for anadromy in Southern SH/RT, the impact of migration barriers on the frequency of the "A" haplotype in individuals, and the risk of progressively losing the genetic basis for anadromy over time in above-barrier populations despite the current presence of the "A" haplotype.

5. Continue to investigate the population structure and ancestry of Southern SH/RT at the extreme southern end of the species distribution in southern California, including further research on identifying genetically introgressed populations and the potential benefit of these populations for maintaining the persistence of viable networks of Southern SH/RT, given recent findings of limited native ancestry in the region and the importance of variation in adaptation.

6. Initiate research into Southern SH/RT ecology identified in the Southern California Steelhead Recovery Plan (NMFS 2012a). Important research topics include:

- Environmental factors that influence anadromy;
- The relationship between migration corridor reliability and anadromous fraction;
- Identification of nursery habitat types that promote juvenile growth and survival;
- The role of seasonal lagoons and estuaries in the life history of Southern SH/RT and the extent to which these areas are used by juveniles prior to emigration;
- Investigation on the role that mainstem habitats play in the life history of steelhead, including identification of the ecological factors that contribute to mainstem habitat quality;
- The role of naturally intermittent creeks and stream reaches;
- Determining whether spawner density is a reliable indicator of a viable population;
- Determining the frequency of return adult spawners;
- Recolonization rates of extirpated watersheds by source populations;
- Dispersal rates between watersheds, including interactions among and between populations through straying;
- Intra-and interannual variation in diet composition and growth rate; and
- Partial migration and life-history crossovers.

7. Formalize minimization and avoidance measures on a Department-wide basis to minimize incidental take of the CESA-listed species due to otherwise lawful activities resulting from construction, research, management, and enhancement activities. This includes working with federal agencies to coordinate and develop efficient permitting processes for incidental take authorization for actions that contribute to the recovery of Southern SH/RT.

8. Explore other means of conserving individual populations of Southern SH/RT that may face the risk of extirpation due to catastrophic events, such as wildfires, droughts, and oil spills (e.g., conservation translocations to other existing facilities at academic institutions or museums, or natural refugia habitats). This includes ensuring that translocations of Southern SH/RT conducted by the Department for conservation purposes significantly contribute to species and ecosystem conservation and are planned, executed, and supported in a manner consistent with best scientific practices and the Department's Policy and Procedures for Conservation Translocations of Animals and Plants (CDFW 2017).

9. Strengthen law enforcement in areas occupied by Southern SH/RT to reduce threats of poaching, illegal water diversions, and instream work used for cannabis cultivation.

10. Evaluate current fishing regulations to determine any potential changes that could be implemented for further protection of Southern SH/RT, and update regulations, using clear and transparent communication, in response to restoration actions, such as dam removal projects, that could change the sport fishing regulation boundary (e.g., inland anadromous waters).

11. Conduct a robust outreach and education program that works to engage with tribes and interested parties, including federal, state, local, NGOs, landowners, underserved communities, and interested individuals, to promote and implement conservation actions. This includes developing outreach and educational materials to increase public awareness and knowledge of the ecological and societal benefits that can be gained by recovering Southern SH/RT.

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Kyle Evans, CDFW, personal communication, 03/08/2023

John O'Brien, CDFW, personal communication, 12/05/2022

Dane St. George, CDFW, personal communication, 05/24/2023

David Boughton, NOAA, personal communication, 09/20/2023

Camm Swift, Emeritus, Section of Fishes, Natural History Museum of Los Angeles County, personal communication, 09/20/20023

APPENDIX A: ANNUAL *O. MYKISS* OBSERVATIONS AND DATA SOURCES FOR THREE EXTANT POPULATIONS IN THE CONCEPTION COAST BPG.

Year	Arroyo Sequit Creek[a]	Topanga Creek[b]	Malibu Creek[b]
2001	0	2	NA
2002	0	95	NA
2003	0	59	NA
2004	0	103	230
2005	0	71	87
2006	0	170	80
2007	0	86	12
2008	0	316	2,245
2009	0	209	130
2010	0	253	160
2011	0	114	281
2012	0	96	156
2013	0	56	99
2014	0	57	31
2015	0	59	32
2016	0	34	7
2017	0	98	6
2018	0	55	1
2019	NA	160	0
Total	0	2,093	3240

"NA" indicates no survey conducted or data not yet available.

[a] Source: Dagit et al. (2019)

[b] Source: Dagit et al. (2019). Sum of the average number of *O. mykiss* observed per month.

APPENDIX B: ANNUAL ADULT STEELHEAD OBSERVATIONS AND DATA SOURCES FOR THREE EXTANT POPULATIONS IN THE CONCEPTION COAST BPG.

Year	Arroyo Sequit Creek[a]	Topanga Creek[b]	Malibu Creek[c]
2001	0	2	NA
2002	0	0	NA
2003	0	0	NA
2004	0	0	0
2005	0 [d]	0	0
2006	0 [d]	1	1
2007	0 [d]	2	2
2008	0 [d]	2	4
2009	0 [d]	1	1
2010	0 [d]	1	2
2011	0 [d]	0	2
2012	0 [d]	1	3
2013	0 [d]	0	3
2014	0 [d]	0	5
2015	0 [d]	0	1
2016	0 [d]	0	0
2017	2	2	1
2018	0	0	0
2019	NA	0	0
Total	2	12	25

"NA" indicates no survey conducted or data not yet available.

[a] Source: Dagit et al. 2020

[b] Source: Dagit et al. (2019; 2020)

[c] Source: Dagit et al. (2019;2020)

[d] Passage barriers prevented access to Arroyo Sequit from 2005-2016. Two adult observations occurred after the removal of barriers (Dagit et al. 2019).

APPENDIX C: ANNUAL *O. MYKISS* OBSERVATIONS AND DATA SOURCES FOR FOUR EXTANT POPULATIONS IN THE MONTE ARIDO HIGHLANDS BPG.

Year	Santa Maria River[a]	Santa Ynez River[b]	Ventura River[c]	Santa Clara River[d]
1994	NA	NA	NA	87[e]
1995	NA	NA	NA	115[e]
1996	NA	NA	NA	96[e]
1997	NA	NA	NA	422[e]
1998	NA	NA	NA	6[e]
1999	NA	NA	NA	5[e]
2000	NA	NA	NA	876[e]
2001	NA	266	NA	124[e]
2002	NA	116	NA	3[e]
2003	NA	196	NA	41
2004	NA	238	NA	3
2005	NA	117	0	NA
2006	NA	653	17	21
2007	NA	665	63	74
2008	NA	561	47	157
2009	NA	610	807	170
2010	NA	367	147	100
2011	NA	484	640	23
2012	NA	199*	378	96
2013	NA	NA	17	1
2014	NA	137*	14	19
2015	NA	134*	65	NA
2016	NA	103*	14	NA
2017	NA	5*	9	NA
2018	NA	27*	1	NA
2019	NA	39*	0	NA
2020	NA	147*	0	NA
2021	NA	205*	0	NA

"NA" indicates no survey conducted or data not yet available.

* NMFS Incidental Take provisions in place. Take limits have not been exceeded since 2014.

[a] Source: Santa Maria River does not appear to be monitored for any viability metrics (NMFS 2016)

[b] Source: COMB (2022). Data represent the total number of upstream and downstream migrant captures at three trapping locations in the Lower Santa Ynez River basin for each water year (WY).

[c] Source: CMWD (2005-2021). Data are derived from snorkel counts and bankside observations from index reaches of the Ventura River near the Robles Diversion.

[d] Source: Booth (2016)

[e] Inconsistent monitoring from 1994-2002 (Booth 2016)

APPENDIX D: ANNUAL ADULT STEELHEAD OBSERVATIONS AND DATA SOURCES FOR FOUR EXTANT POPULATIONS IN THE MONTE ARIDO HIGHLANDS BPG.

Year	Santa Maria River[a]	Santa Ynez River[b]	Ventura River[c]	Santa Clara River[d]	
1994	NA	NA	NA	1	e
1995	NA	0	NA	1	e
1996	NA	0	NA	2	e
1997	NA	2	NA	0	e
1998	NA	1	NA	0	e
1999	NA	3	NA	1	e
2000	NA	0	NA	2	e
2001	NA	4	NA	2	e
2002	NA	0	NA	0	e
2003	NA	1	NA	0	
2004	NA	0	NA	0	
2005	NA	1	NA	0	
2006	NA	1	4	0	
2007	NA	0	4	0	
2008	NA	16	6	2	
2009	NA	1	0	2	
2010	NA	1	1	0	
2011	NA	9	0	0	
2012	NA	0	0	3	
2013	NA	NA	0	0	
2014	NA	0	0	0	
2015	NA	0	0	0	
2016	NA	0	0	0	
2017	NA	0	0	0	
2018	NA	0	0	0	
2019	NA	0	1	NA	
2020	NA	0	0	NA	
2021	NA	0	1	NA	

"NA" indicates no survey conducted or data not yet available.

[a] Source: Santa Maria River does not appear to be monitored for any viability metrics (NMFS 2016)

[b] Source: Dagit et al. (2020), COMB (2022)

[c] Source: Dagit et al. (2020), CDFW R5 internal data from DIDSON monitoring (2019, 2021)

[d] Source: Dagit et al. (2020), Booth (2016)

[e] Inconsistent monitoring from 1994-2002 (Booth 2016)

APPENDIX E. COMMENTS FROM TRIBES AND AFFECTED AND INTERESTED PARTIES ON THE PETITIONED ACTION.

Pursuant to Fish and Game Code 2074.4, the California Department of Fish and Wildlife (Department) and the California Fish and Game Commission (Commission) notified Tribes and affected and interested parties and solicited data and comments on the petitioned action to list Southern California steelhead as endangered under the California Endangered Species Act (CESA).

Native American Tribal Engagement

- From July 13, 2022, to July 15, 2022, the Department distributed by email and mail the attached notices to 309 Tribes notifying them of the Southern California steelhead's candidacy and to request information and comments on the petitioned action. From August 17, 2022, to September 1, 2022, the Department sent follow-up emails to 82 Tribes.
- On February 2, 2023, The Department hosted a virtual Tribal listening session.
- The Department responded to 2 requests for government-to-government consultation and 1 request for a meeting presentation.

Public Notification

- On May 11, 2022, the Commission published a Notice of Findings regarding the candidacy and status review of the Southern California steelhead in the California Regulatory Notice Register (Cal. Reg. Notice Register 2022, No. 19-Z, p. 541).
- The Department distributed by email, on July 15, 2022, and mail, on July 20, 2022, the attached public notice to approximately 152 non-governmental organizations, universities, and local, county, state, and federal entities within the range of Southern California steelhead, notifying them of the Southern California steelhead candidacy and to request information and comments on the petitioned action.
- On July 15, 2022, the Department distributed the attached press release to an email listserv maintained by the Department's Office of Communication, Education and Outreach, and posted the press release to the Department's News Room website, notifying the public of Southern California steelhead's candidacy and to request information and comments on the petitioned action.

Summary of Comments Received

The Department received 17 comments from Tribes. The Department received 480 emails from the public, with 464 emails expressing support for the listing of Southern California steelhead under CESA. Of these emails expressing support, 20 were originally drafted non-format letters. The Department received 12 submissions of information, including 35 literature and data sources, and a list of 2 recommended peer reviewers.

All communications are on file with the Department and can be provided on request by emailing SCSH@wildlife.ca.gov.

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 13, 2022

[redacted]

NOTIFICATION OF STATUS REVIEW FOR SOUTHERN CALIFORNIA STEELHEAD UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Dear [redacted]:

NOTICE IS HEREBY GIVEN that the California Department of Fish and Wildlife (Department) has initiated a status review for Southern California steelhead (*Oncorhynchus mykiss*) pursuant to Fish and Game Code section 2074.6. The Department is providing this notice pursuant to Fish and Game Code section 2074.4 to solicit data and comments on the petitioned action from your Tribe. The Department is also providing this notice pursuant to the Department's Tribal Communication and Consultation Policy to notify your Tribe of this status review process and offer your Tribe government-to-government consultation.

The Department has initiated this status review following related action by the Fish and Game Commission (Commission). On May 13, 2022, the Commission provided public notice that Southern California steelhead is now a candidate species under the California Endangered Species Act (CESA) and as such, receives the same legal protection afforded to an endangered or threatened species. (Cal. Reg. Notice Register 2022, No. 19-Z, p. 541; Fish & G. Code, §§ 2074.2, 2085.) The listing petition defines Southern California steelhead as all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. The listing petition and the Department's petition evaluation report are available at the following Commission webpage: https://fgc.ca.gov/CESA#SCS.

The Department seeks to understand Tribal interests and work collaboratively to include any data or comments on the petitioned action, including Southern California steelhead ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, or recommendations for management of the species during development of the status review. Please submit such data or comments to the Department via email at SCSH@wildlife.ca.gov and include "Southern California Steelhead" in the subject line. Such data or comments may also be submitted to the Department by mail addressed to "Attn: Southern California Steelhead" at the address in the letterhead of this notification.

The Department has twelve months to review the petition, evaluate the best available scientific information relating to the species, and report back to the Commission on whether the petitioned action is warranted or is not warranted. (Fish & G. Code, § 2074.6.) After the Department transmits the report to the Commission, the Commission will place receipt of the report on the agenda for the next available Commission meeting. The report will be made available to the public for that meeting. Following receipt of the report, the Commission will schedule the petition for further consideration at its next available meeting. Pursuant to Fish and Game Code section 2075.5, the Commission—which is a legally separate entity from the Department—is charged with making the final determination on whether to list a species as endangered or threatened under CESA. The Department serves in an exclusively advisory role to the Commission during this process.

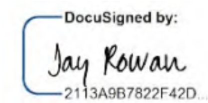
The Department welcomes direct communication and consultation to discuss the status review for Southern California steelhead and to identify any impacts to Tribal interests or cultural resources. The Department is committed to open communication with your Tribe under its Tribal Communication and Consultation Policy, which is available through the Department's Tribal Affairs webpage at: https://www.wildlife.ca.gov/General-Counsel/Tribal-Affairs. If you would like to provide input directly to the final decision makers, the Department encourages you to contact Commission staff about consultation with the Commission and to attend and participate in the Commission's meeting to determine whether to list Southern California steelhead as endangered under CESA. To request formal consultation with the Commission please contact Executive Director Melissa Miller-Henson at [redacted]. For general inquiries and other non-consultation matters, please contact the Commission's Tribal Advisor & Liaison, Chuck Striplen, at [redacted].

To request formal government-to-government consultation with the Department pursuant to the Department's Tribal Communication and Consultation Policy, please contact the Department's Tribal Liaison by email at tribal.liaison@wildlife.ca.gov or by mail at Attention: Tribal Liaison, California Department of Fish and Wildlife, P.O. Box 944209, 94244-2090. Please designate and provide contact information for the appropriate Tribal lead person.

The Department respectfully requests that you respond to this notice expressing your interest in meeting with us or in providing your preliminary input on the petitioned action before September 30, 2022, to allow sufficient time for the Department to evaluate that input in the Department's Southern California steelhead status review. The Department also respectfully requests that if your Tribe intends to request formal government-to-government consultation, your Tribe do so before September 30, 2022. If you would like more information on the status review, please contact Vanessa Gusman, Senior Environmental Scientist (Specialist) at SCSH@wildlife.ca.gov or at the address in the letterhead.

We look forward to your response and input on this status review.

Sincerely,



Jay Rowan, Fisheries Branch Chief

ec: California Department of Fish and Wildlife

Chad Dibble
Deputy Director, Wildlife and Fisheries Division
[redacted]

Department Tribal Liaison
tribal.liaison@wildlife.ca.gov

Ed Pert
Regional Manager, South Coast Region
[redacted]

Jonathan Nelson
Environmental Program Manager, Fisheries Branch
[redacted]

Richard Burg
Environmental Program Manager, South Coast Region
[redacted]

Rob Titus
Senior Environmental Scientist (Supervisor), Fisheries Branch
[redacted]

Vanessa Gusman
Senior Environmental Scientist (Specialist), Fisheries Branch
[redacted]

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Fisheries Branch
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 13, 2022

[redacted]

NOTIFICATION OF STATUS REVIEW FOR SOUTHERN CALIFORNIA STEELHEAD UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Dear [redacted]:

NOTICE IS HEREBY GIVEN that the California Department of Fish and Wildlife (Department) has initiated a status review for Southern California steelhead (*Oncorhynchus mykiss*) pursuant to Fish and Game Code section 2074.6. The Department is providing this notice pursuant to Fish and Game Code section 2074.4 to solicit data and comments on the petitioned action from your Tribe. The Department is also providing this notice pursuant to the Department's Tribal Communication and Consultation Policy to notify your Tribe of this status review process and offer your Tribe consultation.

The Department has initiated this status review following related action by the Fish and Game Commission (Commission). On May 13, 2022, the Commission provided public notice that Southern California steelhead is now a candidate species under the California Endangered Species Act (CESA) and as such, receives the same legal protection afforded to an endangered or threatened species. (Cal. Reg. Notice Register 2022, No. 19-Z, p. 541; Fish & G. Code, §§ 2074.2, 2085.) The listing petition defines Southern California steelhead as all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. The listing petition and the Department's petition evaluation report are available at the following Commission webpage: https://fgc.ca.gov/CESA#SCS.

The Department seeks to understand Tribal interests and work collaboratively to include any data or comments on the petitioned action, including Southern California steelhead ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, or recommendations for management of the species during development of the status review. Please submit such data or comments to the Department via email at SCSH@wildlife.ca.gov and include "Southern California Steelhead" in the subject line. Such data or comments may also be submitted to the Department by mail addressed to “Attn: Southern California Steelhead” at the address in the letterhead of this notification.

The Department has twelve months to review the petition, evaluate the best available scientific information relating to the species, and report back to the Commission on whether the petitioned action is warranted or is not warranted. (Fish & G. Code, § 2074.6.) After the Department transmits the report to the Commission, the Commission will place receipt of the report on the agenda for the next available Commission meeting. The report will be made available to the public for that meeting. Following receipt of the report, the Commission will schedule the petition for further consideration at its next available meeting. Pursuant to Fish and Game Code section 2075.5, the Commission—which is a legally separate entity from the Department—is charged with making the final determination on whether to list a species as endangered or threatened under CESA. The Department serves in an exclusively advisory role to the Commission during this process.

The Department welcomes direct communication and consultation to discuss the status review for Southern California steelhead and to identify any impacts to Tribal interests or cultural resources. The Department is committed to open communication with your Tribe under its Tribal Communication and Consultation Policy, which is available through the Department’s Tribal Affairs webpage at: https://www.wildlife.ca.gov/General-Counsel/Tribal-Affairs. If you would like to provide input directly to the final decision makers, the Department encourages you to contact Commission staff about consultation with the Commission and to attend and participate in the Commission’s meeting to determine whether to list Southern California steelhead as endangered under CESA. To request formal consultation with the Commission please contact Executive Director Melissa Miller-Henson at [redacted]. For general inquiries and other non-consultation matters, please contact the Commission’s Tribal Advisor & Liaison, Chuck Striplen, at [redacted].

To request formal consultation with the Department pursuant to the Department’s Tribal Communication and Consultation Policy, please contact the Department’s Tribal Liaison by email at tribal.liaison@wildlife.ca.gov or by mail at Attention: Tribal Liaison, California Department of Fish and Wildlife, P.O. Box 944209, 94244-2090. Please designate and provide contact information for the appropriate Tribal lead person.

The Department respectfully requests that you respond to this notice expressing your interest in meeting with us or in providing your preliminary input on the petitioned action before September 30, 2022, to allow sufficient time for the Department to evaluate that input in the Department’s Southern California steelhead status review. The Department also respectfully requests that if your Tribe intends to request formal consultation, your Tribe do so before September 30, 2022. If you would like more information on the status review, please contact Vanessa Gusman, Senior Environmental Scientist (Specialist) at SCSH@wildlife.ca.gov or at the address in the letterhead.

We look forward to your response and input on this status review.

Sincerely,

DocuSigned by:
Jay Rowan
2113A9B7822F42D...

Jay Rowan, Fisheries Branch Chief

ec: California Department of Fish and Wildlife

Chad Dibble
Deputy Director, Wildlife and Fisheries Division
[redacted]

Department Tribal Liaison
tribal.liaison@wildlife.ca.gov

Ed Pert
Regional Manager, South Coast Region
[redacted]

Jonathan Nelson
Environmental Program Manager, Fisheries Branch
[redacted]

Richard Burg
Environmental Program Manager, South Coast Region
[redacted]

Rob Titus
Senior Environmental Scientist (Supervisor), Fisheries Branch
[redacted]

Vanessa Gusman
Senior Environmental Scientist (Specialist), Fisheries Branch
[redacted]

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Fisheries Branch
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 15, 2022

NOTICE OF STATUS REVIEW FOR SOUTHERN CALIFORNIA STEELHEAD UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

NOTICE IS HEREBY GIVEN that the California Department of Fish and Wildlife (Department) has initiated a status review for Southern California steelhead (*Oncorhynchus mykiss*) pursuant to Fish and Game Code section 2074.6. The Department is providing this notice pursuant to Fish and Game Code section 2074.4 to notify affected and interested parties and to solicit data and comments on the petitioned action.

The Department has initiated this status review following related action by the Fish and Game Commission (Commission). On May 13, 2022, the Commission provided public notice that Southern California steelhead is now a candidate species under the California Endangered Species Act (CESA) and as such, receives the same legal protection afforded to an endangered or threatened species. (Cal. Reg. Notice Register 2022, No. 19-Z, p. 541; Fish & G. Code, §§ 2074.2, 2085.) The listing petition defines Southern California steelhead as all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. The listing petition and the Department's petition evaluation report are available at the following Commission webpage: https://fgc.ca.gov/CESA#SCS.

As of May 13, 2022, take of Southern California steelhead (hunt, pursue, catch, capture, or kill, or attempt to do so) is prohibited. (Fish & G. Code, § 86). However, incidental take may be authorized with appropriate permits. (Fish & G. Code, §§ 2081(b), 2080.1, 2089.2 et. seq., or 2086.) Activities conducted for scientific, educational, or management purposes (including research and restoration) that may result in take of this species can be authorized through permits or memorandums of understanding (Fish & G. Code § 2081(a)). For information on potential pathways for authorization to take Southern California steelhead, please contact the Department at SCSH@wildlife.ca.gov.

The Department invites data or comments on the petitioned action, including Southern California steelhead ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, or recommendations for management of the species. Please submit such data or comments to the Department via email at SCSH@wildlife.ca.gov and include "Southern California Steelhead" in the subject line. Such data or comments may also be submitted to the Department by mail addressed to "Attn: Southern California Steelhead" at the address in the letterhead of this notice.

The Department has twelve months to review the petition, evaluate the best available scientific information relating to the species, and report back to the Commission on whether the petitioned action is warranted or is not warranted. (Fish & G. Code, § 2074.6.) After the Department transmits the report to the Commission, the Commission will place receipt of the report on the agenda for the next available Commission meeting. The report will be made available to the public for that meeting. Following receipt of the report, the Commission will schedule the petition for further consideration at its next available meeting.

The Department respectfully requests that you submit any data or comments on the petitioned action before September 30, 2022, to allow sufficient time for the Department to evaluate those data or comments in the Department's Southern California steelhead status review.

If you have any questions regarding this notice, please contact the Department via email at SCSH@wildlife.ca.gov.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Fisheries Branch
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 15, 2022

Anthony Spina
Chief, Southern California Branch
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, West Coast Region
[redacted]

NOTIFICATION OF STATUS REVIEW FOR SOUTHERN CALIFORNIA STEELHEAD UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Dear Mr. Anthony Spina:

The purpose of this letter is to notify the National Oceanic and Atmospheric Administration (NOAA) Fisheries that the California Department of Fish and Wildlife (Department) has initiated a status review for Southern California steelhead (*Oncorhynchus mykiss*) pursuant to Fish and Game Code section 2074.6. The Department is providing this notification pursuant to Fish and Game Code section 2074.4 to notify affected and interested parties and to solicit data and comments on the petitioned action.

The Department has initiated this status review following related action by the California Fish and Game Commission (Commission). On May 13, 2022, the Commission provided public notice that Southern California steelhead is now a candidate species under the California Endangered Species Act (CESA) and as such, receives the same legal protection afforded to an endangered or threatened species. (Cal. Reg. Notice Register 2022, No. 19-Z, p. 541; Fish & G. Code, §§ 2074.2, 2085.) The listing petition defines Southern California steelhead as all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. The listing petition and the Department's petition evaluation report are available at the following Commission webpage: https://fgc.ca.gov/CESA#SCS.

The Department invites NOAA Fisheries to provide data or comments on the petitioned action, including Southern California steelhead ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, or recommendations for management of the species. Please submit such data or comments to the Department contact via email at SCSH@wildlife.ca.gov and include "Southern California Steelhead" in the subject line. Such data or comments may also be submitted by mail addressed to "Attn: Southern California Steelhead" at the address in the letterhead of this notification.

The Department has twelve months to review the petition, evaluate the best available information relating to the species, and report back to the Commission on whether the petitioned action is warranted or is not warranted. (Fish & G. Code, § 2074.6.) After the Department transmits the report to the Commission, the Commission will place receipt of the report on the agenda for the next available Commission meeting. The report will be made available to the public for that meeting. Following receipt of the report, the Commission will schedule the petition for further consideration at its next available meeting.

The Department respectfully requests that you submit any data or comments on the petitioned action before September 30, 2022, to allow sufficient time for the Department to evaluate those data or comments in the Department's Southern California steelhead status review.

If you have any questions regarding this notification or would like more information on the Southern California steelhead status review, please contact Vanessa Gusman, Senior Environmental Scientist (Specialist), at SCSH@wildlife.ca.gov.

We look forward to your response and input on this status review.

Sincerely,

DocuSigned by:
Jay Rowan
2113A9B7822F42D...

Jay Rowan, Fisheries Branch Chief

ec: California Department of Fish and Wildlife

Chad Dibble
Deputy Director, Wildlife Fisheries Division
[redacted]

Ed Pert
Regional Manager, South Coast Region
[redacted]

Jonathan Nelson
Environmental Program Manager, Fisheries Branch
[redacted]

Richard Burg
Environmental Program Manager, South Coast Region
[redacted]

Rob Titus
Senior Environmental Scientist (Supervisor), Fisheries Branch
[redacted]

Vanessa Gusman
Senior Environmental Scientist (Specialist), Fisheries Branch
[redacted]

California Department of Fish and Wildlife News Release

July 15, 2022

Media Contacts:
Kirsten Macintyre, CDFW Communications, [redacted]

Public Invited to Comment on Petition to List Southern California Steelhead as Endangered

The California Department of Fish and Wildlife (CDFW) has initiated a status review for Southern California steelhead and invites data or comments on a petition to list Southern California steelhead as an endangered species under the California Endangered Species Act (CESA).

Southern California steelhead (*Oncorhynchus mykiss*) are found in streams from the Santa Maria River at the southern county line of San Luis Obispo County down to the U.S.-Mexico border. Southern California steelhead as defined in the CESA petition include both anadromous (ocean-going) and resident (stream-dwelling) forms of the species below complete migration barriers in these streams.

Major threats to Southern California steelhead include destruction, modification and fragmentation of habitat due to anthropogenic water use (i.e., dams or diversions for the purposes of providing water for human use) and climate change impacts like increased stream temperatures and intensified drought conditions. Southern California steelhead represent an important steelhead diversity component in California due to their unique adaptations, life histories and genetics.

On June 14, 2021, California Trout submitted a petition to the California Fish and Game Commission to list Southern California steelhead as an endangered species under CESA. On April 21, 2022, the Commission accepted that petition for consideration. On May 13, 2022, the Commission provided public notice that Southern California steelhead is now a candidate species under CESA and as such, receives the same legal protection afforded to an endangered or threatened species. The listing petition and CDFW's petition evaluation report are available on the Commission website.

CDFW invites data or comments on the petitioned action, including Southern California steelhead ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management or recommendations for management of the species. Data or comments may be submitted via email to SCSH@wildlife.ca.gov. Please include "Southern California Steelhead" in the subject line. Submissions may also be sent to:

CDFW Fisheries Branch

Attn: Southern California Steelhead
P.O. Box 944209
Sacramento, California 94244-2090

Submissions must be received by Sept. 30. CDFW has 12 months to review the petition, evaluate the best available scientific information relating to Southern California steelhead and make a recommendation to the Commission. The Commission will then place receipt of the report on the agenda for the next available Commission meeting. The report will be made available to the public for that meeting, where the Commission will schedule the petition for further consideration.

For more information on the petition, please visit the Commission website.

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APPENDIX F: PEER REVIEW SUMMARY

Pursuant to Fish and Game Code Section 2074.6, the review process included independent peer review of the draft Status Review by persons in the scientific/academic community acknowledged to be experts on Southern SH/RT and related topics and possessing the knowledge and expertise to critique the scientific validity of the Status Review contents. This Appendix contains the specific input provided to the Department by the individual peer reviewers, the Department's written response to the input, and any amendments made to the Status Review (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Independent experts that reviewed the Status Review are listed in Table 1 below.

Table 1. Status Review Peer Reviewers

Name	Affiliation
Dr. David Boughton	National Marine Fisheries Service
Alan Byrne	Idaho Department of Fish and Game
Dr. Devon Pearse	National Marine Fisheries Service
Dr. Matthew Sloat	Wild Salmon Center
Dr. Camm Swift	Emeritus, Section of Fishes, Natural History Museum of Los Angeles County

The following pages of this appendix contain the letters and draft version of this Status Review sent by the Department to peer reviewers. A table of consolidated peer reviewer comments (arranged by page and line number) and Department responses to those comments is also included at the end of this appendix.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Fisheries Branch
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 21, 2023

Dr. David Boughton
NOAA Fisheries, Southwest Fisheries Science Center
[redacted]

Subject: PEER REVIEW OF THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S REPORT ON THE STATUS OF SOUTHERN CALIFORNIA STEELHEAD

Dear Dr. Boughton,

Thank you for agreeing to serve as a scientific peer reviewer for the California Department of Fish and Wildlife's (Department) draft status review report for Southern California steelhead (*Oncorhynchus mykiss*). The Department seeks your input regarding the assessments and conclusions in this draft status review report based on the best scientific information currently available. Please keep the enclosed report and your review of it confidential until the final report is made public upon receipt by the California Fish and Game Commission (Commission) as an agenda item at a public Commission meeting. Please note that your review will be appended to the final status review report and made public upon receipt by the Commission. **The Department requests your review on or before September 20, 2023.**

The Department seeks your scientific peer review as part of formal proceedings pending before the Commission under the California Endangered Species Act (CESA). The Commission is a constitutionally established entity distinct from the Department, exercising exclusive statutory authority under CESA to add species to or remove species from the endangered or threatened species lists (Fish & G. Code, § 2070). The Department serves in an advisory capacity during CESA listing proceedings, directed by the Fish and Game Code to evaluate the status of the species based on the best scientific information available to the Department and make a recommendation to the Commission as to whether the petitioned action is warranted (Fish & G. Code, § 2074.6).

The Commission first received the petition to list the Southern California steelhead under CESA on June 14, 2021. After considering the Department's evaluation of the petition, the Commission formally accepted the petition for consideration on April 20-21, 2022, thereby designating Southern California steelhead as a candidate for listing as endangered under CESA. As a candidate species, Southern California steelhead currently receives the same protections under CESA as an endangered or threatened species. Formal acceptance of the petition triggered the Department's initiation of the status review.

The draft status review report forwarded to you today reflects the Department's effort to identify and analyze the best scientific information available regarding the status of Southern California steelhead in California. This status review report is not intended to be an exhaustive review of all published literature relevant to the species. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, to provide that information to the Commission, and to serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted.

The Department's preliminary recommendation is that the petitioned action to list Southern California steelhead is warranted. However, we underscore that scientific peer review plays a critical role in the Department's analysis and effort to develop and finalize its recommendation to the Commission as required by the Fish and Game Code. Our analysis and expected recommendation to the Commission may change or be modified following peer review.

During your review, we ask that you assess whether the body of available information supports the Department's listing recommendation. We ask also that you consider CESA and its implementing regulations as summarized in the following paragraphs.

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Fish & G. Code, § 2067).

CESA's implementing regulations state that a species shall be listed as endangered or threatened if the Commission determines that its continued existence is threatened by one or more of the following components: (1) present or threatened modification or destruction of its habitat, (2) overexploitation, (3) predation, (4) competition, (5) disease, or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1(i)(1)(A)).

Following receipt and consideration of peer review comments, the Department will prepare and submit its final status review report and related recommendation to the Commission. After at least a 30-day public review period, the Commission will consider the petition, the Department's status review, related recommendations including peer review comments, and public testimony during a regularly scheduled Commission meeting prior to making its decision.

For ease of review and for accessibility by the public, the Department would prefer to receive your comments in list form by report page and line number using the enclosed Excel file. Please submit your comments electronically to Robin Shin via email at [redacted]. For

questions, Robin Shin can be reached via email or by phone at [redacted] If there is anything the Department can do to facilitate your review, please let us know.

Thank you again for your contribution to the status review and this important step in the CESA listing process.

Sincerely,

DocuSigned by:
Jay Rowan
2113A9B7822F42D...

Jay Rowan
Branch Chief

Enclosures: status review and comments template Excel table

ec: *California Department of Fish and Wildlife*

Chad Dibble
Deputy Director, Wildlife and Fisheries Division

Sarah Mussulman
Environmental Program Manager

Claire Ingel
Senior Environmental Scientist (Supervisor)

Robin Shin
Senior Environmental Scientist (Specialist)

State of California – Natural Resources Agency
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www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 21, 2023

Alan Byrne
Idaho Department of Fish and Game
[redacted]

Subject: PEER REVIEW OF THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S REPORT ON THE STATUS OF SOUTHERN CALIFORNIA STEELHEAD

Dear Alan Byrne,

Thank you for agreeing to serve as a scientific peer reviewer for the California Department of Fish and Wildlife's (Department) draft status review report for Southern California steelhead (*Oncorhynchus mykiss*). The Department seeks your input regarding the assessments and conclusions in this draft status review report based on the best scientific information currently available. Please keep the enclosed report and your review of it confidential until the final report is made public upon receipt by the California Fish and Game Commission (Commission) as an agenda item at a public Commission meeting. Please note that your review will be appended to the final status review report and made public upon receipt by the Commission. **The Department requests your review on or before September 20, 2023.**

The Department seeks your scientific peer review as part of formal proceedings pending before the Commission under the California Endangered Species Act (CESA). The Commission is a constitutionally established entity distinct from the Department, exercising exclusive statutory authority under CESA to add species to or remove species from the endangered or threatened species lists (Fish & G. Code, § 2070). The Department serves in an advisory capacity during CESA listing proceedings, directed by the Fish and Game Code to evaluate the status of the species based on the best scientific information available to the Department and make a recommendation to the Commission as to whether the petitioned action is warranted (Fish & G. Code, § 2074.6).

The Commission first received the petition to list the Southern California steelhead under CESA on June 14, 2021. After considering the Department's evaluation of the petition, the Commission formally accepted the petition for consideration on April 20-21, 2022, thereby designating Southern California steelhead as a candidate for listing as endangered under CESA. As a candidate species, Southern California steelhead currently receives the same protections under CESA as an endangered or threatened species. Formal acceptance of the petition triggered the Department's initiation of the status review.

The draft status review report forwarded to you today reflects the Department's effort to identify and analyze the best scientific information available regarding the status of Southern California steelhead in California. This status review report is not intended to be an exhaustive review of all published literature relevant to the species. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, to provide that information to the Commission, and to serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted.

The Department's preliminary recommendation is that the petitioned action to list Southern California steelhead is warranted. However, we underscore that scientific peer review plays a critical role in the Department's analysis and effort to develop and finalize its recommendation to the Commission as required by the Fish and Game Code. Our analysis and expected recommendation to the Commission may change or be modified following peer review.

During your review, we ask that you assess whether the body of available information supports the Department's listing recommendation. We ask also that you consider CESA and its implementing regulations as summarized in the following paragraphs.

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Fish & G. Code, § 2067).

CESA's implementing regulations state that a species shall be listed as endangered or threatened if the Commission determines that its continued existence is threatened by one or more of the following components: (1) present or threatened modification or destruction of its habitat, (2) overexploitation, (3) predation, (4) competition, (5) disease, or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1(i)(1)(A)).

Following receipt and consideration of peer review comments, the Department will prepare and submit its final status review report and related recommendation to the Commission. After at least a 30-day public review period, the Commission will consider the petition, the Department's status review, related recommendations including peer review comments, and public testimony during a regularly scheduled Commission meeting prior to making its decision.

For ease of review and for accessibility by the public, the Department would prefer to receive your comments in list form by report page and line number using the enclosed Excel file. Please submit your comments electronically to Robin Shin via email at [redacted]. For

questions, Robin Shin can be reached via email or by phone at [redacted]. If there is anything the Department can do to facilitate your review, please let us know.

Thank you again for your contribution to the status review and this important step in the CESA listing process.

Sincerely,

DocuSigned by:
Jay Rowan
2113A9B7822F42D...

Jay Rowan
Branch Chief

Enclosures: status review and comments template Excel table

ec: *California Department of Fish and Wildlife*

Chad Dibble
Deputy Director, Wildlife and Fisheries Division

Sarah Mussulman
Environmental Program Manager

Claire Ingel
Senior Environmental Scientist (Supervisor)

Robin Shin
Senior Environmental Scientist (Specialist)

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 21, 2023

Dr. Devon Pearse
NOAA Fisheries, Southwest Fisheries Science Center
[redacted]

Subject: PEER REVIEW OF THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S REPORT ON THE STATUS OF SOUTHERN CALIFORNIA STEELHEAD

Dear Dr. Pearse,

Thank you for agreeing to serve as a scientific peer reviewer for the California Department of Fish and Wildlife's (Department) draft status review report for Southern California steelhead (*Oncorhynchus mykiss*). The Department seeks your input regarding the assessments and conclusions in this draft status review report based on the best scientific information currently available. Please keep the enclosed report and your review of it confidential until the final report is made public upon receipt by the California Fish and Game Commission (Commission) as an agenda item at a public Commission meeting. Please note that your review will be appended to the final status review report and made public upon receipt by the Commission. **The Department requests your review on or before September 20, 2023.**

The Department seeks your scientific peer review as part of formal proceedings pending before the Commission under the California Endangered Species Act (CESA). The Commission is a constitutionally established entity distinct from the Department, exercising exclusive statutory authority under CESA to add species to or remove species from the endangered or threatened species lists (Fish & G. Code, § 2070). The Department serves in an advisory capacity during CESA listing proceedings, directed by the Fish and Game Code to evaluate the status of the species based on the best scientific information available to the Department and make a recommendation to the Commission as to whether the petitioned action is warranted (Fish & G. Code, § 2074.6).

The Commission first received the petition to list the Southern California steelhead under CESA on June 14, 2021. After considering the Department's evaluation of the petition, the Commission formally accepted the petition for consideration on April 20-21, 2022, thereby designating Southern California steelhead as a candidate for listing as endangered under CESA. As a candidate species, Southern California steelhead currently receives the same protections under CESA as an endangered or threatened species. Formal acceptance of the petition triggered the Department's initiation of the status review.

The draft status review report forwarded to you today reflects the Department's effort to identify and analyze the best scientific information available regarding the status of Southern California steelhead in California. This status review report is not intended to be an exhaustive review of all published literature relevant to the species. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, to provide that information to the Commission, and to serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted.

The Department's preliminary recommendation is that the petitioned action to list Southern California steelhead is warranted. However, we underscore that scientific peer review plays a critical role in the Department's analysis and effort to develop and finalize its recommendation to the Commission as required by the Fish and Game Code. Our analysis and expected recommendation to the Commission may change or be modified following peer review.

During your review, we ask that you assess whether the body of available information supports the Department's listing recommendation. We ask also that you consider CESA and its implementing regulations as summarized in the following paragraphs.

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Fish & G. Code, § 2067).

CESA's implementing regulations state that a species shall be listed as endangered or threatened if the Commission determines that its continued existence is threatened by one or more of the following components: (1) present or threatened modification or destruction of its habitat, (2) overexploitation, (3) predation, (4) competition, (5) disease, or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1(i)(1)(A)).

Following receipt and consideration of peer review comments, the Department will prepare and submit its final status review report and related recommendation to the Commission. After at least a 30-day public review period, the Commission will consider the petition, the Department's status review, related recommendations including peer review comments, and public testimony during a regularly scheduled Commission meeting prior to making its decision.

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Thank you again for your contribution to the status review and this important step in the CESA listing process.

Sincerely,

DocuSigned by:
Jay Rowan
2113A9B7822F42D...

Jay Rowan
Branch Chief

Enclosures: status review and comments template Excel table

ec: *California Department of Fish and Wildlife*

Chad Dibble
Deputy Director, Wildlife and Fisheries Division

Sarah Mussulman
Environmental Program Manager

Claire Ingel
Senior Environmental Scientist (Supervisor)

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State of California – Natural Resources Agency
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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 21, 2023

Dr. Matthew Sloat
Wild Salmon Center
[redacted]

Subject: PEER REVIEW OF THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S REPORT ON THE STATUS OF SOUTHERN CALIFORNIA STEELHEAD

Dear Dr. Sloat,

Thank you for agreeing to serve as a scientific peer reviewer for the California Department of Fish and Wildlife's (Department) draft status review report for Southern California steelhead (*Oncorhynchus mykiss*). The Department seeks your input regarding the assessments and conclusions in this draft status review report based on the best scientific information currently available. Please keep the enclosed report and your review of it confidential until the final report is made public upon receipt by the California Fish and Game Commission (Commission) as an agenda item at a public Commission meeting. Please note that your review will be appended to the final status review report and made public upon receipt by the Commission. **The Department requests your review on or before September 20, 2023.**

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DocuSigned by:
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Jay Rowan
Branch Chief

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ec: *California Department of Fish and Wildlife*

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 21, 2023

Dr. Camm Swift
Natural History Museum of Los Angeles County
[redacted]

Subject: PEER REVIEW OF THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S REPORT ON THE STATUS OF SOUTHERN CALIFORNIA STEELHEAD

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State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION
CALIFORNIA ENDANGERED SPECIES ACT STATUS REVIEW OF SOUTHERN CALIFORNIA STEELHEAD (ONCORHYNCHUS MYKISS)

November 2023

Southern California Steelhead Rainbow Trout, CDFW photo

Prepared by
California Department of Fish and Wildlife

Suggested citation:

California Department of Fish and Wildlife (CDFW). 2023. Report to the California Fish and Game Commission. California Endangered Species Act Status Review for Southern California Steelhead (*Oncorhynchus mykiss*). California Department of Fish and Wildlife, 1416 Ninth Street, Sacramento CA 95814, Sacramento CA 95814. [###] pp., with appendices.

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LIST OF ABBREVIATIONS, ACRONYMS, AND TERMS

BEUTI – Biologically Effective Upwelling Transport Index
BPG – Biogeographic Population Group
CATEX – Categorical Exclusion
CCE – California Current Ecosystem
CESA – California Endangered Species Act
CEQA – California Environmental Quality Act
CFS – cubic feet per second
CMP – California Coastal Monitoring Program
CMWD – Casitas Municipal Water District
COMB – Cachuma Operations and Maintenance
Commission – California Fish and Game Commission
Creeks Division – City of Santa Barbara Creeks Restoration and Water Quality Improvement Division
CRR – cohort replacement rate
CUTI – Cumulative Upwelling Transport Index

CWA – Federal Clean Water Act
Department – California Department of Fish and Wildlife
DIDSON - dual-frequency identification sonar
DO – dissolved oxygen
DPS – Distinct Population Segment
DWR – California Department of Water Resources
EA – Environmental Assessment
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
EPA – United States Environmental Protection Agency
ESA – Federal Endangered Species Act
ESU – Evolutionary significant unit
FERC – Federal Energy Regulatory Commission
FONSI – Finding of No Significant Impact
FRGP – Fisheries Restoration Grant Program
GSA – Groundwater sustainability agency
GSP – Groundwater sustainability plan
HCP – Habitat Conservation Plan
LWD – large woody debris
NCCP – Natural Community Conservation Plan
NEPA – National Environmental Policy Act
NGO – Non-Governmental Organization
NMFS – National Marine Fisheries Service
RCDSMM – Resource Conservation District of the Santa Monica Mountains
SCCWRP – Southern California Coastal Water Research Project
SCWRP – Southern California Wetlands Recovery Project
SGMA – Sustainable Groundwater management Act
SNP – single nucleotide polymorphism
SST – sea surface temperature
SWRCB – California State Water Resources Control Board
TMDL – Total Maximum Daily Load
USACE – United States Army Corp of Engineers
USBR – United States Bureau of Reclamation
USFWS – United States Fish and Wildlife Service
UWCD – United Water Conservation District
WSRA – Federal Wild and Scenic Rivers Act
YOY – young-of-the-year

EXECUTIVE SUMMARY

This status review of southern California steelhead (*Oncorhynchus mykiss*) (Status Review) has been prepared by the California Department of Fish and Wildlife (Department) for the California Fish and Game Commission (Commission) pursuant to the requirements of the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.). This Status Review is based on the best scientific information currently available to the Department regarding each of the components listed under Section 2072.3 of the Fish and Game Code and Section 670.1 of Title 14 of the California Code of Regulations. In addition, this Status Review includes a preliminary identification of habitat that may be essential to the continued existence of the species, the Department's recommendations for management activities, and other recommendations for the recovery of the species (Fish & G. Code, § 2074.6.). This Status Review has been independently reviewed by scientific peers pursuant to Fish and Game Code Section 2074.6.

In this Status Review, southern California steelhead are defined as "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories, from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border." This range encompasses five biogeographic population groups of *O. mykiss* (from north to south): Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast. To capture the life history variability that is included in the scope of the CESA listing unit evaluated in this Status Review, "southern California steelhead rainbow trout" (Southern SH/RT) is used to describe the CESA listing unit. While at the species level, *O. mykiss* exhibits similar biological and life history characteristics across the range of Coastal Rainbow Trout from Alaska to Baja California (*O. mykiss irideus*), Southern SH/RT are adapted to the climate and habitat features of the southern California region.

The Department recommends that the Commission find the petitioned action to list Southern SH/RT as an endangered species under CESA to be warranted. The Department further recommends implementation of the management recommendations and recovery measures described in this Status Review.

The scientific data available to the Department indicates a long-term declining trend of Southern SH/RT and low range-wide abundances. The impacts of the most recent prolonged period of drought from 2012 – 2017 resulted in significant reductions in all life-history forms and stages of Southern SH/RT, and few populations have recovered as current abundance estimates remain low relative to pre-drought conditions. The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions and limited the amount of suitable and accessible spawning and rearing habitats. Dams and other impediments obstruct access to a significant portion of historical Southern SH/RT habitats in many rivers within the proposed listing area, some of which have multiple major dams on a single mainstem. Climate change projections for Southern SH/RT range predict an intensification of typical climate patterns, such as more intense cyclic storms, droughts, and extreme heat. These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form.

1. INTRODUCTION

1.1 Petition History

On June 14, 2021, the California Fish and Game Commission (Commission) received a petition (Petition) from California Trout to list southern California steelhead (*Oncorhynchus mykiss*) as endangered pursuant to the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.).

On June 23, 2021, pursuant to Fish and Game Code Section 2073, the Commission referred the Petition to the California Department of Fish and Wildlife (Department) for evaluation.

On July 16, 2021, pursuant to Fish and Game Code Section 2073.3, the Commission published notice of receipt of the Petition in the California Regulatory Notice Register (Cal. Reg. Notice Register 2021, No. 29-Z, p. 921-922).

On August 18, 2021, pursuant to Fish and Game Code Section 2073.5, the Commission approved the Department's request for a 30-day extension to complete its petition evaluation report.

On October 29, 2021, the Department provided the Commission with a report, "Evaluation of the Petition from California Trout to List Southern California Steelhead (*Oncorhynchus mykiss*) as Endangered under the California Endangered Species Act" (Evaluation). Based upon the information contained in the Petition, the Department concluded, pursuant to Fish and Game Code Section 2073.5, that sufficient information exists to indicate that the petitioned action may be warranted and recommended to the Commission that the Petition be accepted and considered.

On April 21, 2022, at its public meeting pursuant to Fish and Game Code Sections 2074 and 2074.2, the Commission considered the Petition, the Department's Evaluation and recommendation, comments received, and oral testimony. The Commission found that sufficient information exists to indicate the petitioned action may be warranted and accepted the Petition for consideration.

On May 13, 2022, pursuant to Fish and Game Code Section 2074.2, the Commission published its Notice of Findings for southern California steelhead in the California Regulatory Notice Register, designating southern California steelhead as a candidate species (Cal. Reg. Notice Register 2022, No. 19-z, p. 541).

On October 12, 2022, pursuant to Fish and Game Code Section 2074.6, the Commission approved the Department's request for a six-month extension to complete its status review report.

1.2 Status Review Overview

Pursuant to Fish and Game Code Section 2074.6 and the California Code of Regulations, title 14, Section 670.1, the Department has prepared this status review to indicate whether the petitioned action to list southern California steelhead as endangered under CESA is warranted (Status Review). An endangered species under CESA is "a native species or subspecies . . . which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species under CESA is "a native species or subspecies . . . that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (*id.*, § 2067). A species' range for CESA purposes is the species' California range (Cal. Forestry Assn. v. Cal. Fish and Game Com. (2007) 156 Cal.App.4th 1535, 1551).

Using the best scientific information available to the Department, this Status Review includes information on each of the following components pursuant to Fish and Game Code Section 2072.3 and title 14 of the California Code of Regulations Section 670.1: population trend(s), range, distribution, abundance, life history, factors affecting the species' ability to survive and reproduce, the degree and immediacy of threats, the impact of existing management efforts, the availability and sources of information, habitat that may be essential to the continued existence of the species, and the Department's recommendations for future management activities and other recovery measures to conserve, protect, and enhance the species.

Southern California steelhead, as defined in the Petition, means all *O. mykiss*, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border (CDFW 2021a Petition Evaluation). The Department accepts the taxonomy as published by Behnke (1992) that identifies southern California *O. mykiss* as being included in the range of Coastal Rainbow Trout (*O. mykiss irideus*), which have a broad distribution extending from Alaska to Baja California (Moyle 2002). The Department has long referred to these fish as "steelhead rainbow trout" (Shapovalov and Taft 1954), which captures the life history variability that is included in the scope of this status review for both anadromous and resident forms of the species. Thus, the Department will refer to the Petitioner's proposed listing unit as southern California steelhead rainbow trout (*O. mykiss*;

Southern SH/RT) throughout the remainder of this Status Review. This naming convention is slightly different than what was used by the Petitioner in the Petition, but the Department asserts the importance of recognizing the full scope of life history diversity included in the listing unit.

This Status Review report is not intended to be an exhaustive review of all published scientific literature relevant to the Southern SH/RT. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, provide that information to the Commission, and serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted. Specifically, this Status Review analyzes whether there is sufficient scientific information to indicate that the continued existence of Southern SH/RT throughout all or a significant portion of its range is in serious danger or is threatened by one or a combination of the following factors: present or threatened modification or destruction of its habitat; overexploitation; predation; competition; disease; or other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)).

1.3 Federal Endangered Species Act Listing History

The federal Endangered Species Act (ESA) defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532). In 1991, the National Marine Fisheries Service (NMFS) adopted its policy on how it would apply the definition of "species" to Pacific salmon stocks for listing under the ESA (ESU Policy). Under the ESU Policy, a salmon stock is considered a distinct population segment (DPS) if it constitutes an evolutionary significant unit (ESU) of the biological species (NMFS 1991). In February 1996, the United States Fish and Wildlife Service (USFWS) and NMFS published a joint DPS policy for the purposes of ESA listings (DPS Policy) (NMFS 1996a). Section 3.1 of this Status Review describes the ESU Policy and DPS Policy in greater detail.

In 1997, NMFS listed the Southern California Steelhead ESU as endangered under the federal ESA. The Southern California Steelhead ESU only included naturally spawned populations of anadromous *O. mykiss* (and their progeny) residing below long-term, natural and manmade impassable barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to Malibu Creek, Los Angeles County (inclusive) (NMFS 1997). In 2002, NMFS extended the geographic range of the Southern California Steelhead ESU listed under the federal ESA south to the U.S.-Mexico border (NMFS 2002).

In 2001, the United States District Court in Eugene, Oregon, ruled that NMFS improperly excluded certain hatchery stocks from the listing of Oregon Coast Coho Salmon after NMFS had concluded that those hatchery stocks were part of the ESU being considered for listing but not essential for recovery (*Alsea Valley Alliance v. Evans* (D. Or. 2001) 161 F. Supp. 2d 1154, 1162). Based in part on the *Alsea* decision, in 2002 NMFS announced that that it would conduct an updated status review of 27 West Coast salmonid ESUs, including the Southern California Steelhead ESU (NMFS 2006). In 2004, NMFS proposed to continue applying its ESU Policy to the delineation of DPSs of *O. mykiss* and to include resident *O. mykiss* that co-occur with the anadromous form of *O. mykiss* in 10 *O. mykiss* ESUs, including the Southern California Steelhead ESU (NMFS 2006).

In 2005 USFWS wrote to NMFS stating USFWS's "concerns about the factual and legal bases for [NMFS's] proposed listing determinations for 10 *O. mykiss* ESUs, specifying issues of substantial disagreement regarding the relationship between anadromous and resident *O. mykiss*" (NMFS 2006). After discussions with USFWS regarding the relationship between anadromous and non-anadromous *O. mykiss*, in 2006 NMFS decided to depart from their past practice of applying the ESU policy to *O. mykiss* stocks and instead apply the joint DPS Policy (NMFS 2006). Concurrent with that decision, NMFS relisted the Southern California Steelhead ESU as the Southern California Steelhead DPS under the federal ESA (NMFS 2006). As part of its 2006 relisting of southern California steelhead, NMFS concluded that the anadromous life form of *O. mykiss* is markedly separate from the non-anadromous life form of *O. mykiss* within the geographic boundary of the Southern California Steelhead DPS—as well as the geographic boundaries of the other nine *O. mykiss* ESUs that NMFS was relisting as DPSs at that time—due to "physical, physiological, ecological, and behavioral factors" (NMFS 2006). The Southern California Steelhead ESU only includes the anadromous life-history component of *O. mykiss* and is defined as including all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassible barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico border (Table 1) (NMFS 2006).

2. BIOLOGY AND ECOLOGY

2.1 Species Description

The species *O. mykiss* is the most widely distributed of Pacific salmonids, occupying nearly all coastal streams from Alaska to southern California, as well as many lakes and streams above fish passage barriers across California, where they have been widely stocked since the mid- to late-1800s. Steelhead is the common name for the anadromous form of *O. mykiss*, while Rainbow Trout is the common name applied to the freshwater resident form (Behnke 1993; Moyle 2002). *O. mykiss* possess 10–12 dorsal fin rays, 8–12 anal fin rays, 9–10 pelvic fin rays, 11 – 17 pectoral fin rays, and a slightly forked caudal fin (Moyle 2002). They have 9–13 branchiostegal rays and 16–22 gill rakers on each arch (Moyle 2002). Teeth are present on both upper and lower jaws, the tip and shaft of the vomer, as well as on the tip of the tongue (Fry 1973; Moyle 2002). Between 110–180 small, pored scales make up the first row above the lateral line (Fry 1973; Moyle 2002).

The steelhead life history form is thought to be named for the sometimes silvery-metallic appearance of its back and head. The steelhead body profile is fusiform, with typically “bullet-shaped” heads and distinct narrowing at the base of a powerful tail, suited for often-demanding and lengthy upstream spawning migrations. In the marine environment, steelhead body coloration includes a blueish-green dorsum (back) and silver or white coloration over the rest of the body (Fry 1973; Moyle 2002). Black spots typically cover the dorsal, adipose, and caudal fins, as well as the head and back (Fry 1973). When adult steelhead return to spawn in freshwater, their silver sheen fades and a pink or red lateral band develops along the sides and on the opercula, while the silvery-blue coloration on the back transitions to an olive green or brown (Barnhart 1986). These characteristics are very similar to those exhibited by resident Rainbow Trout (Fry 1973); thus, it can be difficult to differentiate the anadromous and resident forms based only on outward appearance. Adult steelhead, however, are generally larger than adult Rainbow Trout in a given stream system since they spend time feeding and growing in the ocean (NWF 2020; USFWS 2020).

Table 1. Common nomenclature for Oncorhynchus mykiss (adapted from Boughton et al. 2022b).

Term	**Description**
Oncorhynchus mykiss	A species of Pacific salmonid composed of both anadromous and freshwater-resident forms, which all spawn in freshwater rivers and streams.
Steelhead	Individuals: *O. mykiss* that are anadromous (individuals that migrate to and spend one or more seasons in the ocean); here used to mean adult steelhead.
Rainbow Trout	Individuals: *O. mykiss* that are freshwater-resident (individuals that complete their life cycle in freshwater), here used to mean adult Rainbow Trout.
Steelhead Rainbow Trout	Population/Evolutionarily Significant Unit (ESU): contain both steelhead individuals and Rainbow Trout individuals.
Juvenile *O. mykiss*	Immature fish whose fate as steelhead or Rainbow Trout cannot yet be established.

Term	Description
Anadromous waters	Stream reaches that are accessible to migrating steelhead (those not blocked by complete natural or artificial barriers). It is important to note that *Oncorhynchus mykiss* individuals, occurring in anadromous waters, may or may not express the anadromous life history type (e.g., smoltification).

Juvenile *O. mykiss* have body coloration similar to that of resident adults, while also exhibiting 5–13 oval parr marks along the lateral line on both sides of the body (Moyle 2002). These parr marks are dark bluish-purple in coloration and are widely spaced, with the marks themselves being narrower than the spaces between them (Moyle 2002). A total of 5–10 dark spots also line the back, typically extending from the head to the dorsal fin. There are usually few to no marks on the caudal fin, and the tips of the dorsal and anal fins are white to orange (Moyle 2002).

After a year or more of development, some *O. mykiss* undergo the transitional process of smolting, which is a series of morphological, physiological, and behavioral changes that prepare the fish for entry into brackish estuaries and then ocean environments (Fessler and Wagner 1969; McCormick 2012). Smolting is the primary characteristic that distinguishes the anadromous life history variant from the resident one within the species. Smolts lose their parr marks and develop silver coloration during the downstream migration process. After entering the ocean, young steelhead will reside in the saltwater environment for 1–4 years while feeding and growing quickly (Moyle 2002). Juvenile Rainbow Trout that do not smolt and remain in freshwater generally lose their parr marks as they grow and develop into adults.

Upon reentering freshwater rivers and streams to spawn, the sexual maturation process for anadromous steelhead involves the development of secondary sex characteristics such as bright coloration and sexual dimorphism, including the development of a hooked snout, or kype, in males. These secondary sex characteristics are typically reabsorbed once spawning is complete, although jaw shape may never fully revert to the pre-spawn condition (Shapovalov and Taft 1954).

Different populations of *O. mykiss* can exhibit variations in growth rate, size, and body shape depending on their life histories and habitats utilized. For example, Bajjaliya et al. (2014) studied morphometric variation between four California steelhead DPSs and found that coastal steelhead (populations with adults migrating less than 160 km from the ocean to their sample site) were significantly larger in size and had a more robust body type than steelhead found in California's Central Valley drainages and the Klamath-Trinity basin (populations with adults migrating more than 160 km from the ocean to their sample site). These morphological differences provided the basis for recognizing “coastal type” and “inland type” steelhead in California (Bajjaliya et al. 2014).

2.2 Taxonomy and Systematics

Steelhead and Rainbow Trout are members of the bony fish class Osteichthyes, in the order Salmoniformes and family Salmonidae. In 1792, J. J. Walbaum classified Rainbow Trout from populations on the Kamchatka Peninsula in Russia as *Salmo mykiss* (Moyle 2002). During the next century, using J. Richardson’s description of Columbia River steelhead as *S. gairdneri* and Gibbons’s description of juvenile steelhead from San Leandro Creek as *S. iridea*, both the biology and fishing communities began referring to resident Rainbow Trout and steelhead as *S. irideus* and *S. gairdneri*, respectively. It was ultimately discovered that Rainbow Trout and steelhead are the same species, and North American scientists applied the original species name, *mykiss*, to North American populations (Moyle 2002).

In the 1970s, analyses of polymorphic proteins, or allozymes, were utilized to determine the degree of species relatedness and evolutionary divergence among salmonids (Quinn 2018). These studies indicated that Coho and Chinook salmon (*O. kisutch* and *O. tschawytscha*, respectively) were most closely related to Pink, Chum, and Sockeye salmon, and that Rainbow and Cutthroat trout were most closely related to each other (Quinn 2018). This phylogeny was assumed until researchers analyzed relatedness by looking at differences in mitochondrial DNA, which showed that Coho and Chinook salmon were related more closely to steelhead than they were to the other three genera of salmon (Quinn 2018). Based on this study, Smith and Stearley (1989) reorganized the taxonomy to reflect both the use of the name *mykiss* for North American Rainbow Trout and the inclusion of Rainbow and Cutthroat trouts in the Pacific salmon genus *Oncorhynchus*, but with their own distinct lineages.

Pacific salmonid lineages continue to be studied using a variety of genetic and statistical methods (Quinn 2018). There has been debate over the relationship between Rainbow and Cutthroat trouts with regards to genetics versus morphology and behavior. Stearley and Smith (1993) and Esteve and McLennan (2007) found that the idea of monophyly (descending from a common ancestor) of these two trout species is not supported by either morphological or behavioral traits, even though mitochondrial DNA suggests otherwise. Esteve and McLennan (2007) attribute this contradiction to hybridization events that have led to a high rate of genetic introgression between the two species (Chevassus 1979). This introgression can dilute the distinctiveness of these close relatives and convolute phylogenetic reconstruction (Esteve and McLennan 2007). Although some uncertainty remains surrounding these evolutionary relationships, it is now accepted that within the genus *Oncorhynchus*, Coho and Chinook salmon have the closest relationship to each other, with Pink (*O. gorbuscha*), Chum (*O. keta*), and

Sockeye (*O. nerka*) salmon in their own group, and Rainbow (*O. mykiss*) and Cutthroat (*O. clarkii*) trout in another group (Kitano et al. 1997; Quinn 2018; Figure 1).

2.3 Range and Distribution

Range is the general geographical area in which an organism occurs. For purposes of CESA and this Status Review, the range is the species' California range (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551). Distribution describes the actual sites where individuals and populations of the species occur within the species' range.

Oncorhynchus mykiss is native to both coastlines of the Pacific Ocean and spawns in freshwater streams, from the Kuskokwim River, in Alaska, south to Baja California along the eastern Pacific, and from Russia's Kamchatka Peninsula to South Korea, in the western Pacific (Moyle 2002). The species is widely distributed throughout the northern Pacific Ocean during its ocean phase. Coastal steelhead within the state historically occupied all perennial coastal streams, from the Oregon/California border to the U.S.-Mexico border (Moyle 2002). Steelhead are also native to the Central Valley, including both the Sacramento and San Joaquin River basins, and have been found as far upstream as the Pit and McCloud rivers (Moyle 2002). It is likely that most suitable streams in the Sacramento and San Joaquin River basins with ocean access have historically supported runs of steelhead (Moyle 2002).

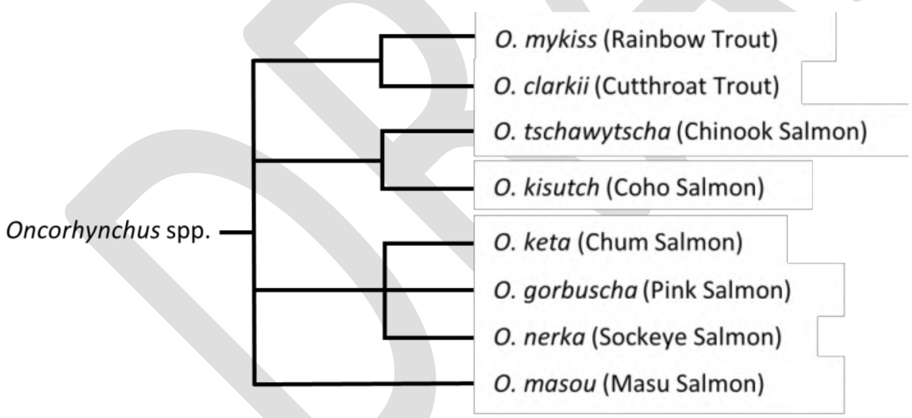


Figure 1. Consensus relationships of Oncorhynchus species from morphological, allozyme, ribosomal RNA, mitochondrial DNA, and short interspersed repetitive elements data across multiple studies. Adapted from Figure 1 in Kitano et al. (1997).

Southern SH/RT currently occupy fluvial habitat from the Santa Maria River at the border of San Luis Obispo and Santa Barbara counties south to the U.S.-Mexico border. This range encompasses five biogeographic population groups (BPGs), collectively described by NMFS as the Southern California steelhead DPS (Boughton et al. 2007; NMFS 2012a). BPGs are steelhead subpopulations within a DPS that occupy contiguous areas that share broadly similar physical geography and hydrology, generally within a single watershed unit. The combinations of these physical characteristics represent the suite of differing natural selective regimes across the watersheds occupied by Southern SH/RT. These varying selective pressures have led to life history and genetic adaptations that enable subpopulations to persist in distinctive and dynamic habitats that have shaped each BPG. The purpose of delineating BPGs for steelhead populations is to ensure the preservation of the range of genetic and natural diversity within each DPS for recovery and conservation purposes (NMFS 2012a). The BPGs that form the Southern SH/RT DPS are (from north to south): Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast.

While some near-coastal populations of Southern SH/RT are small, there are likely dispersal dynamics that contribute to their stability and persistence (Boughton et al. 2007). The movement of spawning adults between BPGs may be an important mechanism for maintaining the viability of steelhead populations (NMFS 2012a). Dams and other impediments obstruct access to a significant portion of historical Southern SH/RT habitats in many rivers within the proposed listing area, some of which have multiple major dams on a single mainstem. There is evidence that loss of access to upstream habitat has resulted in a northward range contraction of anadromous Southern SH/RT (Boughton et al. 2005), whose study also found a strong correlation between steelhead population extirpations and anadromous barriers, as well as urban and agricultural development.

2.4 Life History

An individual fish's genotype, condition, and a variety of environmental factors influence the expression of anadromy versus stream residency (Sloat et al. 2014; Busby et al. 1996; Pascual et al. 2001; Courter et al. 2013). Juvenile *O. mykiss* prior to the smolting life stage are difficult to distinguish without genetic, morphological, or physiological evaluations (Negus 2003; Beeman et al. 1995; Haner et al. 1995; Pearse et al. 2014). Adult steelhead returning to streams from the ocean are often easier to identify due to their larger size relative to most resident Rainbow Trout adults in the same stream system and their overall steel-gray color (Dagit et al. 2020). While anadromy and residency are the two primary life histories, *O. mykiss* life history expression is notably plastic and can be quite variable (Moyle 2002). For example, individuals may exhibit the lagoon-anadromous life history, spending their first or second summer rearing in seasonal lagoons in the estuaries of streams before outmigrating to the ocean (Boughton et al. 2007).

Unlike other Pacific salmonids, which are semelparous and perish almost immediately after spawning, *O. mykiss* can be iteroparous (Moyle 2002), with the potential to spawn up to four times but typically not more than twice (Shapovalov and Taft 1954). Steelhead that spawn and return to the sea are called “kelts.” These fish can either spawn consecutively, returning the next season after their first spawn, or they may return a year later after spending an extra year at sea (Light et al. 1989). Reportedly, females survive spawning events more frequently than males (Shapovalov and Taft 1954; Ward and Slaney 1988; Busby et al. 1996; Marston et al. 2012), although males can repeat spawn in significant numbers, especially in smaller, near-coastal stream systems (Marston et al. 2012).

Steelhead exhibit two seasonal migratory patterns, or run types: 1) winter, also called “ocean-maturing” or “mature-migrating;” and 2) summer, also called “stream-maturing” or “premature-migrating.” The names of these two runs are reflective of the seasonal timing when adult steelhead reenter estuaries and rivers to reproduce (Busby et al. 1996; Moyle 2002). Only the winter-run form of steelhead occurs in southern California streams, consistent with what is believed to be the historical condition (Moyle 2002). Southern SH/RT typically begin migrating upstream from December through May, with returning adults often reliant upon winter rainstorms to breach sandbars at the mouths of stream estuaries and lagoons, providing seasonal upstream spawning passage (California Trout 2019). Steelhead age-at-maturity is dependent on a number of factors, including time spent in either or both freshwater and marine environments; however, adult returning spawners are usually 3 or 4 years old, having spent 1-3 years in freshwater and 1-2 years at sea (Shapovalov and Taft 1954). Southern SH/RT steelhead spawning runs are dominated by age 3+ fish, with 2 years spent in fresh water and 1 year in the ocean, although many smolt after only 1 year in fresh water (Busby et al. 1996). Shapovalov and Taft (1954) found that the average age of male spawners (about 3.5 years) was lower than that of female spawners (close to 4 years) in Waddell Creek, CA. Non-anadromous Rainbow Trout can mature anywhere between 1 and 5 years but are commonly age 2+ or 3+ years, with a fork length of $\geq$13 cm (Moyle 2002). Rainbow Trout typically spawn during the spring months, from February through June (Moyle 2002).

Spawning usually occurs in shallow habitats with fast-flowing water and suitable-sized gravel substrates, often found in riffles, faster runs, or near the tail crests of pool habitats. When female *O. mykiss* are ready to spawn, they will select a suitable spawning site and excavate a nest, or redd, in which they deposit their eggs to incubate (Moyle 2002). Adequate stream flow, gravel size, and low substrate embeddedness are crucial for egg survival, as these conditions allow oxygenated water to permeate through sediments to the egg (Coble 1961). During redd construction, the female may be courted by multiple males. Following completion of the redd, the most dominant males fight for position alongside the female, depositing milt while the female deposits her eggs (Quinn 2018). Immediately following fertilization, females cover their eggs with gravel (Barnhart 1986). Females dig multiple smaller pits within the broader redd where they deposit a portion of eggs into each pocket until all the eggs are expelled (Shapovalov and Taft 1954; Quinn 2018). Adult steelhead are often accompanied by resident male Rainbow Trout during spawning, as they attempt to participate by quickly swimming, or darting, in and out of steelhead redds (Shapovalov and Taft 1954). These fish are sometimes referred to as “egg-eaters,” although it is generally accepted that the main purpose of their presence is to contribute to spawning rather than consume newly laid eggs (Shapovalov and Taft 1954). If adult steelhead cannot emigrate back to the ocean after spawning, they require large, deep pools that provide refuge during the hot summer months (Boughton et al. 2015).

Fecundity, among other biological and environmental factors, contributes substantially to reproductive success. Egg production is positively correlated with fish length, although there is wide variation in female steelhead fecundity at a given size (Shapovalov and Taft 1954; Quinn 2018). Larger females tend to produce larger and greater numbers of eggs; however, energy demands for gonad development create a physiological tradeoff between the number and size of eggs produced (Quinn 2018). Thus, females generally produce either many smaller eggs or fewer larger eggs. Quinn (2018), referencing multiple sources of data, showed that female steelhead of average size produce slightly over 5,000 eggs. Moyle (2002) provides a range of eggs per female from 200 to 12,000 and states that steelhead generally produce about 2,000 eggs per kilogram of body weight. Rainbow Trout less than 30 cm in total length usually have under 1,000 eggs per kilogram of body weight (Moyle 2002).

Multiple factors contribute to egg development and incubation time; however, eggs generally incubate in stream gravels for up to several months. Temperature has the greatest effect on the incubation period; colder water slows development, and warmer water increases the rate of development (Quinn 2018). Incubation can take from 19 days at an average temperature of 60°F (15.6°C) to 80 days at an average temperature of 40°F (4.4°C) (Shapovalov and Taft 1954). Dissolved oxygen (DO) levels in surrounding waters also influence life stage development rates in Southern SH/RT and other salmonids. Higher DO levels lead to more rapid egg development, while eggs exposed to low levels of DO during incubation produce much smaller alevins (yolk-sac fry) than those exposed to high DO (Quinn 2018). Fry emerge from the gravel 2-3 weeks after hatching, once the yolk sac is fully or almost entirely absorbed, at which time they form schools along stream banks (Shapovalov and Taft 1954). During their first year of life, *O. mykiss* juveniles develop small territories and defend them against other individuals in their age class (Shapovalov and Taft 1954; Barnhart 1986). Juvenile *O. mykiss* generally feed on many different species of aquatic and terrestrial insects, sometimes cannibalizing newly emerged fry (Barnhart 1986). Feeding generally peaks during the summer months and is depressed during the winter months; however, *O. mykiss* in California typically have higher growth rates in the winter and spring than summer and fall (Hayes et al. 2008; Sogard et al. 2009; Krug et al. 2012). As they grow, juveniles will move into deeper, faster water and are often found in riffle or swift-run habitats (Shapovalov and Taft 1954; Barnhart 1986). Larger juvenile *O. mykiss* can outcompete and displace their smaller counterparts from ideal habitats, such as deep pools or run complexes, leaving smaller individuals to often inhabit suboptimal habitats, such as riffles (Barnhart 1986).

Parr will ultimately begin transitioning into smolts and migrate downstream to estuaries and lagoons, where they complete the process of smolting. Smolt outmigration to the ocean typically occurs from March–May in southern California but can vary depending on factors such as connectivity between the ocean and estuary or lagoon and streamflow (Booth 2020). Compared to other Pacific salmonids, steelhead have the greatest variability in the timing and duration of freshwater inhabitance, ocean entry, time spent at sea, and return to freshwater (Barnhart 1986). Resident Rainbow Trout early life stages mirror those of anadromous steelhead, up until their life history strategies diverge (Moyle 2002). Rather than migrating out to the ocean like steelhead, resident *O. mykiss* will reside in freshwater for the remainder of their lives.

Little is known regarding steelhead stock-specific utilization of and distribution in the ocean environment. While much is known about the status and abundance of commercially important ocean stocks of Pacific salmon, steelhead-specific research on this topic is lacking and hampered by the inability to differentiate individual stocks using standard sampling methods (Barnhart 1986; Light et al. 1989; Moyle 2002). Unlike Pacific salmon species, steelhead are rarely captured in the ocean; therefore, information specific to Southern SH/RT ocean distribution is not available. Limited tag recoveries by North American fisheries research and management agencies showed no differences in the ocean distribution of steelhead by stock (Light et al. 1989). Attempts to distinguish steelhead population units from one another in terms of ocean distribution are confounded by findings that all steelhead apparently congregate in shared ocean feeding grounds, regardless of their origin or run type (Light et al. 1988).

Pacific steelhead smolts quickly migrate offshore after entry into the ocean (Daly et al. 2014) and, once in the open water, generally move in a northwestern trajectory from spring to summer and follow a southeastern pattern from fall to winter (Okazaki 1983; Light et al. 1989). In the winter, steelhead are found in the eastern North Pacific (Myers et al. 2016) and tend to be closer to shore than during other times of the year (Light et al. 1989). California steelhead do not appear to migrate any farther west than the Gulf of Alaska (Light et al. 1989), and, overall, steelhead migration patterns appear to be strongly tied to “thermal avoidance.” Migratory-based thermal avoidance involves fish movement patterns that remain within a narrow range of tolerable sea surface temperatures, suggesting that steelhead ocean migration may be largely influenced by physiological responses to temperature (Hayes et al. 2016). Ocean steelhead are typically found within seven meters of the sea surface, within the epipelagic zone, although they have been found at more than three times that depth (Light et al. 1989).

Studies addressing steelhead ocean behavior, distribution, and movement are limited; however, as with other salmonids, steelhead tend to exhibit strong homing behavior to their natal streams, with some exceptions. Evidence of straying has been documented in central California steelhead populations (Donohoe et al. 2021), while genetic population structure analyses suggest that historical (natural) exchange of genetic information occurred between coastal populations of steelhead (Garza et al. 2014).

2.5 Genetics and Genomics

2.5.1 Role of Genetics and Genomics in Evaluating Steelhead Population Structure

To date, most genetic studies focused on quantifying the population structure of salmonid species have used neutral genetic markers (e.g., microsatellite DNA). Neutral markers are not directly linked with a particular life history trait, and it is assumed that they are not under direct selection. This class of genetic marker continues to be used to investigate and define salmonid listing units and population structure (e.g., Busby et al. 1996) in both California and across the Pacific Northwest. These types of markers have also been successfully used for decades to delineate populations and ESUs based primarily on reproductively isolated lineages. These markers remain valuable, in that they are the standard for determining the genetic structure and relatedness of species and, thus, their evolutionary histories.

More recently, the advent and rapid development of “adaptive” genetic markers have provided fishery managers and geneticists with a new suite of tools. Adaptive genetic markers provide putative associations with specific life history characteristics, and the “genetic type”, or “variant” infers information about a phenotype of interest. Specific genes, or genomic regions, within individuals or subgroups may vary from the overall pattern exhibited by a species. Of particular relevance to Southern SH/RT is the role that adaptive genetic variation plays in migratory behavior. This relationship is still being evaluated, and uncertainties remain regarding the level of influence genetics may have on migration phenotype. See Section 2.6.5 for more information.

2.5.2 Patterns of O. mykiss Genetic Population Structure

Geography and local environmental factors influence the genetic structure of *O. mykiss* populations, a pattern referred to as "isolation by distance". Evidence of isolation by distance is shown in *O. mykiss* populations throughout their range. Studies based on neutral mitochondrial DNA analysis have demonstrated a pattern of isolation by distance in populations spanning the western coast of the United States, including among coastal California steelhead populations (Hatch 1990; Reisenbichler et al. 1992; McCusker et al. 2000). Nielsen (1999) found a pattern of isolation by distance when looking at the microsatellite loci of southern California and northern

California steelhead populations. Bjorkstedt et al. (2005) suggested that genetic variation in salmonid populations generally increases with greater distances between watersheds. Pearse et al. (2007) analyzed geographic structure within the Klamath-Trinity River basin and consistently found a positive relationship between geographic distance and genetic relatedness—specifically, that genetic divergence between populations increased as a function of geographic distance.

Garza et al. (2004) evaluated population structure across coastal California populations using microsatellite loci to understand the relationship between genetic distance and the geography of coastal steelhead populations. This study's results included a bootstrap consensus tree showing clustering of geographic locations corresponding to five DPS assignments in coastal California steelhead (Figure 2). The long terminal branches in this consensus tree demonstrate that, while migration is important to the populations in this study, the conflicting evolutionary processes of random genetic drift and local adaptation were likely responsible for the genetic differentiation between the populations. The general isolation-by-distance pattern of genetic diversity is also visually apparent.

Aguilar and Garza (2006) found a significant relationship between geographic distance and genetic distance in coastal *O. mykiss* using both major histocompatibility complex genes, which can be helpful in identifying salmonid population structure, and microsatellite loci. This significant relationship represented isolation through distance. Garza et al. (2014) reaffirmed that genetic variation is associated with isolation by distance using microsatellite loci from samples of coastal California steelhead. Across all coastal California steelhead populations sampled, there was evidence that population structure is dependent on geographic distance. Their phylogeographic trees also suggested that population structure was almost entirely consistent with geographic proximity.

Populations within a watershed, even those disconnected by barriers, have been shown through microsatellite DNA analyses to be more genetically similar than those in adjacent watersheds (Clement et al. 2009; Garza et al. 2014). However, anthropogenic impacts including stocking, barrier construction, and habitat destruction have resulted in weaker relationships between geographic proximity and relatedness in modern *O. mykiss* populations (Pearse et al. 2011).

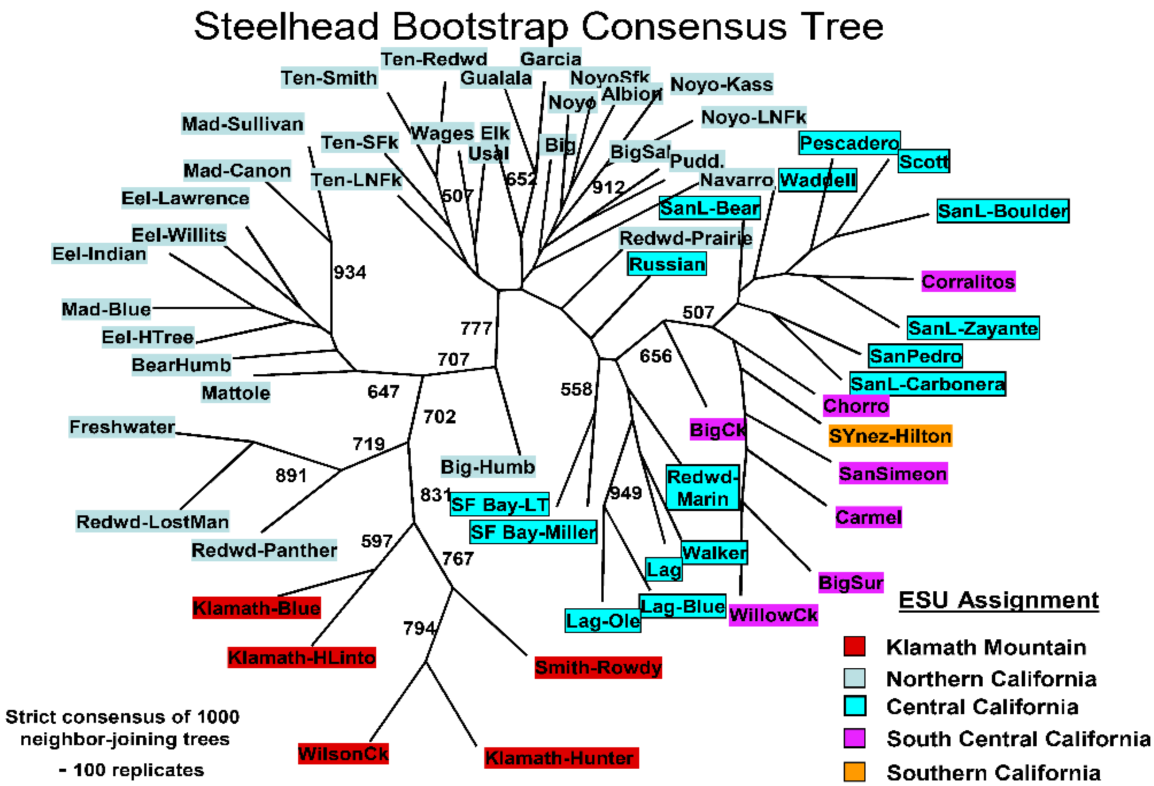


Figure 2. Majority-rule consensus tree, with genetic data bootstrapped 1,000 times, showing chord distances and neighbor-joining trees for 62 coastal California steelhead populations. (from Garza et al. 2004).

2.5.3 Genetics of the Southern California SH/RT

Busby et al. (1996) posited that the extreme environmental conditions found in southern California could result in both substantial local adaptations of and gene flow impediments between *O. mykiss* populations in the region. Nielsen (1999) hypothesized that the substantial interpopulation genetic diversity found in southern California's mostly small and somewhat isolated *O. mykiss* populations could be the result of a transitional ecotone, where two adjacent Pleistocene source populations have met and blended. Allozymes, mitochondrial DNA, and microsatellites have uncovered significant and unique genetic diversity in southern California steelhead, with traits not found in more northern populations. Busby et al. (1996) noted that a mitochondrial DNA type exists in steelhead populations between the Santa Ynez River and Malibu Creek that is rare in populations to the north, and samples from Santa Barbara County were found to be the most genetically unique of any wild coastal steelhead populations analyzed. In general, *O. mykiss* at the extreme southern end of their range have low genetic diversity (Clemento et al. 2009; Pearse et al. 2009; Jacobson et al. 2014; Abadía-Cardoso et al. 2016; Apgar et al. 2017). Loss of genetic diversity is often a consequence of declines in population size (Allendorf et al. 1997), which have been observed in Southern SH/RT populations.

2.5.4 South-Central and Southern California Genetic Relationships

Clemento et al. (2009) conducted a genetic analysis of steelhead populations in California south of Monterey Bay using microsatellite data to elucidate patterns of genetic differentiation and gene flow. In terms of coastwide population structure, the authors found that southern California steelhead populations were grouped with all other steelhead populations south of San Francisco Bay and were well-distanced from populations north of San Francisco Bay. Population genetic structure does not correspond with geographic management boundaries because genetically based population clusters are not separated by current federal-ESA-listed DPS boundaries. Overlap in clustering was detected between populations from nearby watersheds, and genetic differentiation between populations in the South-Central California Coast steelhead DPS and the southern California steelhead DPS could not be detected. Additionally, the construction of phylogeographic trees did not result in the separation of populations from the two DPSs into distinct genetic lineages based on their current ancestry (Figure 3). In populations south of San Francisco Bay, no apparent isolation by distance pattern corresponding with DPS boundaries was detected. This may be a result of metapopulation dynamics occurring between these *O. mykiss* populations. Although a lack of genetic differentiation was observed across these southern DPSs, the Department recognizes other factors that define Southern SH/RT, such as unique regional biogeography, ecology, physiology, and behavior of the population groups (Boughton et al. 2007).

2.5.5 Role of Genetics in Life History Expression

Many *O. mykiss* populations are considered “partially migratory,” meaning they contain both migratory (e.g., anadromous) and non-migratory (e.g., resident) individuals (Chapman et al. 2011). It is widely accepted that migratory behavior and migration-associated traits are heritable in partially migratory populations (Pearse et al. 2014; Hecht et al. 2015; Phillis et al. 2016). In recent years, studies have revealed that important migration-related characteristics in *O. mykiss*, such as maturation, growth, development, and smolting, are linked to specific genomic regions that are under natural selection (Nichols et al. 2008; Martínez et al. 2011; Hecht et al. 2012; Miller et al. 2012; Pearse et al. 2014). Phenotypic expression of anadromy vs. residency has since been found to be strongly associated with a large genomic region on *O. mykiss* chromosome 5 (*Omy5*) (Martínez et al. 2011; Hecht et al. 2012; Pearse et al. 2014; Leitwein et al. 2016; Kelson et al. 2019). This *Omy5* migration-associated region exhibits unique alleles, associated with either anadromy or residency as their phenotypic expression, and these

Omy5 genetic variants are thought to be the result of a chromosomal inversion (Pearse et al. 2014; Leitwein et al. 2016).

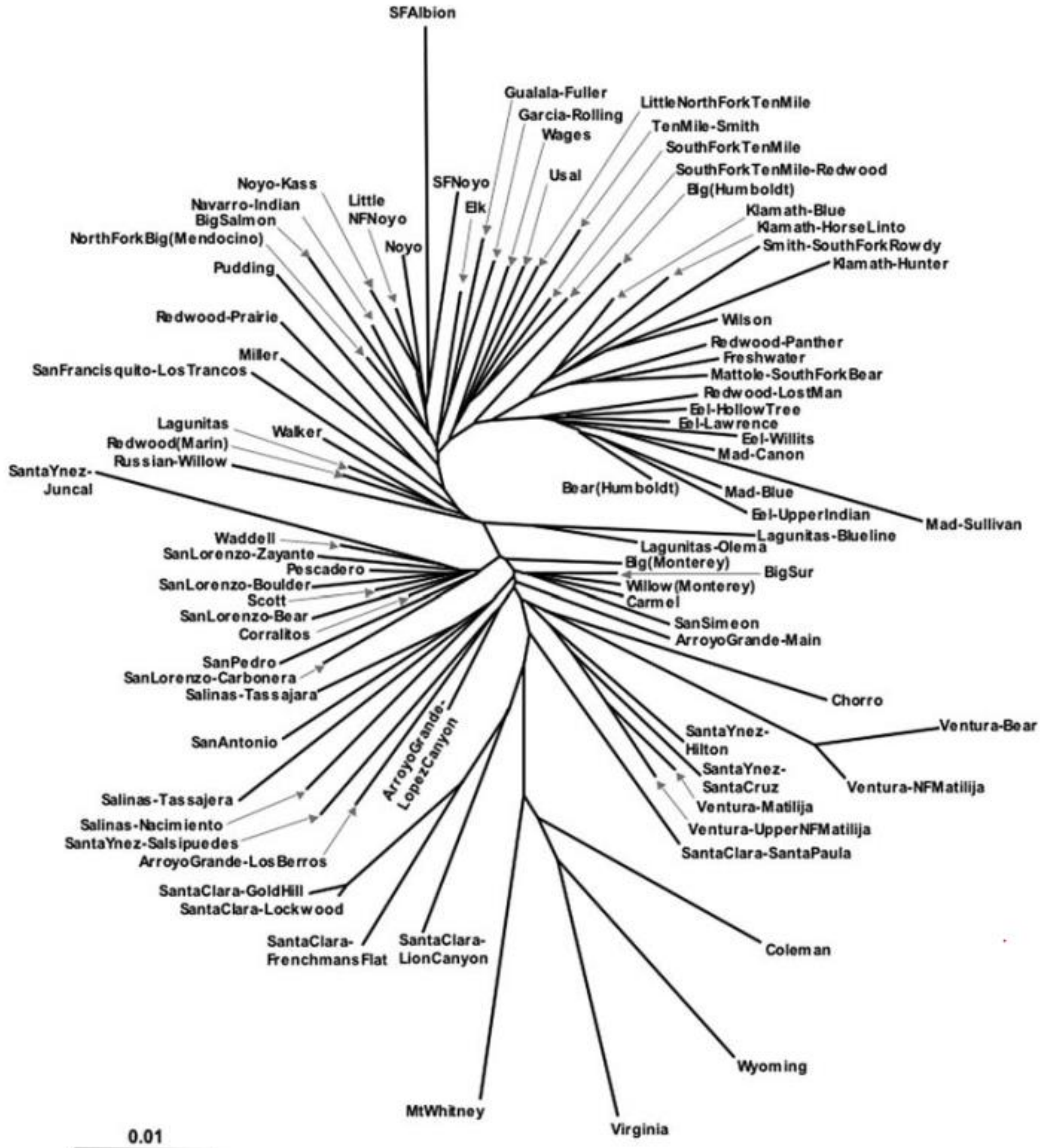


Figure 3. Unrooted neighbor-joining chord distance tree of 84 coastal O. mykiss populations in California (from Clemento et al. 2009).

Chromosome *Omy5* is associated with multiple life history characteristics related to migration vs. residency in *O. mykiss*, explaining morphological and developmental variation between the two life history forms (Nichols et al. 2008; Martínez et al. 2011; Hecht et al. 2012; Rundio et al. 2012). Nichols et al. (2008) used quantitative trait loci analysis to locate specific loci associated with smolting and found several genomic regions that were linked with morphological and physiological smolting indicators. The study was the first of its kind in terms of finding connections between specific genomic loci and the migration characteristics of a species of fish. In addition, Martínez et al. (2011) found multiple microsatellite markers on *Omy5* that were correlated with differential selection between anadromous and resident *O. mykiss*, while Hecht et al. (2012) identified associations between *Omy5*, body morphology, and skin reflectance, which are linked to the smolting process and the anadromous phenotype. Pearse et al. (2014) found that specific *Omy5* loci diverged between above-barrier and below-barrier *O. mykiss* populations that had differing frequencies of the anadromous phenotype.

Populations with a higher population-wide frequency of the anadromous variant of *Omy5* typically have higher proportions of anadromous or migratory individuals compared to populations that have a higher frequency of the resident variant (Pearse et al. 2014; Leitwein et al. 2016). This suggests that utilizing comparative anadromous *Omy5* variant frequency data between steelhead populations may indicate which populations have a higher likelihood of producing anadromous offspring, as well as having utility in identifying above-barrier populations with the genetic potential to support or bolster downstream anadromous populations. Results from Kelson et al. (2020) suggest that the *Omy5* genomic region also regulates physiological traits, such as juvenile growth, which will subsequently influence residency vs. anadromy (Figure 4).

Sex determination has also been genetically linked to the migratory phenotype of *O. mykiss* (Rundio et al. 2012). Migratory ecotype composition within a population is typically female-dominated, a phenomenon that has been observed in multiple salmonid species (Jonsson et al. 1998; Páez et al. 2011; Ohms et al. 2014; Kelson et al. 2019) and may be due to a strong correlation between fecundity and body size (Hendry et al. 2004; Quinn 2018). Female steelhead that migrate to the ocean can grow larger in the highly productive marine environment than their counterparts in the less productive freshwater environment and, as a result, produce greater numbers of embryos. Their genetic traits, which control the anadromous ecotype, are therefore predominant in most populations.

Alternate life history ecotypes within a given watershed are typically more closely related to each other than to their life history stage equivalents in other watersheds (Nielsen and Fountain 1999; Docker and Heath 2003; Narum et al. 2004; Olsen et al. 2006; McPhee et al. 2007; Leitwein et al. 2016). These close genetic relationships indicate some degree of gene flow between sympatric life history forms of *O. mykiss* (Olsen et al. 2006; McPhee et al. 2007; Heath et al. 2008), although the level of gene flow is dependent on environmental, physiological, and genetic factors, such as watershed size and degree of reproductive isolation between life history forms (Heath et al. 2008). Regardless, the close genetic relationships between sympatric populations of steelhead and Rainbow Trout suggest that managing individual fish with different life histories separately is biologically unjustified, and the two life history variants should be considered a single population when found coexisting in streams (McPhee et al. 2007). Additionally, freshwater resident populations can retain alleles associated with anadromy (Nielsen and Fountain 1999; Phillis et al. 2016; Apgar et al. 2017) and can contribute to the viability of anadromous *O. mykiss* populations.

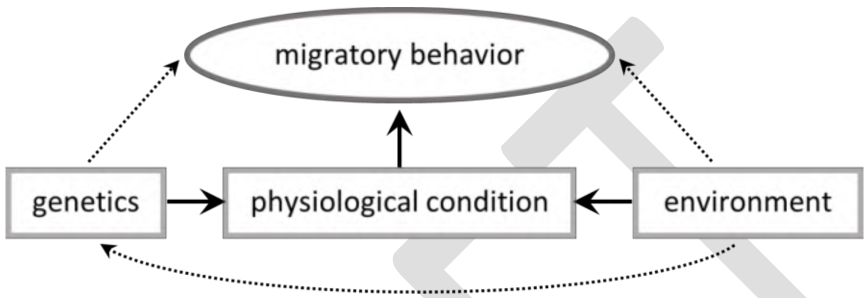


Figure 4. Schematic of indirect genetic control of migratory behavior. Genetic variation and the environment influence physiology, which then impacts migratory behavior (adapted from Kelson et al. 2020).

2.5.6 Above-Barrier vs. Below-Barrier Genetic Relationships

Studies have shown that populations of *O. mykiss,* above and below barriers within the same drainage, are closely related to one another (Heath et al. 2008; Clemento et al. 2009; Pearse et al. 2009; Leitwein et al. 2016; Fraik et al. 2021). Clemento et al. (2009) used microsatellite data to evaluate steelhead population structure above and below barriers in southern California streams and determined that populations separated by barriers are typically a single, monophyletic clade more closely related to each other than to populations in adjacent watersheds, consistent with many previous barrier studies. This relationship had strong bootstrap support, especially for natural-origin steelhead populations. For example, populations from the Santa Clara River formed a monophyletic lineage on the unrooted neighbor-joining tree constructed from samples taken in five main southern California watersheds (Figure 5).

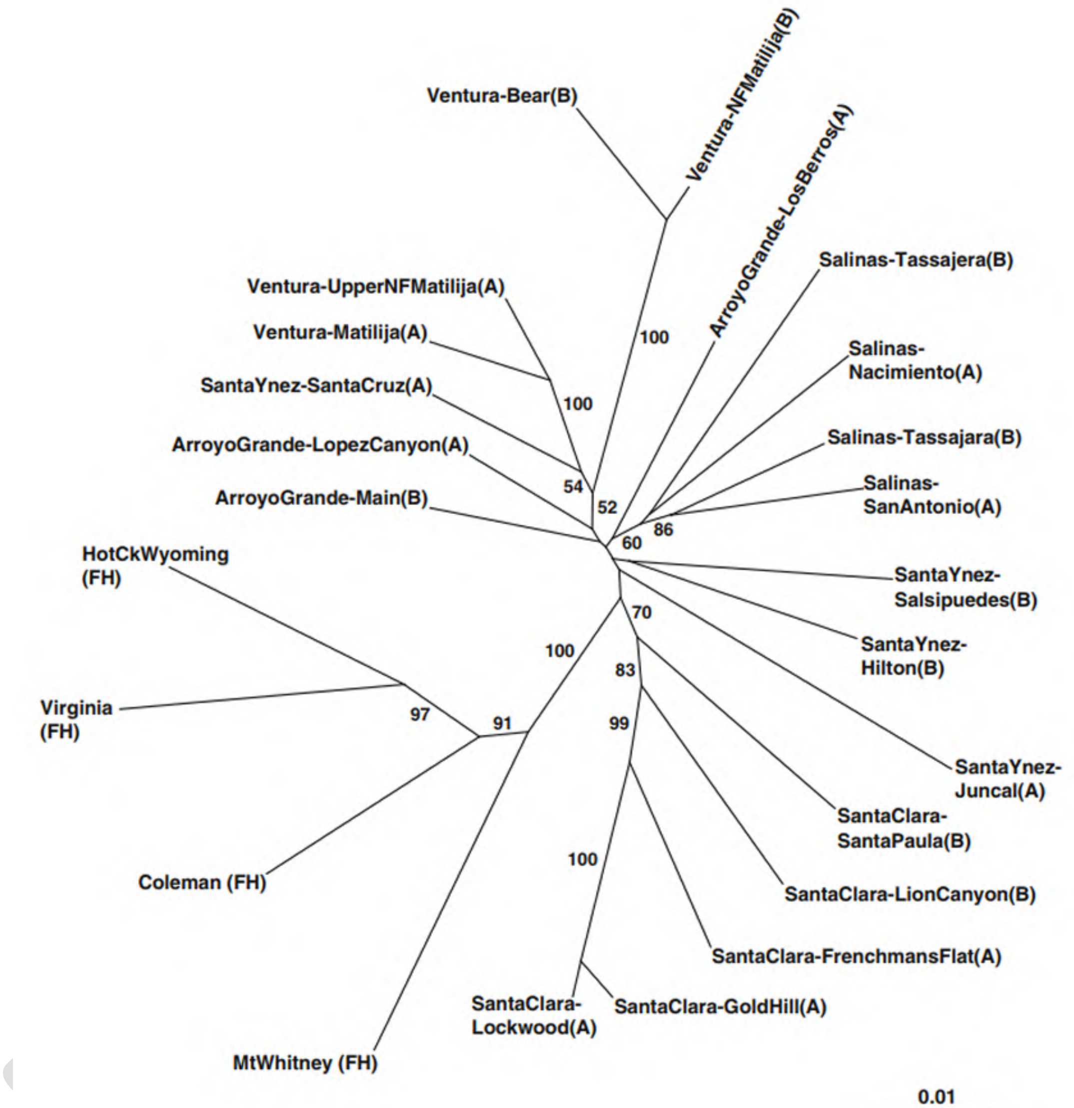


Figure 5. Unrooted neighbor-joining dendogram showing chord distances between 24 sampled naturally spawning populations both above and below barriers, denoted with A and B, respectively. Strains of Rainbow Trout from Fillmore Hatchery used for regional stocking are indicated with FH. Numbers associated with branches indicate percentage >50% of the 10,000 bootstrap replications in which the branch appeared (from Clemento et al. 2009).

Fraik et al. (2021) recently studied patterns of genetic diversity both before and after dam removal on the Elwha River (in Washington state) and determined that populations separated by natural barriers had greater genetic differentiation than those separated by long-standing dams. Following the removal of major artificial dams on the Elwha, they also detected admixture of above- and below-dam lineages and recolonization of upstream areas by steelhead.

While many fish populations separated by barriers within the same watershed have been shown to be closely related (Heath et al. 2008; Clemento et al. 2009; Pearse et al. 2009; Leitwein et al. 2016), major barriers to anadromy, both natural and artificial, have been found to prevent gene flow between populations upstream and downstream of the obstruction (Pearse et al. 2009; Abadía-Cardoso et al. 2019; Fraik et al. 2021). Multiple studies have demonstrated that there is often a discrepancy between life history expression (Nielsen 1999; Pearse et al. 2009) and associated adaptive genetic variation (Leitwein et al. 2016; Phillis et al. 2016; Apgar et al. 2017; Abadía-Cardoso et al. 2019) across major fish passage barriers. In a number of California watersheds, *O. mykiss* populations above major barriers, especially permanent artificial barriers, have shown decreased anadromous allelic frequency when compared with the population below (Leitwein et al. 2016; Phillis et al. 2016; Abadía-Cardoso et al. 2019). Likewise, in San Francisco Bay Area study streams, most above-dam *O. mykiss* populations, have significantly lower frequencies of the anadromous *Omy5* genotype than populations downstream of barriers (Leitwein et al. 2016). Abadía-Cardoso et al. (2019) also found decreased frequencies of anadromous alleles above barrier dams in the American River drainage.

Reduced migratory allelic frequency in fish populations above longstanding natural barriers is the expected condition since the population is fragmented and gene flow is unidirectional. Fish can almost always move, either passively or volitionally, over barriers and downstream, potentially contributing genes to the downstream population. Those that inhabit waters upstream of permanent barriers either assume a resident life history or must migrate downstream, taking migratory alleles with them and further reducing their frequency in the upstream population (Leitwein et al. 2016). It is also important to note that some above-barrier fish populations exhibit less genetic diversity (lower heterozygosity) than their below-barrier counterparts within the same drainage (Martínez et al. 2011). In some cases, however, fish carrying anadromous alleles may not be able to move downstream over barriers, especially large artificial dams and other complete barriers, which may help maintain anadromous *Omy5* variants in some above-dam populations (Leitwein et al. 2016). It also appears that some large, above-barrier reservoirs can act as “surrogate oceans” and may assist in the retention of anadromous genotypes and the expression of the adfluvial life history type (Leitwein et al. 2016).

Apgar et al. (2017) recently investigated the effects of climate, geomorphology, and fish passage barriers on the frequency of migration-associated alleles in *O. mykiss* populations across four California steelhead federal-ESA-listed DPSs (Southern California, South-Central California Coast, Central California Coast, and Northern California). Long-term natural barriers and artificial dams that provide no fish passage had the most pronounced negative impact on migration-associated allele frequency. Southern California DPS populations had the lowest frequency of *Omy5* haplotypes associated with anadromy of all California DPSs sampled. The Southern California DPS also exists in a number of heavily developed watersheds, with the greatest average number of partial and complete artificial barriers of the DPSs sampled. Removal of these barriers was predicted to substantially increase the frequency of anadromous alleles in southern California watersheds (Apgar et al. 2017).

2.5.7 Genetic Impacts of Historical Stocking

Clemento et al. (2009) conducted a genetic analysis using microsatellite loci to elucidate the genetic population structure of *O. mykiss* in southern California, with an emphasis on above- and below-barrier genetic relationships. Their analysis included an evaluation of genetic influences of long-standing Fillmore Hatchery stocking on naturally spawned populations in the region. In regional population structure analysis, Fillmore Hatchery Rainbow Trout strains clustered separately from all other wild populations, both above and below barriers. This dispersal pattern indicates that there was no evidence of hatchery introgression with wild *O. mykiss* within the Southern SH/RT range (Clemento et al. 2009).

More recently, Jacobson et al. (2014) analyzed microsatellite loci and SNP genotypes to determine the ancestry of *O. mykiss* populations in multiple southern California watersheds, expanding the geographic range assessed by Clemento et al. (2009). To the contrary, Jacobson et al. found that southern California steelhead ancestry was of mixed origin, with both hatchery and native coastal steelhead lineages, and most populations had almost complete introgression of hatchery lineages from the Central Valley. Only select populations in the San Luis Rey River, Coldwater Canyon Creek, the Santa Ana River watershed, and the San Gabriel River were found to have significant native coastal steelhead ancestry. Based upon these findings, the authors recommended that conservation planning focus on these populations for the preservation of native coastal lineages. Additionally, although Bear Creek (Santa Ana River) and Devil's Canyon Creek (West Fork San Gabriel River) show signs of strong hatchery introgression, they still have some native ancestry and are self-sustaining populations that could be important sources for restoration and recovery efforts of native southern California *O. mykiss*. The authors noted that introgressive hybridization with hatchery Rainbow Trout in these instances does not necessarily decrease viability and can, sometimes, even enhance adaptive genetic variation in a population exposed to changes in their surrounding environment (the phenomenon known as hybrid vigor). The addition of new alleles to a steelhead population via hatchery genetic lineages can also prevent potential genetic bottlenecks in small populations (Jacobson et al. 2014). However, the trade-off is eventual erosion of the native, ancestral lineage, so it is an option that must be weighed carefully. It is worth noting, however, that most samples collected for this study were from populations above anadromous barriers, which mostly precludes any analysis of Southern SH/RT genetic lineage pertinent to the proposed CESA listing unit, which includes only below barrier *O. mykiss*. It is equally important to note that, while potentially beneficial in some cases, the introduction of genetic variants presented in domesticated hatchery Rainbow Trout may reduce long term viability in wild populations because those genetic variants may be the product of several generations of domestication selection. In the case of southern California *O. mykiss*, the native lineage is much different than the predominant founding lineages of California's domesticated Rainbow Trout strains (e.g., Clemento et al. 2009).

Abadía-Cardoso et al. (2016) used microsatellite and SNP loci to elucidate *O. mykiss* ancestry at the extreme southern extent of its range. Southern California *O. mykiss* populations had lower genetic diversity than more northern populations and, genetically, most resembled hatchery Rainbow Trout. The most northern populations of the Southern SH/RT exist in the Santa Maria, Santa Ynez, and Santa Clara rivers, all of which exhibit genetics associated with the native coastal steelhead lineage, matching the results of Clemento et al. (2009) and Nielsen et al. (1997). Many southern populations have been almost entirely replaced by hatchery produced Rainbow Trout. The southern populations containing significant native coastal Steelhead ancestry were some populations in the San Gabriel River system, Coldwater Canyon Creek in the Santa Ana River, and the West Fork San Luis Rey River. These populations also had shared ancestry with the native coastal *O. m. nelsoni* from Baja California. Secondarily, they identified Bear Creek and Devil's Canyon Creek as high value populations with remnant, detectable levels of native ancestry. Also, in contrast to northern coastal steelhead populations, southern California *O. mykiss* showed low allelic frequency correlated with anadromy at *Omy5* loci, again consistent with extensive introgressive hybridization with hatchery Rainbow Trout and limited opportunities to express the anadromous life history. Low genetic variation, observed in populations with predominantly native ancestry, may not allow them to endure changes in environmental conditions, particularly rapid and dramatic changes like those being driven by escalating climate change impacts to the region. Abadía -Cardosa et al (2016) further recommended a managed translocation strategy between the few remaining southern populations with native ancestry to help slow the erosion of native genetic diversity. They found a high variability in the frequency of alleles associated with anadromy, suggesting that many populations of southern RT/SH maintain the capability to express the anadromous phenotype.

Nuetzel et al (2019) examined population genetic structure of *O. mykiss* populations in the Santa Monica Mountains BPG using a set of SNP markers. Specifically, they conducted genetic analyses of *O. mykiss* from Topanga, Malibu and Arroyo Sequit creeks and compared SNP data to the existing data from the Abadía -Cardosa et al (2016) study, including Omy5 genetic marker data. Their results indicate that Malibu Creek trout are almost entirely of native ancestry. The analysis of Topanga Creek trout was more complex, suggesting that Topanga Creek is a predominantly unique native population with some introgressive hybridization with hatchery

Rainbow Trout. The authors did not have a sufficient sample size from Arroyo Sequit Creek to draw meaningful inferences about the ancestry of that population. Both Malibu and Topanga creeks were also found to have relatively high frequencies of the anadromous Omy5 alleles. Together, both of these populations can be a valuable genetic resource for recovery of southern California native coastal *O. mykiss*.

3. ASSESSMENT OF PROPOSED CESA LISTING UNIT

The Commission has authority to list species or subspecies as endangered or threatened under CESA (Fish and G. Code, §§ 2062, 2067). The Legislature left to the Department and the Commission, which are responsible for providing the best scientific information and for making listing decisions, respectively, the interpretation of what constitutes a “species or subspecies” under CESA (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535, 1548-49). The Department has recognized that similar populations of a species can be grouped for efficient protection of bio- and genetic diversity (*Id.* at 1546-47). Further, genetic structure and biodiversity in California populations are important because they foster enhanced long-term stability (*Id*. at p. 1547). Diversity spreads risk and supports redundancy in the case of catastrophes, provides a range of raw materials that allow adaptation and persistence in the face of long-term environmental change, and leads to greater abundance (*Ibid*.).

Courts should give a “great deal of deference” to Commission listing determinations supported by Department scientific expertise (Central Coast Forest Assn. v. Fish & Game Com. (2018) 18 Cal.App.5th 1191, 1198-99). Courts have held that the term “species or subspecies” includes ESUs (*Id*. at 1236, citing *Cal. Forestry Assn.*, supra, 156 Cal.App.4th at pp. 1542 and 1549). The Commission’s authority to list necessarily includes discretion to determine what constitutes a species or subspecies (*Id.* at p. 1237). The Commission’s determination of which populations to list under CESA goes beyond genetics to questions of policy (*Ibid.*). The Department and Commission’s determinations of what constitutes a species or subspecies under CESA are not subject to the federal ESA, regulations based on the federal ESA, or federal ESA policies adopted by NMFS or USFWS, but those sources may be informative and useful to the Department and Commission in determining what constitutes a species or subspecies under CESA.

The ESU designation has been used for previous Pacific salmon listings under CESA, including the Sacramento River Winter-run Chinook Salmon ESU (Endangered, 1989), the Central Valley Spring-run Chinook Salmon ESU (Threatened, 1999), Southern Oregon-Northern California Coast Coho Salmon ESU (Threatened, 2005), and the Central California Coast Coho Salmon ESU (Endangered, 2005). In 2022, the Commission listed northern California summer steelhead as endangered under CESA. In support of that listing, the Commission determined that the petitioned listing unit qualified as a subspecies under CESA “based on the discreteness (when compared to other ecotypes) and significance of that listing unit within the state of California” (Cal. Fish and G. Com. 2022).

3.1 DPS and ESU Criteria

The federal ESA defines “species” to include “any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature” (16 U.S.C. § 1532). In 1991, NMFS adopted its policy on how it would apply the definition of “species” to Pacific salmon stocks for listing under the ESA. Under the NMFS ESU Policy, a salmon stock is considered a DPS if it constitutes an ESU of the biological species. To be considered an ESU, the salmon stock must meet two criteria (NMFS 1991):

1. “It must be substantially reproductively isolated from other conspecific population units; and
2. It must represent an important component in the evolutionary legacy of the species.”

Generally, reproductive isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units (NMFS 1991). The evolutionary legacy of a species refers to whether the population contributes substantially to the ecological and genetic diversity of the species as a whole (NMFS 1991).

In February 1996, USFWS and NMFS published a joint DPS policy for the purposes of ESA listings. Three elements are evaluated in a decision regarding the determination of a possible DPS as endangered or threatened under the ESA. These criteria are (NMFS 1996a):

1. “Discreteness of the population segment in relation to the remainder of the species to which it belongs;
2. The significance of the population segment to the species to which it belongs; and
3. The population segment’s conservation status in relation to the [federal ESA’s] standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened [under the federal ESA’s standards]).”

A population segment is discrete if it meets either of two conditions specified in the DPS Policy (NMFS 1996a):

1. “It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of Section 4(a)(1)(D) of the [ESA]."

If a population segment is determined to be discrete based on physical, physiological, ecological, or behavioral factors, its significance and status are then evaluated based on several characteristics specified in the joint DPS Policy. These include, but are not limited to (NMFS 1996a):

1. "Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.
2. Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.
3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.
4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics."

Under the DPS Policy, if a population segment is found to be both discrete and significant, its status is then evaluated for listing based on listing factors established by the federal ESA.

3.2 Southern SH/RT Evaluation under the Joint DPS Policy

The proposed listing unit (Southern SH/RT) in the Petition is "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories, from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border." Southern SH/RT is a subtaxon of the species *O. mykiss*. The anadromous life history of Southern SH/RT is not markedly separate from the non-anadromous life history of Southern SH/RT. To determine whether Southern SH/RT is a subspecies for the purposes of CESA listing, the Department used the joint DPS Policy to determine whether Southern SH/RT is a DPS. The Department evaluated the proposed listing unit by applying the first (discreteness) and second (significance) criteria of the joint DPS Policy but not the third criterion (the population segment's conservation status in relation to the federal ESA's standards). The Department did not apply the third criterion because after using the discreteness and significance criteria to determine whether Southern SH/RT is a DPS and hence a subspecies for purposes of CESA, the Department will assess the listing unit's status in relation to CESA's standards rather than the federal ESA's standards.

In 2006 NMFS concluded that application of the joint DPS Policy to West Coast *O. mykiss*, including the Southern California Steelhead DPS, was logical, reasonable, and appropriate (NMFS 2006). Further, NMFS concluded that use of the ESU Policy, which was originally intended for Pacific salmon, should not continue to be applied to *O. mykiss*, a type of salmonid with characteristics not typically exhibited by Pacific salmon (NMFS 2006). The Department finds that the application of the discreteness and significance DPS criteria from the DPS Policy is appropriate, logical, and reasonable for identifying whether Southern SH/RT is a subspecies for purposes of CESA because the taxon exhibits characteristics that are not typically exhibited by other Pacific salmonids, for which the ESU policy was developed.

3.2.1 Discreteness

Markedly Separate: Yes. The Department considers Southern SH/RT to be markedly separate from other populations of the taxon along the West Coast of North America. Point Conception in southern California is a well-studied biogeographic boundary that separates different physical oceanographic processes and the abundance and distribution of many marine species (Horn and Allen 1978; Horn et al. 2006; Miller 2023). The coastal areas north of Point Conception have cooler water temperatures, stronger upwelling, high nutrient concentrations, and the coastline is generally rocky. Within the southern California Bight, water temperatures are warmer, upwelling is weaker, and the coastline is typically sandy. While intraspecific genetic breaks do not always coincide with biogeographic boundaries near Point Conception (Burton 1998), the Department maintains that the DPS standards for discreteness do not require absolute separation of a DPS from other members of this species, because this can rarely be demonstrated in nature for any population of organisms (NMFS 1996a).

The life history of Southern SH/RT relies more heavily on seasonal precipitation than populations of the same taxon occurring farther north (Busby et al. 1996). Because average precipitation is substantially lower and more variable and erratic in southern California than regions to the north, Southern SH/RT are more frequently exposed to adverse environmental conditions in marginal habitats (i.e., warmer water temperatures, droughts, floods, wildfire) (Busby et al. 1996). Morphologically, anadromous forms of Southern SH/RT are typically longer in length and more streamlined in shape than more northern populations to enable passage through southern California’s erratic and low streamflow watersheds (Moyle et al. 2017).

International Border: No.

3.2.2 Significance

Unique Ecological Setting: Yes. The range of Southern SH/RT represents the southernmost region of the taxon’s entire West Coast Range of North America. Within this range, the watersheds that occur south of the Santa Monica Mountains have a semi-arid climate that is characterized by low precipitation, high evaporation rates, and hot and dry summers (CDFW 2021d). This climate type represents a unique ecological setting for Southern SH/RT relative to most *O. mykiss* populations along the West Coast of North America that occur in Mediterranean climates characterized by summer fog.

The ecological setting for Southern SH/RT is characterized by significant urbanization which is unique among other federally listed steelhead DPSs that occur in coastal regions of California that are not as highly developed or populated. For example, approximately 22 million people reside in the southern California counties of Santa Barbara, Ventura, Los Angeles, Orange, San Bernadino, Imperial, and San Diego, whereas the population in the South-Central coast counties of Santa Cruz, Santa Clara, Monterey, San Benito, and San Luis Obispo is approximately 2.8 million people (NMFS 2012a; NMFS 2013). Furthermore, almost all Southern SH/RT-bearing watersheds contain dams and water diversions that have blocked access to most historic spawning and rearing habitats. Of the four DPSs sampled by Apgar et al. (2017), the Southern California Steelhead DPS contained the highest average number of partial anthropogenic barriers per watershed (n = 4.7) and the highest total number of complete anthropogenic barriers (n = 8). For context, the neighboring, and more northern South-Central Coast DPS contains a significantly lower average number of partial anthropogenic barriers per watershed (n = 1.6) and complete anthropogenic barriers (n = 1). Moreover, nearly all estuary and lagoon ecosystems in southern California have been severely degraded, thereby limiting the ability of juvenile Southern SH/RT to utilize these critical nursery habitats (Moyle et al. 2017). While these anthropogenic threats are not necessarily unique to the southern California coastal area, the region's highly variable and erratic hydrologic cycle and relatively arid climate, combined with the impacts of climate change, make Southern SH/RT increasingly vulnerable to extinction and less resilient to disturbance events and catastrophic events such as major wildfires and floods.

Gap in Range: Yes. The Department believes that the loss of Southern SH/RT would result in a significant truncation of the southern range of the taxon along the West Coast of North America. The range of Southern SH/RT encompasses approximately 12,700 square miles with 25,700 miles of streams (NMFS 2012a).

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. Individuals from populations of Southern SH/RT have been shown to not be genetically isolated from populations of *O. mykiss* in the south-central California coast (Clemento et al. 2009). Evidence of straying has been documented in steelhead in central California (Donohue et al. 2021), and genetic population structure analyses suggest that there was historical exchange of genetic information between coastal populations (Garza et al. 2014). Although many steelhead populations can be partially isolated, at least a small amount of exchange between different populations of steelhead is to be expected due to natural straying. This connectivity results in a level of genetic similarity, which is more pronounced between neighboring populations, and prevents most populations from being completely isolated (Bjorkstedt et al. 2005; Garza et al. 2014; Arciniega et al. 2016).

Nonetheless, allozymes, mitochondrial DNA, and microsatellites have uncovered significant and unique genetic diversity in southern California steelhead, including traits not found in more northern populations. Busby et al. (1996) noted that a mitochondrial DNA type exists in *O. mykiss* populations between the Santa Ynez River and Malibu Creek that is rare in populations to the north, while samples from Santa Barbara County were found to be the most genetically unique of any wild coastal steelhead populations analyzed. Conservation of both neutral and adaptive genetic diversity, such genetic variation associated with migratory life history, is crucial in maintaining the ability of *O. mykiss* populations to adapt to altered environments. Given that Southern SH/RT populations have the lowest frequencies of anadromous genotypes, it is critical to preserve this genetic variation and ensure no more of it is lost.

3.2.3 Conclusion

Southern SH/RT satisfies the first (discreteness) and second (significance) criteria of the joint DPS Policy: i.e., Southern SH/RT is markedly separate and biologically significant to the taxon to which it belongs. Accordingly, the Department concludes that Southern SH/RT is a DPS and hence a subspecies for the purposes of CESA listing.

4. POPULATION TRENDS AND ABUNDANCE

4.1 Structure and Function of Viable Salmonid Populations

In this review, we use the definition of “population” from McElhany et al. (2000): “An independent population is a group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place, or in the same place at a different season.” In other words, a population as defined by McElhany et al. (2000) is a group of fish that experiences a substantial degree of reproductive isolation.

Steelhead have strong fidelity to their natal stream, which can lead to substantial reproductive isolation and, as a result, create local adaptation within somewhat isolated populations (Waples et al. 2008). Isolation can expose these local populations to varying degrees of genetic drift as well as different environmental pressures that ultimately lead to the development of genetic and phenotypic differences. Although many steelhead populations can be partially isolated, at least a small amount of exchange between different populations of steelhead is to be expected due to natural straying. This connectivity results in a level of genetic similarity, which is more pronounced between neighboring populations, and prevents most populations from being completely isolated (Bjorkstedt et al. 2005; Garza et al. 2014; Arciniega et al. 2016).

The concept of viable salmonid populations was introduced by McElhany et al. (2000). A viable salmonid population is defined as, “an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame,” and an independent population is defined as, “any collection of one or more local breeding groups whose population dynamics or extinction risk over a 100-year time period are not substantially altered by exchanges of individuals with other populations.”

McElhany et al. (2000) introduced four criteria for assessing viability of salmonid populations: abundance, productivity, population spatial structure, and diversity. These parameters form the foundation for evaluating population viability because they serve as reasonable predictors of extinction risk, reflect general processes important to all populations of species, and are measurable. Abundance is a key parameter because smaller populations are at greater risk of extinction than larger populations. Productivity, which is associated with abundance, serves as an indicator of population growth rate either over an entire life cycle or stage-specific life-history stage. Population spatial structure represents the distribution of individuals in habitats they use throughout their life cycle, as well as the processes that generate that distribution. Spatial structure often reflects the amount of suitable habitat available for a population as well as demographic stability and the level of straying among habitats. Diversity represents variation in traits such as anadromy, run-timing, and spawning behavior and timing. Typically, a more diverse population is more likely to contain individuals that will survive and reproduce in the face of environmental variation (McElhany et al. 2000). In this chapter, we evaluate, to the best of our ability, these four criteria for Southern SH/RT populations.

4.2 Sources of Information

We reviewed many sources of information for this Status Review, including primary research and literature review articles, the CESA listing petition, previous federal status reviews, recovery plans, viability assessments, Department reports and documents, annual reports from ongoing Southern SH/RT monitoring efforts, and historical reports. Agency staff with knowledge of watersheds supporting Southern SH/RT were also consulted for information.

Data limitations and uncertainties associated with historical accounts for Southern SH/RT limits our ability to understand their complete historical abundance and distribution in their range.

The majority of available historical data are in reports, technical memos, and other documents that have not undergone a formal peer-review process. These types of historical sources are not necessarily at a high level of scientific rigor and have not been subject to peer review, but they represent the best information available at the time of this review regarding the historical distribution and abundance of Southern SH/RT populations.

Multiple data sources were used to evaluate viability metrics of Southern SH/RT populations. These data are mostly derived from monitoring reports from several single-basin annual survey efforts. For example, data for the Santa Ynez River population was sourced from monitoring reports developed by the Cachuma Operations and Maintenance Board (COMB). Data for the Ventura River was sourced from annual monitoring reports produced by Casitas Municipal Water District (CMWD), and data contained in Booth (2016) for the United Water Conservation District (UWCD) was used for the Santa Clara River population (See Appendices A – D for full data sources). Although data from these monitoring reports represent the best available scientific information in many southern California watersheds, the data may be derived from different monitoring approaches and designs, contain detection bias, and vary in the level of monitoring effort through time and geographic areas. These constraints may limit the power of statistical analyses to assess trends in viability criteria. Therefore, the results of the analyses conducted in subsequent portions of this chapter should be interpreted in the context of these limitations.

Dagit et al. (2020) describes the occurrences of adult steelhead from 1994-2018 and was also used as a source of peer-reviewed information to provide insight into the abundance trends of Southern SH/RT, particularly for the basins south of Los Angeles where historically no monitoring of steelhead occurred. Additional information on the data sources used in this chapter can be found in Appendices A - D. and Dagit et al. (2020).

4.3 Historical and Current Distribution

This section discusses the historical and current distribution of Southern SH/RT within their range. The section is structured on the five BPGs, which are a federal delineation based on a suite of environmental conditions (e.g., hydrology, local climate, geography) and watershed characteristics (i.e., large inland or short coastal streams) (NMFS 2012a). Separate watersheds within each BPG are considered to support individual populations of southern SH and RT; therefore, single BPGs encompass multiple watersheds and populations (Figure 6). Additional information on southern SH/RT distribution in watersheds not included in this section can be found in Good et al. (2005), Becker and Reining (2008) and Titus et al. (2010). In general, estimates of historical population abundance are based on sparse data and assumptions that are plausible but have yet to be adequately verified or tested. While the following historical estimates are likely biased either upward or downward, the examination of historical records of adult run size in southern California show consistent patterns of abundance that are at least two or three orders of magnitude greater in size than in recent years.

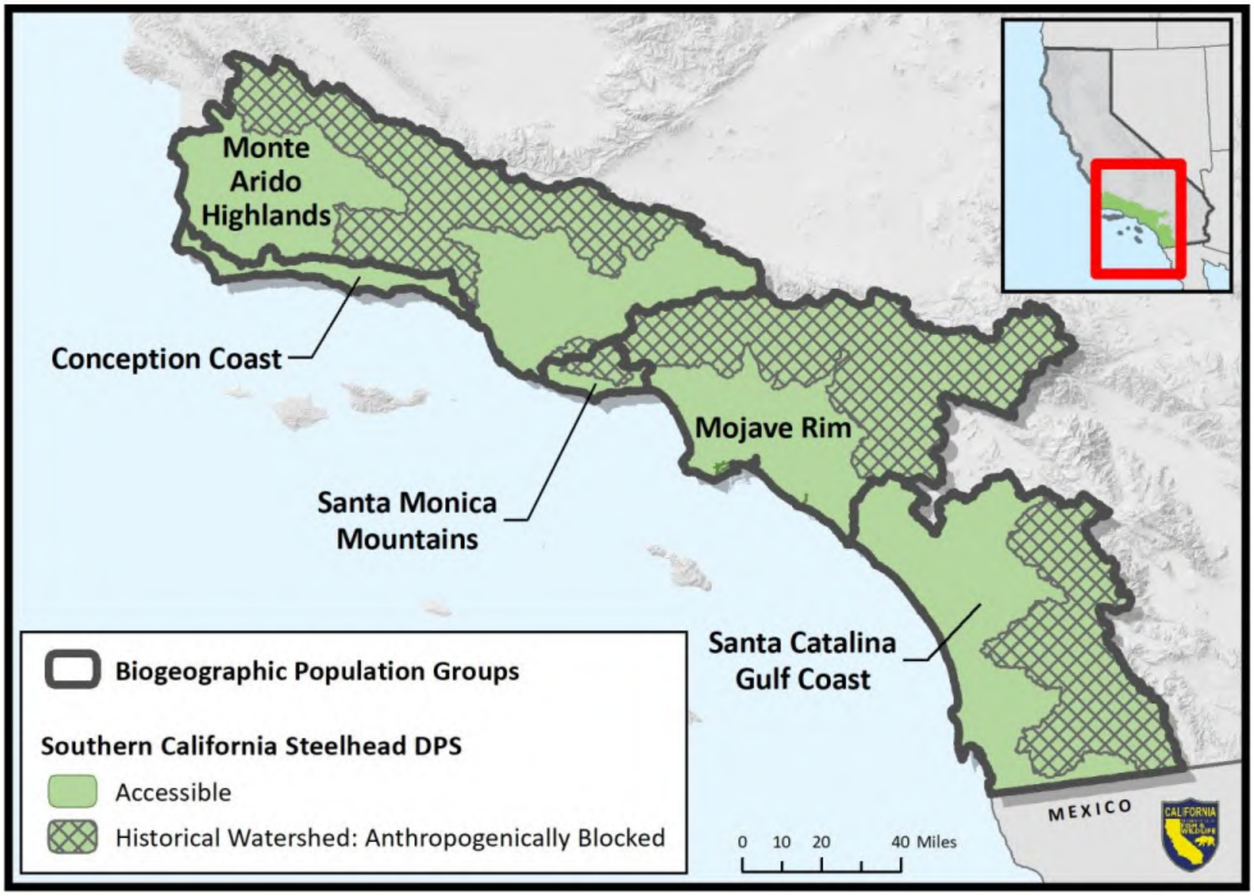


Figure 6. Map of the current and historical distribution of Southern SH/RT. BPGs represented are the Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast.

4.3.1 Monte Arido Highlands Biogeographic Population Group

The Monte Arido Highlands BPG includes four watersheds spanning San Luis Obispo, Santa Barbara, Ventura, and northern Los Angeles counties draining the west side of the Transverse Range and terminating at the Pacific Ocean (NMFS 2012a; Figure 7). Inland stretches of these watersheds are high in elevation and mountainous, but otherwise the watersheds contain different geographic features. Watersheds in this BPG are susceptible to “flashy” flows with seasonal storms and can also dry during the summer even in mainstem reaches. Perennial flows are mainly found in the upper reaches of tributaries that still retain groundwater connection (NMFS 2012a).

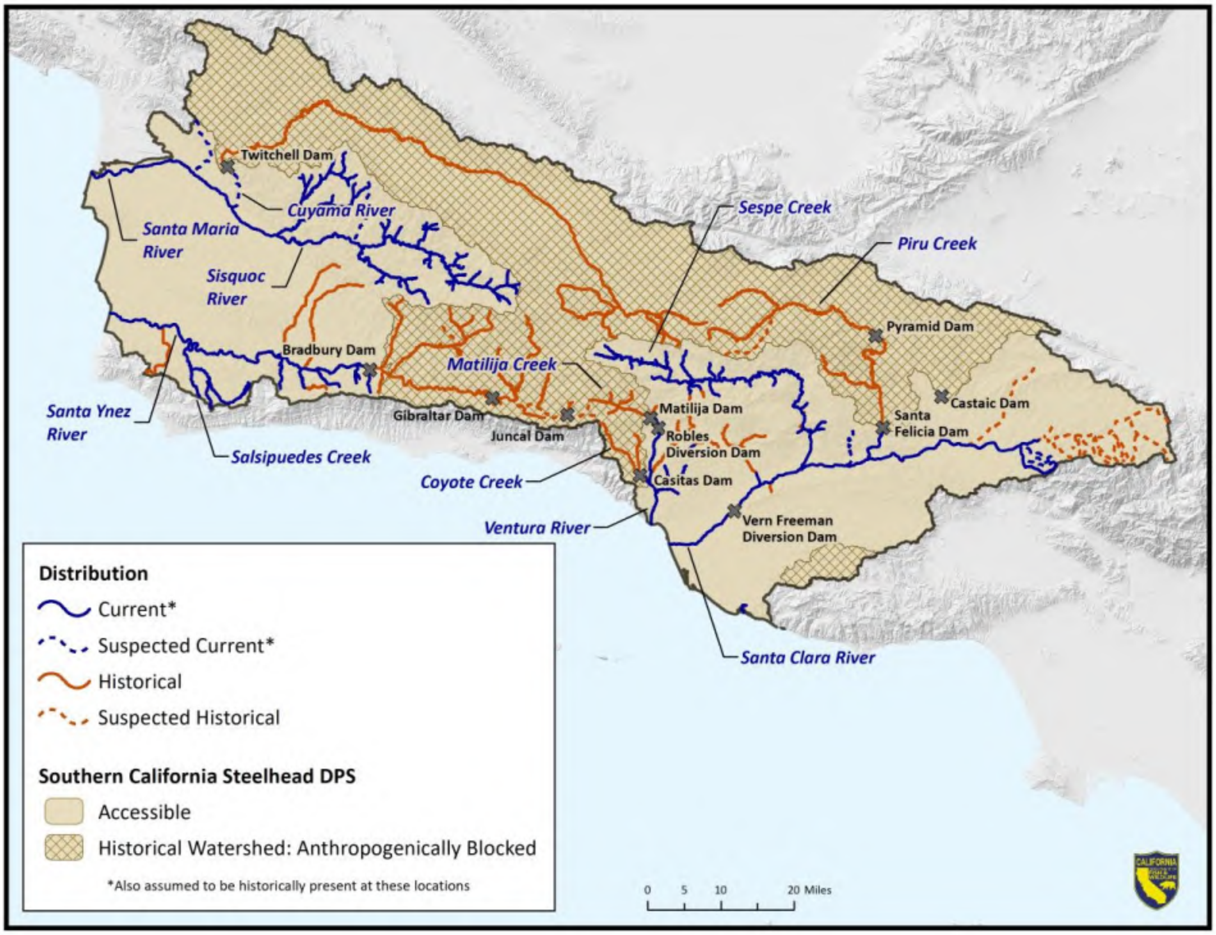


Figure 7. Map of the Monte Arido Highlands BPG depicting known and suspected current and historical distribution.

4.3.1.1 Santa Maria River

The Santa Maria River runs from the confluence of the Cuyama and Sisquoc rivers to the ocean and encompasses 1,790 square miles of watershed (Becker and Reining 2008). Historically, the Santa Maria River served mainly as a corridor for steelhead migrating to and emigrating from the Cuyama and Sisquoc rivers, rather than as habitat for spawning and rearing (Titus et al. 2010).

Hatchery stocking of *O. mykiss* occurred in the early 1930s in the Sisquoc and Cuyama watersheds (Titus et al. 2010). In the early to mid-1940s, juvenile steelhead from the Santa Ynez River were rescued and translocated to the Santa Maria River. Tributaries of the Cuyama River were stocked with Rainbow Trout in the 1940s to support recreational fishing; however, it is unknown if there was a historical run of anadromous Southern SH/RT in the Cuyama River tributaries (Titus et al. 2010). Starting in 1950, there was essentially no steelhead fishery for at least a decade (Titus et al. 2010).

The Sisquoc River had a robust population of resident *O. mykiss* in 1959 (Becker and Reining 2008) and fish were seen in smaller numbers in 1964 (Titus et al. 2010). Southern SH/RT of multiple age classes were also observed in the upper river during the 1990s (Becker and Reining 2008). In 2005, substantial numbers of young-of-the-year (YOY) *O. mykiss*, as well as some older age classes, were observed in the upper Sisquoc watershed during a population survey (Stoecker 2005).

Other smaller tributaries in the Santa Maria watershed, mostly tributaries of the Sisquoc and Cuyama rivers, have had limited historical and present *O. mykiss* observations from surveys, although some anecdotal sightings have occurred (Becker and Reining 2008). The streams include Deal Canyon Creek, Reyes Creek, Beartrap Creek, Tepusquet Creek, La Brea Creek, North Fork La Brea Creek, Manzana Creek, Davy Brown Creek, Munch Canyon Creek, Sunset Valley Creek, Fish Creek, Abel Canyon Creek, South Fork Sisquoc River, White Ledge Canyon Creek, Rattlesnake Canyon Creek, and Big Pine Canyon Creek. Some of these *O. mykiss* observations were made in tributaries of the Cuyama River post-dam construction (Becker and Reining 2008); however, it is possible that anadromous Southern SH/RT were able to access and inhabit these areas historically. Notably, many of these small tributaries were stocked with thousands of hatchery-raised *O. mykiss* in the mid-1900s for fishery supplementation (Titus et al. 2010).

Twitchell Dam was built on the Cuyama River in the late 1950s, almost 8 miles upstream from the confluence with the Santa Maria River. The dam currently impacts hydrologic function of the Santa Maria system by increasing the frequency of “false positive” migration flows in the Sisquoc River, reducing the frequency of downstream passable migration conditions, increasing the number of days with upstream passable flows that are not followed by additional days of passable flows, and reducing the frequency of long-duration migration flows (Becker and Reining 2008; Stillwater Sciences 2012). Twitchell Dam is a complete barrier to anadromy, and historically, water releases have not been regulated to provide instream flows for upstream and/or downstream steelhead migration in the Santa Maria River during the winter and spring migration periods (Stoecker 2005). Following construction of the dam, the Santa Maria and Cuyama rivers continue to have intermittent flows (Becker and Reining 2008). Currently, the lower mainstem of the Santa Maria River, which serves as a migration corridor for Southern SH/RT, is dry most of the year in most years due to managed aquifer recharge in the Santa Maria Valley (NMFS 2012a).

4.3.1.2 Santa Ynez River

The Santa Ynez River is a major watershed spanning approximately 900 square miles and 90 river miles (Becker and Reining 2008). The river is thought to have supported the largest anadromous Southern SH/RT run (Titus et al. 2010). The first record of Southern SH/RT in the Santa Ynez occurred in the late 1800s prior to any stocking of the river with hatchery trout (Alagona et al. 2012). Upstream migration of Southern SH/RT past river km 116 was impeded in 1920 resulting from the construction of Gibraltar Dam (Titus et al. 2010). The reservoir supported landlocked steelhead following dam construction and was stocked in the 1930s with hatchery *O. mykiss* as well as steelhead rescued from the Santa Ynez River in 1939, 1940, and 1944 (Titus et al. 2010).

Upstream migration typically occurred from December to March following precipitation events. Southern SH/RT were seen spawning in all tributaries as well as the mainstem below Gibraltar Dam during the spring in the mid-1930s, though flow was observed to limit suitable spawning habitat (Titus et al. 2010). Most spawning in the Santa Ynez River occurred in the upper reaches between Buellton and Gibraltar Dam as well as the tributaries to the mainstem such as Alisal, Santa Cota, Cachuma, Tequepis Canyon, and Santa Cruz creeks. Fish rescues were required during the summer due to intermittent flows and drying of downstream tributary areas as well as the mainstem (DFG 1944).

Tens of thousands of hatchery *O. mykiss* were stocked in Gibraltar Reservoir in the 1930s, and over 100,000 hatchery-reared juvenile steelhead were planted in the Santa Ynez River from 1930-1935. In the 1940s, about 2.5 million juvenile Southern SH/RT were translocated from various areas of the watershed to the lower river (DFG 1944). An approximate run size of at least 13,000 spawners was inferred by a Department staff member based on comparisons with Benbow Dam counts on the South Fork Eel River, California in the 1930s and 1940s (Becker and Reining 2008; Titus et al. 2010). However, it is possible that the Santa Ynez steelhead population may have increased during this period due to ongoing rescue operations that resulted in lower mean mortality rates during the early to mid-1940s (Good et al. 2005). Nonetheless, these estimates may underestimate historical abundance because they were produced 24 years after a significant portion of spawning and rearing habitat had been blocked by Gibraltar Dam.

Construction of Bradbury Dam, originally named Cachuma Dam, downstream of Gibraltar Dam was finished in 1953. Bradbury Dam forms the Lake Cachuma reservoir, blocks Southern SH/RT access to upstream habitat, and alters natural flow regimes and sediment dynamics (Becker and Reining 2008; Titus et al. 2010). Even before the dam was built, the lack of precipitation limited upstream migration due to the sandbar at the mouth of the river remaining intact (Titus et al.

2010). Steelhead run size declined significantly after 1946 and only small numbers were seen in the stream reaches below Bradbury Dam in following decades (Titus et al. 2010). Anadromous Southern SH/RT were effectively extirpated by 1975 due to lack of flows below Bradbury Dam especially during summer months, though steelhead have occasionally been observed over the past few decades (Becker and Reining 2008).

Recently, Reclamation's permit to operate releases from Bradbury Dam was modified to require releases from the dam for purposes of protecting fishery resources in accordance with the 2000 NMFS Biological Opinion during wetter years. This modification also included additional measures to benefit Southern SH/RT, including opportunities to provide fish passage above and below Bradbury Dam, measures to reduce the impacts of predation, and restoration of stream and bankside habitat (SWRCB 2019).

Department staff have monitored steelhead in Salsipuedes Creek, Hilton Creek, and the mainstem Santa Ynez River and have found that most years can support a small steelhead run. However, zero adult steelhead have been found in the Santa Ynez River since 2012 (Boughton et al. 2022a). COMB has conducted uncalibrated, single pass snorkel surveys each year since the 1990s at multiple index sites to determine *O. mykiss* densities in the Santa Ynez River. Until 2012, fish densities were consistent but declined sharply in the following years due to drought conditions (Boughton et al. 2022a). The past few years have seen numbers rebound somewhat in response to wetter conditions. Similar trends were observed in the migrant traps on Hilton and Salsipuedes creeks and the mainstem Santa Ynez River, which have been in operation since 2001 (COMB 2022).

4.3.1.3 Ventura River

The Ventura River watershed encompasses 228 square miles and 16.5 stream miles (Becker and Reining 2008). Matilija Creek and North Fork Matilija Creek intersect to form the headwaters of the Ventura River. Multiple impassable dams occur in this watershed, altering the natural flow regime and causing negative impacts to Southern SH/RT habitat quantity and quality. About 2 miles downstream of the Ventura River headwaters is the Robles Diversion Dam, which was constructed in 1958 to direct water for storage into Lake Casitas (Becker and Reining 2008; Titus et al. 2010). Both Matilija Dam on Matilija Creek and Casitas Dam on Coyote Creek, are also attributed to population declines of Southern SH/RT on the Ventura River (Titus et al. 2010).

In the 1930s, tens of thousands of juvenile *O. mykiss* were stocked in the Ventura River, as well as thousands of fish that were transplanted from rescues conducted on the Santa Ynez River (Titus et al. 2010). Department staff estimated that the Ventura watershed supported 4,000 to 5,000 steelhead spawners in 1946. In 1973, Department staff estimated a run of between 2,500 and 3,000 steelhead (Becker and Reining 2008). However, the methodologies used to make these estimates were likely based on expert opinion. Similar to the Santa Ynez River, ongoing rescues may have had a small effect on the Ventura River steelhead populations in the 1940s. By the mid-1970s, the steelhead run size was estimated at approximately 100 fish, likely due to limited suitable rearing habitat below Robles Diversion Dam (Becker and Reining 2008).

There are four key tributaries to the Ventura River that historically provided substantial suitable spawning and rearing habitat for *O. mykiss*. These tributaries were Matilija Creek, San Antonio Creek, Coyote Creek, and Santa Ana Creek (Capelli 1974). Coyote Creek likely had a strong run of steelhead with up to 500 adult returns being probable prior to construction of Casitas Dam. Currently, the few returning Southern SH/RT spawners may use the lower reaches of the 13-mile stream for spawning (Becker and Reining 2008; Titus et al. 2010). Matilija Creek, which extends for almost 15 miles from its confluence with the Ventura River, contains ideal spawning and rearing habitat. However, access to the upper reaches of the creek was impeded with the construction of Matilija Dam (Becker and Reining 2008). Before completion of the dam, it is estimated that the creek could have supported runs of 2,000 to 2,500 spawners (Becker and Reining 2008). The removal of Matilija Dam, which is an important element of the Matilija Dam Ecosystem Restoration Project, is currently in the process of environmental review. Tributaries of Matilija Creek contain high quality habitat that continue to support resident *O. mykiss* (Becker and Reining 2008). The removal of Matilija dam will allow access to about 20 miles of stream habitat for Southern SH/RT (MDERP 2022). Historical presence of steelhead in San Antonio Creek is unknown, but the stream is thought to have produced steelhead in the 1980s and 1990s (Titus et al. 2010). Santa Ana Creek was home to *O. mykiss* in the headwater reaches during the 1930s through the 1940s as well as in 1979 (Becker and Reining 2008).

Construction on the Robles Fish Passage Facility, which allows fish passage through the Robles Diversion Dam, was completed in 2006. As a requirement of their federal Biological Opinion, CMWD monitors fish migration through the facility (CMWD 2019). A downstream migrant trap is also operated to evaluate if smolts can pass through the facility without injury (CMWD 2019). A weir trap is then used to evaluate success of smolt migration through the reach downstream of the facility (CMWD 2019). Small numbers of out-migrating smolts have been captured since operation of the weir trap began. However, during the most recent drought (2012-2017), trapping did not occur due to low flow conditions. Since 2017, zero to only a few fish have been observed per year in the vicinity of the passage facility. Presence/absence and redd surveys for *O. mykiss* have also been conducted by CMWD each year and numbers have declined substantially since the beginning of the drought (CMWD 2018).

4.3.1.4 Santa Clara River

The Santa Clara River is a major river that flows into the Pacific Ocean near Ventura, California. The watershed drains an area of approximately 1,600 square miles with 75 stream miles (Becker and Reining 2008). The historical steelhead run was estimated to be around 9,000 fish based on comparisons of habitat suitability metrics produced for the Ventura River (Moore 1980). Numerous instream water diversions have impeded anadromous migration since the 1950s (Becker and Reining 2008; Titus et al. 2010).

Tributaries that intersect the Santa Clara River above the Vern Freeman Diversion historically provided most of the suitable Southern SH/RT spawning and rearing habitat in the watershed. Santa Paula Creek, a tributary to the Santa Maria River, contains high quality suitable *O. mykiss* spawning and rearing habitat. The Harvey Diversion Dam is located on the lower reaches of Santa Paula Creek. While this diversion originally provided fish passage, strong flows rendered the facility irreparable in 2005 (Stoecker and Kelley 2005). More recently, the Harvey Diversion Fish Passage Remediation Project has the goal of restoring fish passage at the facility to reestablish connection to the upstream watershed on Santa Paula and Sisar creeks (California Trout 2018).

Sespe and Piru creeks are the largest tributaries of the Santa Clara River and support higher *O. mykiss* numbers than Santa Paula Creek (Stoecker and Kelley 2005). Sespe Creek contains over 198 km of habitat historically accessible to steelhead and sustains the highest relative abundance of wild *O. mykiss*. It is thought that Sespe Creek offers the highest potential for steelhead recovery because it lacks mainstem migration barriers (Stillwater Sciences 2019). However, Sespe Creek is known to dry in years with low precipitation, leading to a loss of connectivity with the Santa Clara River (Puckett and Villa 1985; Stoecker and Kelley 2005). A recent survey found high abundances of aquatic invasive species throughout most reaches of Sespe Creek downstream of its confluence with Howard Creek, which transports high abundances of invasive species from the Rose Valley Lakes (Stillwater Sciences 2019).

The Piru Creek watershed includes the Santa Felicia and Pyramid Dams. Both dams block access to upstream historical habitat on the Santa Clara River. Reservoir and dam operations also lead to unnatural and diminished flow regimes in the watershed (Moore 1980). Prior to the construction of both dams, adult steelhead were reported to migrate up into Buck and Snowy creeks (Stoecker and Kelley 2005). Piru Creek does not provide spawning and rearing habitat to Southern SH/RT (Moore 1980); however, Aqua Blanca and Fish creeks contain suitable habitat and currently support adfluvial *O. mykiss* populations, which could be important in the future for restoring an anadromous run in this tributary (Stoecker and Kelley 2005).

Various Santa Clara tributaries, including those mentioned above, were stocked in the 1930s through 1950s with hatchery *O. mykiss* as well as those rescued from the Santa Ynez River in 1944 (Titus et al. 2010). Some minor tributaries of the Santa Clara River were also stocked but have no historical records of *O. mykiss* presence. These tributaries include Hopper Canyon, Tom, Pole, and Willard creeks (Titus et al. 2010).

Operations of a downstream migrant trap at the Vern Freeman Diversion Dam began in 1993. Operations typically occur from January to June when flows in the river are sufficient to maintain consistent water levels at the fish trap. A total of 16 adult steelhead and 839 smolts were observed at the Freeman Diversion from 1993-2014 (Booth 2016).

4.3.2 Conception Coast Biogeographic Population Group

Eight small watersheds that are relatively uniform in geographic features comprise the Conception Coast BPG, which spans about 50 miles of the southern California coast (NMFS 2012a; Figure 8). Streams in this BPG run north to south and have steep slopes in the upper portions of their watersheds where there is perennial flow. Precipitation can be much higher in the upper watersheds and can lead to “flashy” flows due to the steep stream gradients (NMFS 2012a). Both the Carpinteria Creek and Gaviota Creek watersheds have been the focus of habitat restoration in recent years, as both provide high-quality spawning and rearing habitat for Southern SH/RT and have high recovery potential (NMFS 2012a).

4.3.2.1 Gaviota Creek

Gaviota Creek is about six miles in length, connecting with the Pacific Ocean just south of Las Cruces, California. Steelhead were documented in Gaviota Creek in the 1930s in the winter (Becker and Reining 2008) and multiple ages of *O. mykiss* were observed in the 1990s and early 2000s (Becker and Reining 2008). Steelhead runs in Gaviota Creek, which were historically present in most years, were likely small (Becker and Reining 2008). Livestock grazing is responsible for reductions in suitable habitat for Southern SH/RT in the watershed (Becker and Reining 2008). In recent years, periodic bankside observations conducted by the Department have observed a range of zero to a few hundred *O. mykiss* and no adult steelhead in Gaviota Creek (K. Evans, CDFW, unpublished data).

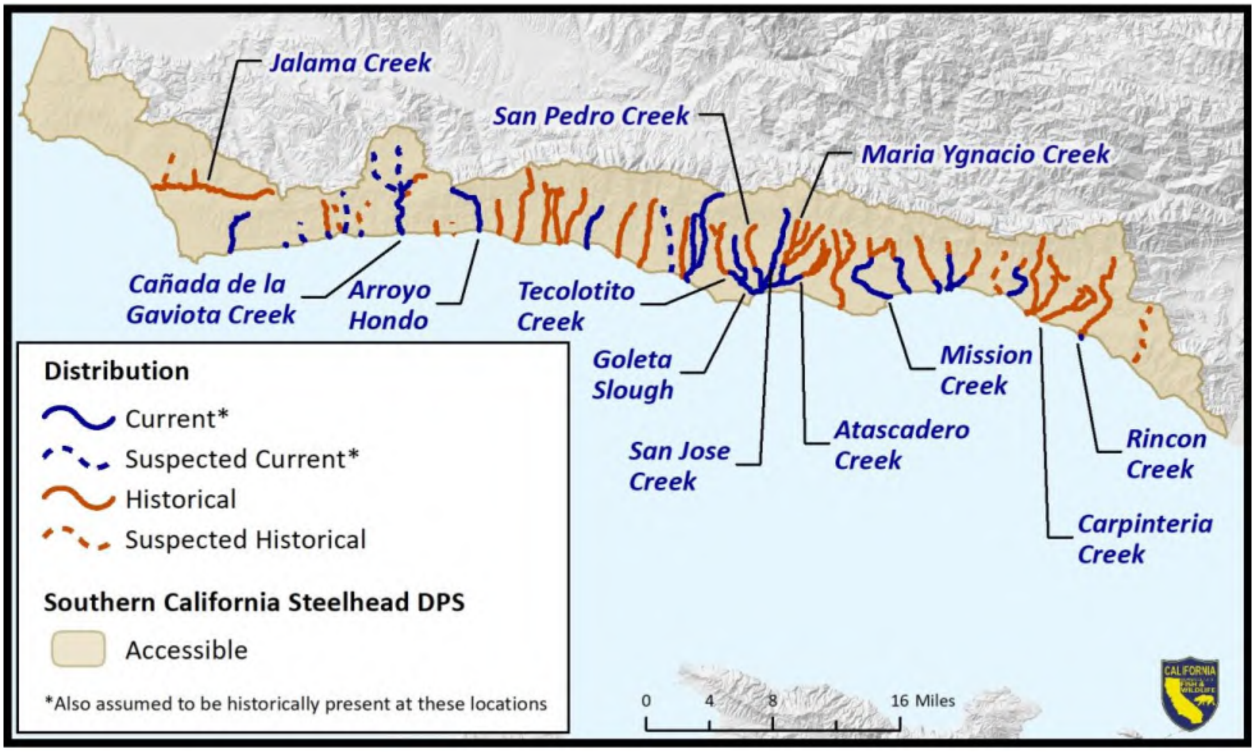


Figure 8. Map of the Conception Coast BPG depicting known and suspected current and historical distribution.

4.3.2.2 Carpinteria Creek

Carpinteria Creek is approximately 6.5 miles long and connects with the Pacific Ocean near Carpinteria, California. Southern SH/RT were observed in the watershed in 1942 (Stoecker et al. 2002) and the stream was understood to have a historical steelhead run (Becker and Reining 2008). Different life stages of *O. mykiss* were seen in the mid-1990s (Becker and Reining 2008) and many were seen in the upper watershed (Becker and Reining 2008) which is known to have suitable habitat (Becker and Reining 2008). A few *O. mykiss* of varying sizes were found in the lower watershed in 2008 (Becker and Reining 2008). In recent years, monitoring conducted by the Department from 2016-2022 have observed few if any individuals of either life-history forms (K. Evans, CDFW, unpublished data).

4.3.2.3 Other Creeks

There are many other creeks flowing into the Pacific Ocean, some of which may have supported Southern SH/RT historically, some where there have been recent observations, and others where *O. mykiss* has not been seen at all. These coastal creeks are typically no longer than 10 stream miles. In addition to Gaviota and Carpinteria creeks, other suitable streams with more recent sightings of Southern SH/RT include Arroyo Hondo Creek and Rincon Creek (Becker and

Reining 2008). Arroyo Hondo Creek contains the least number and severity of threats for Southern SH/RT in the Conception Coast BPG (NMFS 2012a).

4.3.3 Santa Monica Mountains Biogeographic Population Group

There are five watersheds in the Santa Monica Mountains BPG, the majority of which are small with geography resembling that of watersheds in the Conception Coast BPG (NMFS 2012a; Figure 9). Except for Malibu Creek, the headwaters of the streams occur prior to passing through the Santa Monica mountains. Malibu Creek is the largest watershed in the BPG (NMFS 2012a) but is similar to Topanga Creek in stream length (Becker and Reining 2008). There are two substantial anthropogenic migration barriers on Malibu Creek, Rindge Dam and Malibu Lake Dam. Rindge Dam is located a few miles upstream from the mouth and prevents access to nearly all historical Southern SH/RT habitat. The remaining three streams include Big Sycamore Canyon Creek, Arroyo Sequit, and Las Flores Canyon Creek (NMFS 2012a).

4.3.3.1 Malibu Creek

The Malibu Creek watershed encompasses about 105 square miles including 8.5 miles of stream that outflows into the Pacific Ocean at Malibu Lagoon State Beach in Santa Monica Bay (Becker and Reining 2008). Rindge Dam was constructed in 1924 about three miles upstream from the mouth (Becker and Reining 2008; Titus et al. 2010). Before the dam was built, steelhead were able to access spawning habitat in Las Virgenes and Cold creeks (Titus et al. 2010). In 1947, a substantial steelhead run was observed when the sandbar at the mouth was manually opened. At the time, steelhead were able to access about 10-12 stream miles in the basin (Becker and Reining 2008). In the 1970s, steelhead were observed migrating upstream up to Rindge Dam (Becker and Reining 2008). In 1980, a Department employee counted 61 steelhead immediately downstream of Rindge Dam (Titus et al. 2010). Multiple life stages of *O. mykiss* were observed during a study conducted in the winter and spring of 1986. A total of 158 fish was reported though only one was an adult steelhead. Later in 1986 and in 1987, a handful of adult *O. mykiss* were found below Rindge Dam and a few adult *O. mykiss* were seen just below the dam in 1992 (Titus et al. 2010). The quality of spawning and rearing habitat is the best just below Rindge Dam (Titus et al. 2010), which explains the greater use of that area by juvenile *O. mykiss* (Titus et al. 2010). Stocking of hatchery Rainbow Trout occurred in 1984 at Malibu Creek State Park with additional stockings likely occurring frequently (Titus et al. 2010).

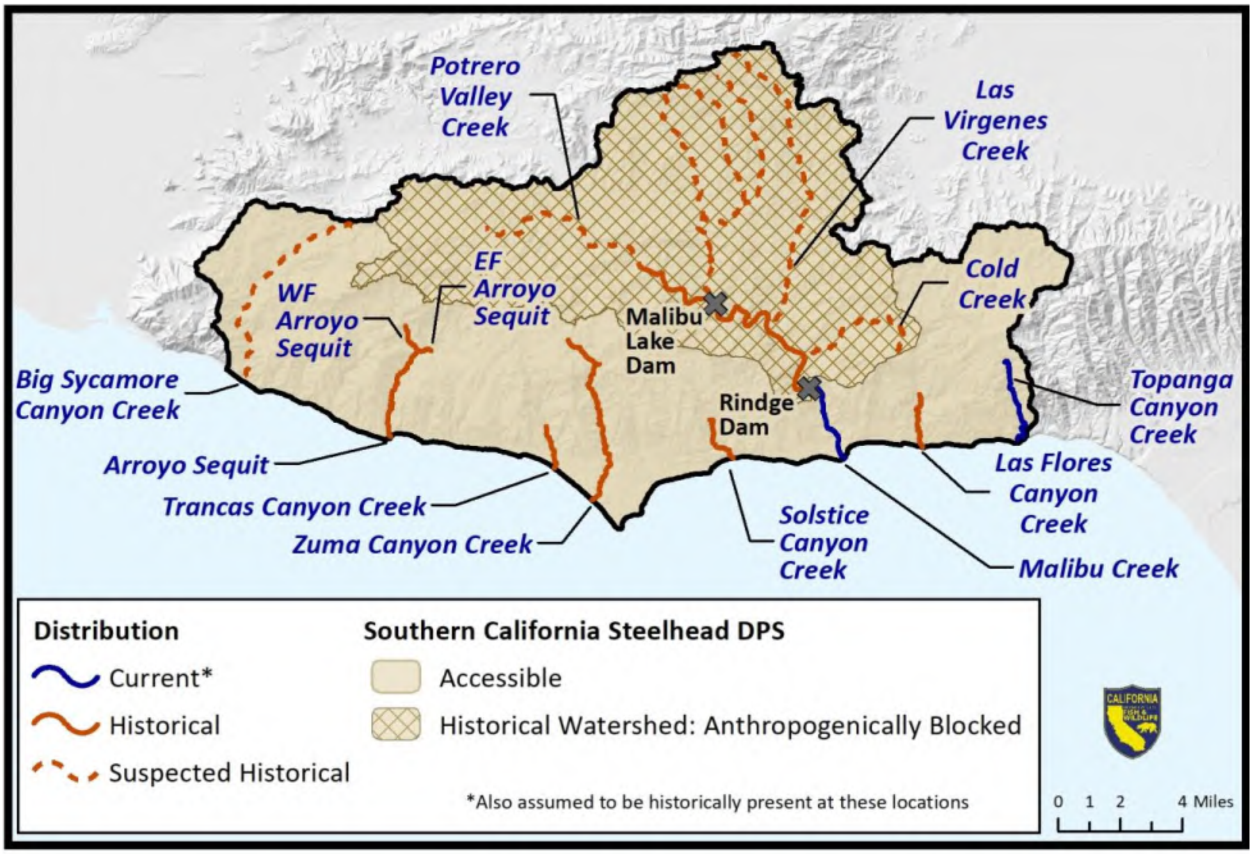


Figure 9. Map of the Santa Monica Mountains BPG depicting known and suspected current and historical distribution. Abbreviations: EF = East Fork, WF = West Fork.

In addition to Rindge Dam and other migration barriers blocking access to historical habitat, the natural flow regime and water quality of Malibu Creek has been modified by operations of the Tapia Water Reclamation Facility (approximately 5 miles upstream from the ocean). Treated water releases from the facility sustain flows in Malibu Creek throughout the year (Titus et al. 2010). Currently, a new recycled wastewater treatment facility is being proposed that would treat effluent from the Tapia Water Reclamation Facility with the purpose of re-distributing the water to the service area rather than releasing it back to Malibu Creek (Las Virgenes-Triunfo Joint Powers Authority 2022). The implementation of this project could lead to less streamflow in Malibu Creek as a result of the repurposing of discharged recycled water that would have previously been released to Malibu Creek.

In more recent years, *O. mykiss* have been seen in Malibu Creek below Rindge Dam (Becker and Reining 2008). A die off of about 250 *O. mykiss* occurred in the creek in 2006 after yellowing of the fish was noticed during snorkel surveys (Becker and Reining 2008). Recent drought conditions starting in 2012 have led to reduced abundances of *O. mykiss* in Malibu Creek based on similar observations on Topanga Creek (Dagit et a. 2017)

4.3.3.2 Topanga Creek

Topanga Creek empties into the ocean at Topanga Beach and contains similar stream mileage to Malibu Creek (Becker and Reining 2008). Some steelhead can access Topanga Creek in years when there is sufficient precipitation (Becker and Reining 2008) and *O. mykiss* of various sizes were observed in the watershed in 1979 (Becker and Reining 2008). Juvenile *O. mykiss* were observed by Department staff in Topanga Creek again in 1982 (Becker and Reining 2008).

The Southern SH/RT population in Topanga Creek was recently monitored from 2001-2007, revealing consistent use by spawning steelhead adults and successful smolt production (Becker and Reining 2008). Bell et al. (2011b) characterized the Topanga population as a satellite population that is supported by other populations in the Southern SH/RT range but provides minimal production to other streams. As a satellite population, Topanga Creek *O. mykiss* support the metapopulation in southern California but are more vulnerable to extirpation (Bell et al. 2011b). The effects of the most recent prolonged drought on Southern SH/RT have been severe. Significant reductions for all life-stages were observed from 2012-2016, leading to reductions of the population from 358 individuals in 2008 to less than 50 individuals in 2016 (Dagit et al. 2017).

4.3.3.3 Other Creeks

Big Sycamore Canyon Creek was surveyed in 1989-1990 but no steelhead were observed (Becker and Reining 2008). NMFS (2005) designated the population as extirpated after another survey in 2002.

Arroyo Sequit Creek was reported to have a small historical steelhead run. Steelhead were seen in a 1989-1990 survey of the stream and again in a 1993 survey. From 2000-2007 steelhead were reported utilizing Arroyo Sequit Creek (Becker and Reining 2008).

Overall, from 2005-2019, monitoring in Arroyo Sequit Creek done by the Resource Conservation District of the Santa Monica Mountains (RCDSMM) has observed few *O. mykiss*, primarily due to two instream barriers that were eventually removed in 2016. Two adult observations occurred after the removal of barriers in 2017 (Dagit et al. 2019). There is also limited documentation of steelhead in the West and East forks of Arroyo Sequit Creek (Becker and Reining 2008). Las Flores Canyon Creek is reported to have suitable steelhead habitat but there is no evidence of historical or present use by steelhead (Becker and Reining 2008; Titus et al. 2010).

4.3.4 Mojave Rim Biogeographic Population Group

There are three relatively large watersheds that make up the Mojave Rim BPG (NMFS 2012a; Figure 10). These watersheds include the San Gabriel, Santa Ana, and Los Angeles rivers. The headwaters of these streams are in the San Gabriel and San Bernardino mountains, which experience greater seasonal precipitation than is seen in the neighboring BPGs. Lower watershed areas span the flat coastal plain of the Los Angeles River, and over time the mouths of these rivers have drifted to different areas along the coast. Currently, the river mouths are each less than 20 miles apart (NMFS 2012a).

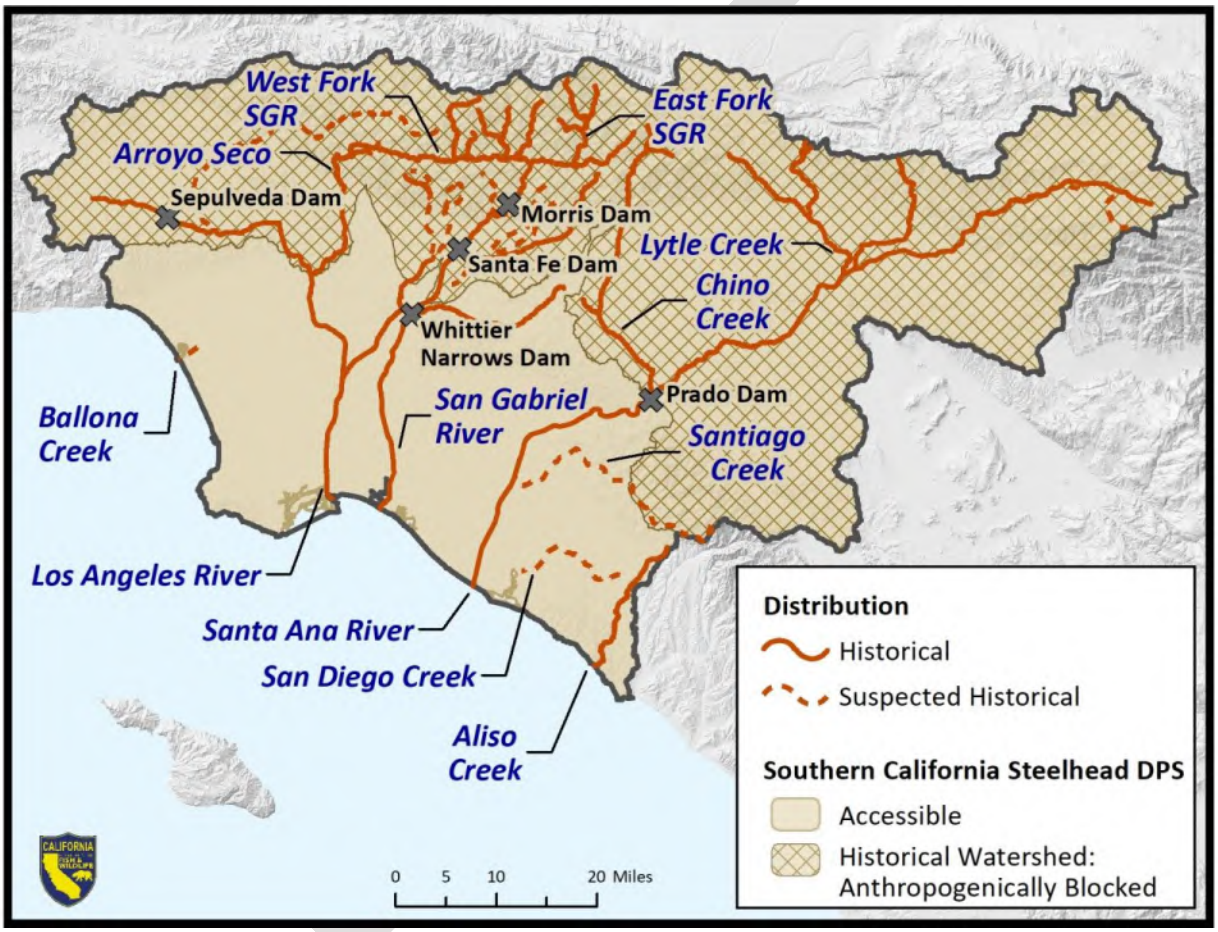


Figure 10. Map of the Mojave Rim BPG depicting known and suspected current and historical distribution. Abbreviations: SGR= San Gabriel River.

4.3.4.1 San Gabriel River

The San Gabriel River encompasses more than 58 stream miles but about half of it is channelized below Santa Fe Dam. Morris Dam and Santa Fe Dam were both constructed in the 1930s (Becker and Reining 2008) and are considered complete barriers to fish migration.

Rainbow trout were seen by Department staff in the 1930s, but the river was also stocked during that time (Becker and Reining 2008). Stocking below Morris Dam also occurred on Little Dalton Creek in 1945 (Titus et al. 2010). Rainbow Trout fishing was good from the late 1930s to late 1940s according to various Department stream surveys and in 1951, Department staff noted that natural production was average (Becker and Reining 2008). Fish Canyon Creek and Robert's Canyon Creek, which are mainstem tributaries downstream of Morris Dam, were observed by Department surveyors to have *O. mykiss* in in the 1940s, 1950s, and 1973 (Titus et al. 2010).

Southern SH/RT historically occurred in a few tributaries of the San Gabriel River such as San Jose Creek. Many tributaries to the San Gabriel River have been channelized and contain fish passage barriers. Most were stocked for recreational angling in the 1930s and 1940s (Becker and Reining 2008). Southern SH/RT remain in tributaries above the two barrier dams and are known to presently inhabit the East Fork. The ancestry of these fish is unclear and may have genetic influence from stocking *O. mykiss* from other watersheds (Nielsen 1999). There is also a remnant historical population of Rainbow Trout just below Morris Dam that appears to self-propagate (Becker and Reining 2008).

4.3.4.2 Santa Ana River

The Santa Ana River is the largest river within southern California at almost 100 miles long (Becker and Reining 2008). Prado Dam, which is located approximately 30 miles upstream of the river outlet, was constructed in 1941 (O.C. Public Works, n.d.). The lower 24 miles of channelized river below the dam outflows to the Pacific Ocean in Huntington Beach (Becker and Reining 2008). Rainbow Trout were observed in the mountainous upper watershed during the 1930s, coinciding with when stocking occurred (Becker and Reining 2008). A steelhead run was historically present in the lower river (Becker and Reining 2008); however, in 1951 and 1955, no *O. mykiss* were observed in any stream reaches below Prado Dam during Department surveys (Titus et al. 2010). Various water uses have highly altered flows in the Santa Ana River and low numbers of fish in the lower river are attributed to limited water releases from Prado Dam (Titus et al. 2010). Southern SH/RT are thought to be extirpated from the Santa Ana River (Nehlsen et al. 1991), but resident *O. mykiss* remain in the upper watershed above natural and manmade impassable barriers (Boughton et al. 2005).

Southern SH/RT were historically present in Santiago Creek below Prado Dam. Many tributaries upstream of where the dam was built were stocked with *O. mykiss* in the 1930s and fish have been observed reproducing naturally in the decades that followed (Becker and Reining 2008).

4.3.4.3 Los Angeles River

The Los Angeles River is approximately 52 miles long and flows to the Pacific Ocean in Long Beach. Like the San Gabriel River, the Los Angeles River is completely channelized with much of the lower mainstem channel paved with concrete for flood control purposes (Becker and Reining 2008; Titus et al. 2010). Southern SH/RT are assumed to have been present in the watershed but there have been no actual observations to confirm this assumption (Titus et al. 2010). Major tributaries to the Los Angeles River were stocked in the 1930s or 1940s (Becker and Reining 2008; Titus et al. 2010) but some of these tributaries were later channelized and no longer support *O. mykiss*. Due to the highly modified nature of the river basin, Southern SH/RT cannot utilize the mainstem Los Angeles River for spawning or rearing (Titus et al. 2010) and are considered extirpated (Nehlsen et al. 1991). However, resident *O. mykiss* have recently been observed in Arroyo Seco, a main tributary to the Los Angeles River, and its tributaries (Becker and Reining 2008). Fish passage by native Southern SH/RT on the creek is obstructed by Devil's Gate Dam. Recently, Department-led fish rescues have transplanted Southern SH/RT from the West Fork San Gabriel River and Bear Creek to Arroyo Seco as a result of the Bobcat Fire (Pareti 2020).

4.3.5 Santa Catalina Gulf Coast Biogeographic Population Group

Multiple medium sized watersheds comprise the Santa Catalina Gulf Coast BPG (Figure 11). Most have their headwaters in the Santa Ana or Peninsular Mountain ranges and flow south over coastal terraces (NMFS 2012a). Many watersheds in the BPG have intermittent flow and are seasonally dry due to limited precipitation. Some smaller drainages within the BPG might occasionally support steelhead. Streams in this BPG have substantial tributary mileage in the upper watershed areas due to the fragmented landscape in the region (NMFS 2012a).

4.3.5.1 San Juan Creek

San Juan Creek is 22-mile stream located in Orange and Riverside Counties. Arroyo Trabuco Creek is a major tributary to San Juan Creek with approximately the same stream length (Becker and Reining 2008). Steelhead were observed in the creek in 1939 (Swift et al. 1993) and in the 1940s as well as in 1968 and 1974 (Becker and Reining 2008). Trout stocking to support fishing in San Juan Creek occurred year-round in 1981 (Becker and Reining 2008) and possibly in other years. San Juan Creek contains suitable habitat for *O. mykiss*, which have been observed in some but not all years in recent decades (Becker and Reining 2008).

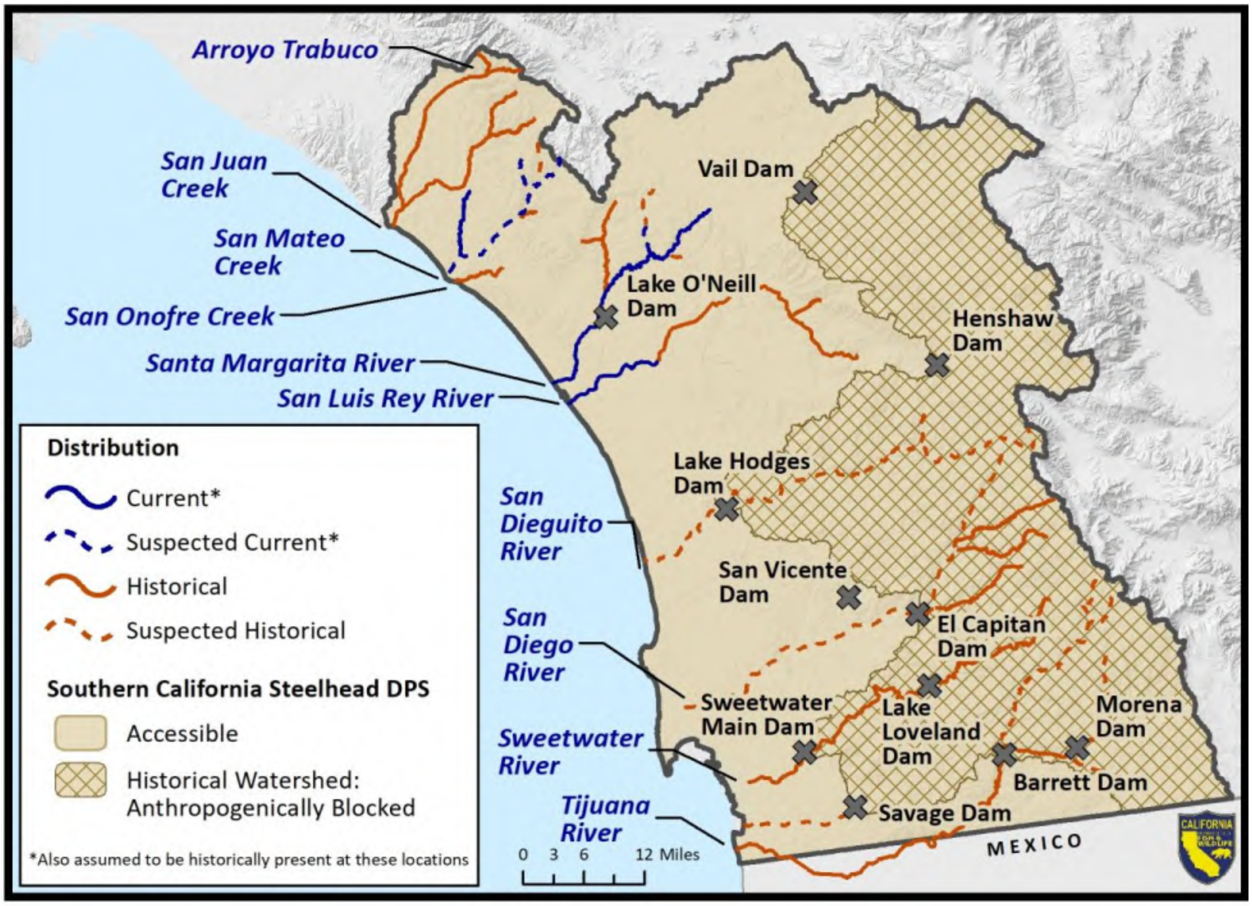


Figure 11. Map of the Santa Catalina Gulf Coast BPG depicting known and suspected current and historical distribution.

Arroyo Trabuco was a historical Southern SH/RT stream; however, there is now a complete barrier to fish migration about 2.4 miles from the confluence with San Juan Creek. Regardless, the stream still appears to contain suitable habitat and steelhead were still believed to be present in 2004 (Becker and Reining 2008). Recently, efforts to remediate fish passage at two total barriers to migration on Trabuco Creek are in progress. Completion of this project would provide access to 15 miles of upstream spawning and rearing habitat.

4.3.5.2 San Mateo Creek

San Mateo Creek, which has a similar stream length as San Juan creek, supported a historical steelhead run (Titus et al. 2010). In the early 1900s, anglers were successful in catching Southern SH/RT of greater sizes than in other regional watersheds (Titus et al. 2010). In 1939, juvenile Southern SH/RT were observed and rescued in the thousands from isolated reaches and transferred to the estuary lagoon (Titus et al. 2010). Stocking of the creek began in 1945 (Becker and Reining 2008). Anadromous and resident Southern SH/RT were thought to persist in 1950 (Becker and Reining 2008), though after that year, Southern SH/RT encounters declined (Titus et al. 2010). In 1999, *O. mykiss* sampled by the Department were surmised to be offspring from anadromous Southern SH/RT because of the lack of a resident population (Becker and Reining 2008). A resident *O. mykiss* population likely does exist in Devil Canyon Creek, a major tributary to San Mateo Creek (Hovey 2004). Habitat quality in the watershed has been degraded by anthropogenic activities and intermittent streamflow has posed migration issues for Southern SH/RT (Titus et al. 2010). Steelhead are thought to be extirpated from San Mateo Creek (Nehlsen et al. 1991). Currently, the San Diego Regional Water Quality Control Board is considered using a draft invasive species Total Maximum Daily Load (TMDL) and plan to certify that actions of other entities will correct impairments to the creek caused by invasive species (Loflen 2022).

4.3.5.3 San Onofre Creek

San Onofre Creek consists of 13 miles of stream in Orange County. Personal observations of annual steelhead runs in the creek prior to 1946 suggest it was a historical Southern SH/RT stream (Becker and Reining 2008). Fletcher Creek, a tributary to San Onofre Creek, was considered a steelhead rearing area in 1950 and *O. mykiss* were observed by Department staff during a survey in 1979 (Titus et al. 2010). By the 2000s, San Onofre Creek was observed to be dry (Boughton et al. 2005), though reaches in the upper watershed may still offer suitable *O. mykiss* habitat (Becker and Reining 2008).

4.3.5.4 Santa Margarita River

The Santa Margarita River is almost 30 miles long, but a diversion weir located approximately ten miles upstream within the boundaries of Camp Pendleton likely acts as a complete barrier to upstream fish migration (Becker and Reining 2008; Titus et al. 2010). This diversion eliminates surface flow during most of the year (Titus et al. 2010). Adult and juvenile steelhead were observed in the river in the 1930s and 1940s and steelhead were thought to migrate upstream to the town of Fallbrook when flows allowed (Becker and Reining 2008). DeLuz Creek, a tributary to the Santa Margarita River, also historically supported steelhead (Becker and Reining 2008). Stocking of *O. mykiss* in the Santa Margarita watershed began in 1941 (Becker and Reining 2008) and occurred most recently in 1984 (Titus et al. 2010). Currently, the reaches downstream of O’Neill Lake do not support Southern SH/RT spawning (Titus et al. 2010) and they are thought to be extirpated (Nehlsen et al. 1991). As part of the Santa Margarita River Conjunctive Use Project, the existing O’Neill weir diversion will be replaced with an inflatable structure that will allow fish passage during most flow events (FPUD 2016). Further upstream, efforts are also underway to replace a fish passage barrier at the Sandia Creek Drive bridge to provide passage to 12 miles of upstream rearing and spawning habitat (Dudek 2021)

4.3.5.5 San Luis Rey River

The San Luis Rey River is a large river in northern San Diego County that runs approximately 69 stream miles from its river mouth near Oceanside, California. Lake Henshaw Dam, which was built in 1924, reduces the downstream flow of the river and blocks steelhead access to the uppermost portion of the drainage (Becker and Reining 2008; Titus et al. 2010). According to Native Americans and other observers of *O. mykiss* in the late 1800s, there was a historical run of steelhead that was able to reach areas above where the dam was constructed (Becker and Reining 2008). Stocking of Rainbow Trout occurred sometime prior to 1946 (Becker and Reining 2008). Although resident Rainbow Trout remain in tributaries of the upper watershed like Pauma Creek and the West Fork San Luis Rey River (Becker and Reining 2008), native Southern SH/RT are extirpated from the lower reaches of the San Luis Rey River (Nehlsen et al. 1991; Becker and Reining 2008).

4.3.5.6 San Dieguito River

The San Dieguito River is a large river in San Diego County that runs for 23 stream miles before entering into the Pacific Ocean north of the City of San Diego. Hodges Dam, which was constructed 12 miles upstream from the mouth in 1918, serves as a complete barrier to anadromy (Becker and Reining 2008). A journal article by Hubbs (1946) mentioned anglers catching possible steelhead in the estuary (Titus et al. 2010). Rainbow trout have been stocked below the dam (Titus et al. 2010); however, those downstream reaches no longer support *O. mykiss* (Becker and Reining 2008). Prior to the construction of the Sutherland Lake dam on Santa Ysabel Creek, a major tributary of the San Dieguito River, Department staff saw *O. mykiss* in a creek upstream of the eventual dam site, though there had been stocking efforts in that creek (Becker and Reining 2008). Black Canyon Creek, another smaller tributary to the San Dieguito River, was also stocked for rainbow trout fishing (Becker and Reining 2008).

4.3.5.7 San Diego River

The San Diego River has a stream length of 52 miles but El Capitan Dam, built in 1934, blocks about 22 miles of historical Southern SH/RT habitat (Becker and Reining 2008). Additionally, channelization of downstream reaches has eliminated suitable habitat below the dam (Titus et al. 2010). Anglers may have caught steelhead historically (Titus et al. 2010) but the population is now thought to be extinct (Nehlsen et al. 1991). Upper watershed tributaries above the dam were stocked in the 1930s and earlier and may still support *O. mykiss* (Becker and Reining 2008; Titus et al. 2010).

4.3.5.8 Sweetwater River

The Sweetwater River is a large river in San Diego County that runs for 55 miles before emptying into San Diego Bay southeast of the City of San Diego. The Sweetwater Reservoir, formed by the construction of the Sweetwater Dam in 1888, serves as a total barrier to anadromy (Becker and Reining 2008; Titus et al. 2010). Although *O. mykiss* were present historically and may still be found in the upper watershed, there are no mentions of a historical anadromous steelhead run in the Sweetwater River (Becker and Reining 2008; Titus et al. 2010). In years leading up to 1946, Cold Stream, a small tributary to Sweetwater River, was stocked with Rainbow Trout and these fish may have continued to naturally reproduce for some time (Becker and Reining 2008).

4.3.5.9 Otay River

The Otay River enters the south end of San Diego Bay near the U.S.-Mexico Border. There are no known historical or current records of Southern SH/RT existing in the Otay River. Fish passage is obstructed by the dam that forms Lower Otay Lake, though there may be *O. mykiss* residing in upper reaches above the reservoir (Titus et al. 2010).

4.3.5.10 Tijuana River

The Tijuana River is the southernmost stream within the Southern SH/RT range and extends for 26 miles from the intersection of Cottonwood Creek (Becker and Reining 2008). Other than one account of few steelhead seen in 1927 by Department law enforcement, there has been no other documentation of historical use of the mainstem river (Titus et al. 2010). Steelhead were present in Cottonwood Creek in the mid-1930s, which was stocked with *O. mykiss* at that time, but Southern SH/RT are no longer able to pass multiple dams within the creek (Titus et al. 2010). If a steelhead run did exist in the Tijuana watershed, it is now assumed to be extirpated (Titus et al. 2010).

4.4 Abundance and Trends

To provide the best scientific information in our evaluation of the candidate species as required by Fish and Game Code Section 2074.6, we analyzed status and trends for Southern SH/RT with annual abundance data compiled from a variety of sources (See Section 4.2 for Sources of Information).

Southern SH/RT, as defined in the Petition, include both anadromous and resident forms of the species below complete migration barriers. To account for both life-history forms in our review, our analyses in Sections 4.4-4.8 examine data on anadromous adult Southern SH/RT (Adult SH) separately from data on *O. mykiss* not identified as anadromous adult Southern SH/RT (Other *O. mykiss*), as most existing monitoring efforts produce datasets that use these two categories. This is because it is possible to distinguish anadromous adult Southern SH/RT in rivers and streams due to their larger size (fork length >400m), greater girth, and steel-gray appearance, but it is otherwise difficult to conclude which life history an individual *O. mykiss* that does not have the identifying characteristics of an adult fish has expressed or will express. (Dagit et al. 2020; Moyle et al. 2017).

The analysis presented below is structured on the five BPGs with an emphasis on Core 1 and Core 2 populations within each BPG (NMFS 2012a; Boughton et al. 2007). The BPGs are a federal delineation based on a suite of environmental conditions (e.g., hydrology, local climate, geography) and watershed characteristics (i.e., large inland or short coastal streams). Core populations are identified as watersheds that exhibit the physical and hydrological conditions that have the highest potential to sustain self-sufficient viable populations of Southern SH/RT (NMFS 2012a). Datasets were reviewed to ensure that they were collected from monitoring conducted below the upper limit to anadromy in each watershed to remain consistent with the geographic scope of the listing unit proposed in the Petition. Where sufficient data were available for a given population, we present and discuss abundance and long-term population trend estimates for each BPG. The Department was unable to analyze core watersheds in the Mojave Rim and Santa Catalina Gulf Coast BPGs in detail due to data limitations. In these instances, as well as in other cases where data was limiting or unavailable, we provide a qualitative discussion, such as a viability assessment, based on the sources identified in Section 4.2 (Boughton et al. 2022a).

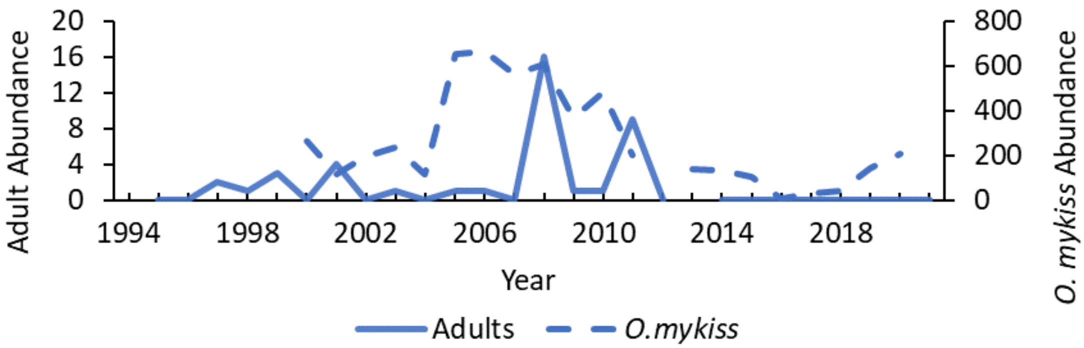
4.4.1 Time Series of Abundance

Southern SH/RT populations in the Monte Arido Highlands BGP have the longest running time-series dating back to the 1990s for the Santa Ynez and Santa Clara rivers (COMB 2022; Booth 2016) and the early 2000s for the Ventura River (CMWD 2005-2021; Dagit et al. 2020) (Figure 12). However, no organized monitoring efforts have been conducted on the Santa Maria River since steelhead were federally listed in 1997. Therefore, no further analysis of the Santa Maria Southern SH/RT populations are conducted in this chapter.

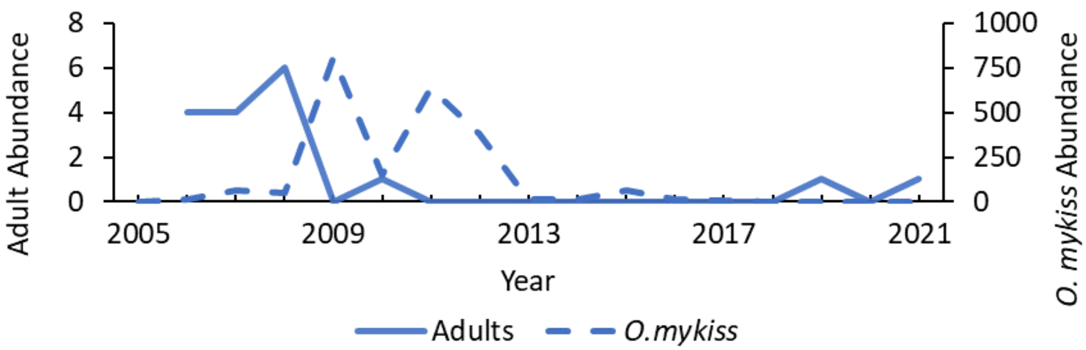
More recently, monitoring has been intermittently conducted on Carpinteria, Mission, and Arroyo Hondo in the Conception Coast BPG by the Department (Boughton et. al 2022a). Malibu, Topanga, and Arroyo Sequit creeks in the Santa Monica Mountains BPG have been actively monitored since the early 2000s (Dagit et al. 2019) (Figure 13). No recent or historical monitoring has been conducted in either the Mojave Rim or Santa Catalina Gulf Coast BPGs.

4.4.1.1 Monte Arido Highlands BPG

A. Santa Ynez River



B. Ventura River



C. Santa Clara River

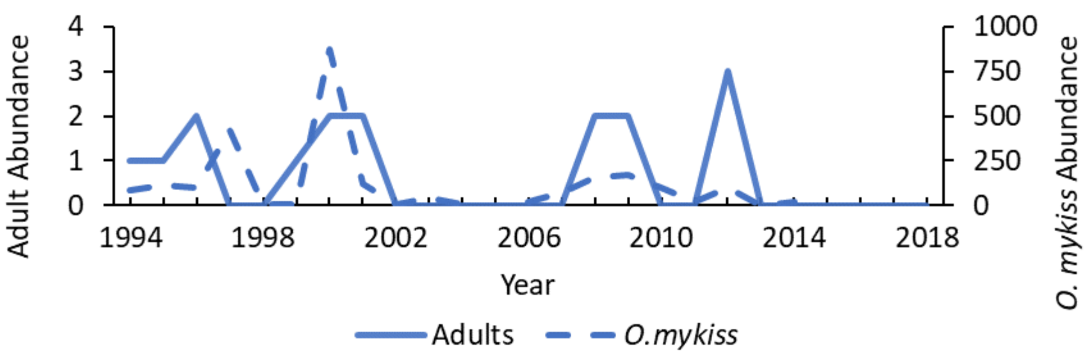


Figure 12. Adult steelhead (Adults) and other O. mykiss (O. mykiss) abundances for the Monte Arido Highlands BPG. A) Santa Ynez River; no data 2013. Biological Opinion Incidental Take provisions have been required since 2014. B) Ventura River. C) Santa Clara River. Adult abundance is on the left -axis with the solid blue line and O. mykiss abundance is on the right axis with the dashed blue line. Note different scales on the Y-axis.

4.4.1.2 Conception Coast BPG

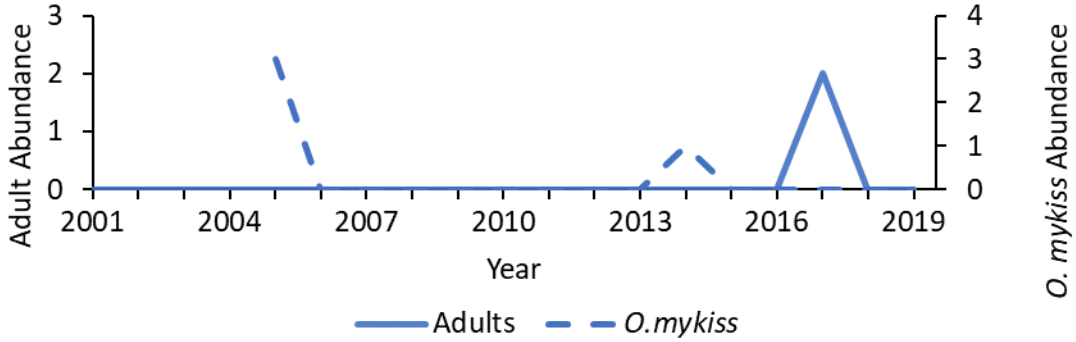
Very few monitoring activities have occurred throughout the Conception Coast BPG, and most of the work that has occurred in more recent years was conducted by the Department. We were unable to develop a full-time series of Southern SH/RT abundance for Conception Coast populations.

Although past monitoring is limited in this BPG, Dagit et. al (2020) documented a total of 42 adult steelhead opportunistic observations from 2000-2018. Two adults were observed in Arroyo Hondo Creek in 2017 and 10 adults were documented in the Goleta Slough Complex with the most recent observation occurring in 2017. For the entirety of Conception Coast BPG, 64% (n=27) of all adult observations occurred in Mission Creek, primarily from 1998-2008. However, from 2018-2022, Department redd and snorkel surveys documented zero adult steelhead in Mission Creek (K. Evans, CDFW, unpublished data). Three adults were observed opportunistically in Carpinteria Creek in 2008 (Dagit et al. 2020); however, from 2008-2019, zero adult steelhead were observed based on recent monitoring conducted by the Department (Boughton et al. 2022a).

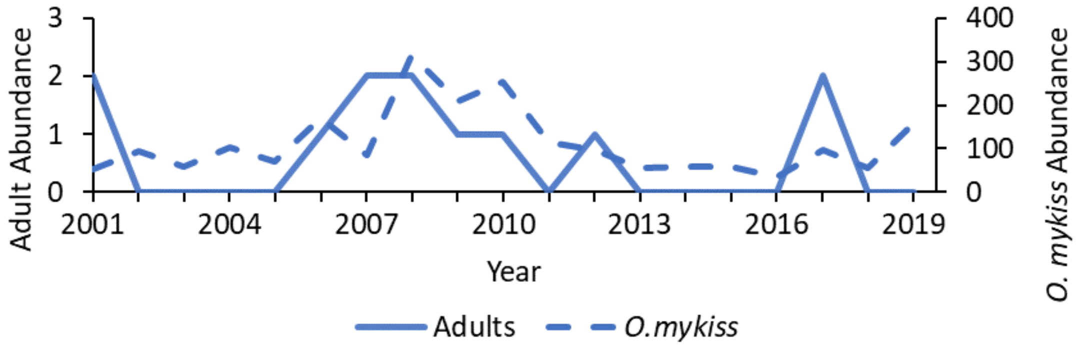
There is also limited data for *O. mykiss* in the Conception Coast BPG. No *O. mykiss* have been documented in Carpinteria Creek since 2016. In Mission Creek, no *O. mykiss* were observed from bankside surveys during the 2018-2019 spawning season (Carmody et al. 2019). In recent years, the largest number of *O. mykiss* observations in this BPG have occurred on Arroyo Hondo Creek, indicating that despite being a small watershed, the creek contains suitable habitat that is relatively undisturbed due to its inclusion in a natural reserve system (NMFS 2012a). Snorkel surveys have documented a total of 2,363 *O. mykiss* in Arroyo Hondo Creek from 2017-2019 (Carmody et al. 2019), while winter redd surveys have documented a total of 12,090 *O. mykiss* from 2015-2022 (K. Evans, CDFW, unpublished data).

4.4.1.3 Santa Monica Mountains BPG

A. Arroyo Sequit Creek



B. Topanga Creek



C. Malibu Creek

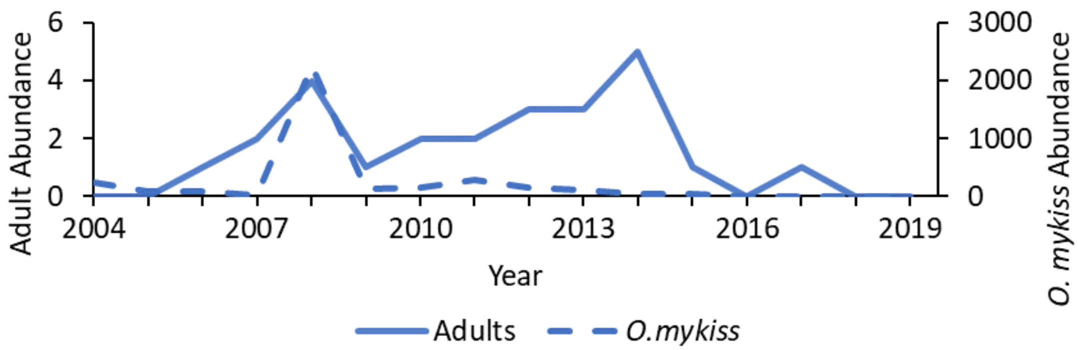


Figure 13. Adult steelhead (Adults) and other O. mykiss (O. mykiss) abundances for the Santa Monica Mountains BPG. A) Arroyo Sequit Creek. B) Topanga Creek. C) Malibu Creek. Adult abundance is indicated on the left -axis and delineated by the solid blue line and O. mykiss abundance is indicated on the right axis and delineated by the dashed blue line. Note different scales on the Y-axis.

4.4.1.4 Mojave Rim BPG

Abundance data is generally not available for this BPG; therefore, we were unable to create a full-time series of Southern SH/RT abundances for the San Gabriel River, Santa Ana River, and Los Angeles River watersheds.

A total of 3 adult steelhead were observed opportunistically in the Mojave Rim BPG from 2000-2018. Two observations occurred on Ballona Creek in 2007, and one observation occurred on the San Gabriel River in 2016 (Dagit et al. 2020). It is generally accepted that all over-summering, rearing, and spawning habitat occurring upstream is no longer accessible to Southern SH/RT due to the presence of extensive physical and velocity related passage barriers located within the lower reaches of each of the three major rivers; therefore, steelhead are not expected to be present in the lower reaches of these watersheds (NMFS 2012a).

4.4.1.5 Santa Catalina Gulf Coast BPG

We were unable to construct a full-time series of Southern SH/RT abundance for these populations because no data series were available to analyze the Santa Catalina Gulf Coast BPG. A total of 15 adult steelhead have been observed in the Santa Catalina Gulf Coast BPG from 2001-2018. Ten of these steelhead observations occurred on either San Juan or San Mateo creeks, and the remainder of observations were distributed throughout the Santa Margarita and San Luis Rey rivers and Los Penasquitos Creek (Dagit et al. 2020).

4.4.2 Geometric Mean Abundance

We calculated the geometric mean of abundance for Southern SH/RT populations (Na) with at least 3-4 generations of data for three time periods. The long-term calculation represents the total available time series. The medium-term calculation represents 12 years or three generations of data, while the short-term calculation is for the most recent 5 years of data. Missing data are noted in the following tables and there was no effort to interpolate or otherwise fill in missing data.

The geometric mean is a useful metric for evaluating species' status because it calculates the central tendency of abundance while minimizing the effect of outliers in the data. Furthermore, the geometric mean is thought to more effectively characterize time series data of abundance based on counts than the arithmetic mean (Good et al. 2005; Spence et al. 2008). We did not calculate arithmetic mean because of its tendency to be overly sensitive to outlier data to a few large counts and can result in the incorrect depiction of central tendency. A range of minimum and maximum abundances were also calculated to provide scale.

Using methods from Spence et al. (2008), we defined the geometric mean of Southern SH/RT abundance as:

$$Na\ (geom) = \left(\prod Na(i)\right)^{1/n}$$

where $Na(i)$ is the total number of adult steelhead in year *i*, and *n* is the number of years of data available.

4.4.2.1 Monte Arido Highlands BPG

Maximum abundance of adult steelhead in the Monte Arido Highlands BPG has remained consistently low since the mid-1990s and early 2000s (Table 2a-2c). For each population examined, maximum counts from the most recent 5-year period are less than either the medium or long-term time frames. For all three watersheds, years in which zero adults were observed have occurred more frequently than years in which at least one fish was observed.

The highest average abundance in this BPG was during the 12-year time frame (2010-2021) on the Santa Ynez River. Both the Santa Clara and Santa Ynez rivers have higher 12-year averages compared to the long-term average. Overall, all three populations have lower 5-year averages when compared to the long-term average and geometric mean abundances remain low across all time frames (Table 3).

Table 2a. Minimum and maximum adult steelhead abundance for the Santa Ynez River over three-time frames: 1995 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year). No data for 2013. Biological Opinion Incidental Take provisions have been required since 2014.

Abundance	**Minimum**	**Maximum**
Long-term	0	16
12-year	0	9
5-year	0	0

Table 2b. Minimum and maximum adult steelhead abundance for the Ventura River over three-time frames: 2006 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	6
12-year	0	1
5-year	0	1

Table 2c. Minimum and maximum adult steelhead abundance for the Santa Clara River over three-time frames: 1994 to 2018 (long-term), 2007 to 2018 (12-year), and 2014 to 2018 (5-year).

Abundance	Minimum	Maximum
Long-term	0	3
12-year	0	3
5-year	0	0

Table 3. Long-term, medium-term, and short-term geometric mean abundance of adult steelhead in the Monte Arido Highlands BPG.

Population	Years	Long-term Mean	Years	12-year mean	Years	5-year mean
Santa Ynez River[1]	1995-2021	2.1	2010-2021	3.0	2017-2021	0.0
Ventura River	2006-2021	2.1	2010-2021	1.0	2017-2021	1.0
Santa Clara River	1994-2018	1.7	2007-2018	2.3	2014-2018	0

[1] No data long-term 2013; Biological Opinion Incidental Take provisions have been required since 2014.

Maximum abundances of *O. mykiss* for all populations in the Monte Arido BPG are considerably less when comparing the 5-year time frame to the long-term time frame (Table 4a-4c). On the Ventura River, a maximum of 807 *O. mykiss* were observed during the long-term time frame compared to just nine individuals being observed during the most recent 5-year time frame. Minimum abundances range from zero to five *O. mykiss* for all three time-periods and populations. All three *O. mykiss* populations have lower 5-year averages compared to the 12-year and long-term time frames (Table 5). The Santa Ynez River has the highest average abundance of the three populations for each time frame. Overall, mean abundances of *O. mykiss* in this BPG have declined to low numbers, especially in the last five years.

Table 4a. Minimum and maximum O. mykiss (Other O. mykiss) abundance for the Santa Ynez River over three-time frames: 2001 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year). No data for 2013. Biological Opinion Incidental Take provisions have been required since 2014.

Abundance	Minimum	Maximum
Long-term	5	665
12-year	5	484
5-year	5	205

Table 4b. Minimum and maximum O. mykiss abundance (Other O. mykiss) for the Ventura River over three-time frames: 2005 to 2021 (long-term), 2010 to 2021 (12-year), and 2017 to 2021 (5-year).

Abundance	Minimum	Maximum
Long-term	0	807
12-year	0	640
5-year	0	9

Table 4c. Minimum and maximum other O. mykiss abundance for the Santa Clara River over three-time frames: 1994 to 2014 (long-term), 2003 to 2014 (12-year), and 2010 to 2014 (5-year). No data for 2005.

Abundance	Minimum	Maximum
Long-term	1	876
12-year	1	170
5-year	1	100

Table 5. Long-term, medium-term, and short-term geometric mean abundance of O. mykiss (Other O. mykiss) in the Monte Arido Highlands BPG.

Population	Years	Long-term Mean	Years	12-year mean	Years	5-year mean
Santa Ynez River[1]	2001-2021	166.4	2010-2021	100.5	2017-2021	43.7
Ventura River	2005-2021	44.7	2010-2021	34.5	2017-2021	3.0
Santa Clara River[2]	1994-2014	39.5	2003-2014	30.5	2010-2014	21

[1] No data long-term 2013; Biological Opinion Incidental Take provisions have been required since 2014.
[2] No data long-term 2005

4.4.2.2 Conception Coast BPG

We were unable to calculate geometric mean abundance estimates for the Conception Coast BPG aside from the Arroyo Hondo Creek *O. mykiss* population due to the lack of long-term data. Based on bankside *O. mykiss* observations as part of spawner redd surveys, the geometric mean abundance was 581 individuals from 2015-2022, the maximum abundance of 8,614 individuals was observed in 2021, and the minimum abundance of zero individuals was observed in 2022 (K. Evans, CDFW, unpublished data).

4.4.2.3 Santa Monica Mountains BPG

Maximum abundance counts of adult steelhead in the Santa Monica Mountains BPG have remained consistently low since the early 2000s (Table 6a-6c). A total of two adult steelhead were observed in Arroyo Sequit Creek in 2017, coinciding with the removal of all instream barriers on the creek below the Mulholland culvert in 2016; however, no adult steelhead have been observed in this creek since 2017. The maximum abundance of adult steelhead in Topanga and Malibu creeks has not been greater than five individuals for any given year during all time periods. For adult steelhead populations in both Topanga and Malibu creeks, the 5-year average is lower than the long-term average (Table 7). Overall, average abundances of adult steelhead for all three populations remain low across all time frames.

Table 6a. Minimum and maximum adult steelhead abundance for Arroyo Sequit Creek over three-time frames: 2005 to 2018 (long-term), 2007 to 2018 (12-year), and 2014 to 2018 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	2
12-year	0	2
5-year	0	2

Table 6b. Minimum and maximum adult steelhead abundance for Malibu Creek over three-time frames: 2004 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	5
12-year	0	5
5-year	0	1

Table 6c. Minimum and maximum adult steelhead abundance for Topanga Creek over three-time frames: 2001 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	0	2
12-year	0	2
5-year	0	2

Table 7. Long-term, medium-term, and short-term geometric mean abundance of adult steelhead in the Santa Monica Mountains BPG.

Population	Years	Long-term mean	Years	12-year mean	Years	5-year mean
Arroyo Sequit Creek[1]	2005-2019	NA	2008-2019	NA	2015-2019	NA
Topanga Creek	2001-2019	1.4	2008-2019	1.3	2015-2019	1
Malibu Creek	2004-2019	1.9	2008-2019	2.1	2015-2019	1

[1] Insufficient data to produce meaningful results.

For all populations in this BPG, maximum abundances of *O. mykiss* for the 5-year time frame are considerably lower compared to the long-term time frame (Table 8a-8c). Since 2005, a total of four *O. mykiss* were observed in Arroyo Sequit Creek with most years recording zero observations (Table 8a). For the Malibu Creek population, a maximum abundance of 2,245 *O. mykiss* was observed from 2004-2019 compared to just 32 individuals during the 5-year time frame (Table 8b). Topanga Creek appears to support a small but consistent population of *O. mykiss* with a long-term maximum and minimum abundance of 316 and 34 individuals, respectively (Table 8c). Topanga Creek *O. mykiss* have also declined in abundance over the three time periods, but this difference is less pronounced than the decline observed for the Malibu Creek population (Table 9).

Table 8a. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Arroyo Sequit Creek over three-time frames: 2005 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	Minimum	Maximum
Long-term	0	3
12-year	0	1
5-year	0	0

Table 8b. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Malibu Creek over three-time frames: 2004 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	Minimum	Maximum
Long-term	0	2,245
12-year	0	2,245
5-year	0	32

Table 8c. Minimum and maximum O. mykiss (Other O. mykiss) abundance for Topanga Creek over three-time frames: 2001 to 2019 (long-term), 2008 to 2019 (12-year), and 2015 to 2019 (5-year).

Abundance	**Minimum**	**Maximum**
Long-term	34	316
12-year	34	316
5-year	34	160

Table 9. Long-term, medium-term, and short-term geometric mean abundance of O. mykiss (Other O. mykiss) in the Santa Monica Mountains BPG. Data used are sum of the average number of O. mykiss observed per month.

Population	**Years**	**Long-term geometric Mean**	**Years**	**12-year geometric mean**	**Years**	**5-year geometric mean**
Arroyo Sequit Creek[1]	2005-2019	NA	2008-2019	NA	2015-2019	NA
Malibu Creek	2004-2019	55.9	2008-2019	52.6	2015-2019	6.1
Topanga Creek	2001-2019	94.2	2008-2019	100.1	2015-2019	70

[1] Insufficient data to produce meaningful results.

4.4.2.4 Mojave Rim and Santa Catalina Gulf Coast BPG

We were unable to calculate geometric mean abundance estimates for either the Mojave Rim or Santa Catalina Gulf Coast BPG due to the lack of long-term data. See Sections 4.3.4, 4.4.1.4, 3.3.5 and 3.4.1.5 for more information on adult steelhead and *O. mykiss* distribution and abundances in these two BPG.

4.4.3 Trend Analysis

Trends were calculated as the slope (β_1) of the regression of log-transformed abundance against years. A value of one was added to the number of Southern SH/RT before the log-transformation to address any zero values if they were present in the dataset [i.e., $ln\ (\bar{N}_a + 1)$]. Using methods from Good et al. (2005), the linear regression can be expressed as:

$$ln\ (\bar{N}_a + 1) = \beta_0 + \beta_1 X + \in$$

Where $\bar{N}_a$ is annual adult steelhead abundance, β_0 is the intercept, β_1 is the slope of the equation, and ∈ represents the random error term. Population trend, *T*, for the specified time series was expressed as the exponentiated slope from the regression above:

$$\exp(\beta_1)$$

with 95% confidence intervals calculated as:

$$\exp(\beta_1) \pm t_{0.05(2),df} s_{b_1}$$

where b_1 is the estimate of the true slope, β_1, $t_{0.05(2),df}$ is the two-sided t-value for a confidence level of 0.95, *df* is equal to *n*-2, *n* is the number of data points in the time series, and s_{b_1} is the standard error of the estimate of the slope, b_1 (Good et al. 2005). We converted the slope to percent annual change (Busby et al. 1996), calculated as:

$$100 * (\exp(\beta_1) - 1)$$

Negative trend values indicate declining abundances over time, whereas positive values indicate growth of the population. Slopes significantly different from zero (P<.05) were noted.

4.4.3.1 Monte Arido Highlands BPG

We calculated adult steelhead and *O. mykiss* population trends for the Santa Ynez, Ventura, and Santa Clara rivers; however, due to lack of monitoring data we were unable to calculate trends for the Santa Maria River adult steelhead and *O. mykiss* populations (Tables 10 and 11). All three adult steelhead populations have declining trends in abundance for their respective data series and the decline in the Ventura River population is statistically significant (p=0.03). Our trend estimates are consistent with other recently reported trend estimates for the Monte Arido Highlands BPG (Boughton et al. 2022a). Similarly, all three *O. mykiss* populations have declining trends in abundance with significant declines observed on the Santa Ynez (p=0.03) and Ventura (p=0.05) rivers (Table 11).

Table 10. Trends in adult steelhead abundance using slope of ln-transformed time series counts for three Monte Arido Highland BPG populations. Missing years of data were eliminated and not interpolated in any way. Bolded trend values were found to be significant (p<0.05).

Population	**Years**	**Trend (%/year)**[1]	**Lower 95% CI**	**Upper 95% CI**
Santa Ynez River[1]	1995-2021	-2.24	-6.12	1.59
Ventura River	2006-2021	**-7.54**	-13.77	-0.86
Santa Clara River	1994-2018	-2.29	-4.99	0.49

[1] No data 2013, Biological Opinion Incidental Take provisions have been required since 2014.

Table 11. Trends in O. mykiss (Other O. mykiss) abundance using slope of ln-transformed time series counts for three Monte Arido Highland BPG populations. Missing years of data were eliminated and not interpolated in any way. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)[1]	Lower 95% CI	Upper 95% CI
Santa Ynez River[1]	1995-2021	**-8.81**	-15.98	-1.03
Ventura River	2006-2021	**-19.39**	-34.89	-0.20
Santa Clara River[2]	1994-2018	-6.09	-18.03	7.58

[1] No data 2013, Biological Opinion Incidental Take provisions have been required since 2014.
[2] No data 2005

4.4.3.2 Santa Monica Mountains BPG

Both Topanga and Malibu Creek populations have a declining but non-significant trend in adult abundance (Table 12). The trend estimates reported here are consistent with recently reported trend estimates for Topanga and Malibu creeks (Boughton et al. 2022a).

The Malibu Creek *O. mykiss* population has experienced a statistically significant (p=0.002) average declining trend in abundance of approximately 26% per year from 2004-2019 (Table 13). The average trend in adult *O. mykiss* abundance for the Topanga Creek population also suggests a decline from 2001-2019; however, the trend is not statistically significant.

Table 12. Trends in adult steelhead abundance using slope of ln-transformed time series counts for the Santa Monica Mountains BPG populations. Missing years of data were not included. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)	Lower 95% CI	Upper 95% CI
Arroyo Sequit[1]	2001-2019	NA	NA	NA
Topanga Creek	2001-2019	-1.70	-5.76	2.54
Malibu Creek	2004-2019	-1.41	-8.49	6.22

[1] Insufficient data to produce meaningful results.

Table 13. Trends in O. mykiss (Other O. mykiss) abundance using slope of ln-transformed time series counts for the Santa Monica Mountains BPG populations. Missing years of data were not included. Bolded trend values were found to be significant (p<0.05).

Population	Years	Trend (%/year)	Lower 95% CI	Upper 95% CI
Arroyo Sequit [1]	2005-2019	NA	NA	NA
Malibu Creek	2004-2019	**-25.56**	-37.19	-11.79
Topanga Creek	2001-2019	-1.24	-6.44	4.25

[1] Insufficient data to produce meaningful results.

4.4.3.3 Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs

We were unable to calculate trends for populations of Southern SH/RT in the Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs due to lack of available data, with the exception of Arroyo Hondo Creek *O. mykiss*. The analysis of the Arroyo Hondo Creek *O. mykiss* population counts from seven years of bankside observations conducted during winter redd surveys indicate a declining trend in *O. mykiss* abundance, but the trend is not statistically significant (p=0.71).

Many watersheds in the Mojave Rim and Santa Catalina Gulf Coast BPGs likely supported intermittent steelhead populations characterized by repeated local extinctions and recolonization events in dry and wet years, respectively (NMFS 2012a). The sporadic and intermittent nature of these populations preclude the ability to effectively analyze trends in abundance. Furthermore, many populations occurring south of the Santa Monica Mountains are considered severely reduced and, in many instances, extirpated (Boughton et al. 2005).

4.5 Productivity

Productivity or population growth rate provides important information on how well a population is “performing” in the habitat it occupies throughout its life cycle. Productivity is a key indicator of whether a population is able to replace itself from one generation to the next. Productivity and abundance are closely linked metrics as a population’s growth rate should be sufficient to maintain its abundance above viable levels (McElhany et al. 2000).

A population’s cohort replacement rate (CRR) is defined as the rate at which each subsequent cohort or generation replaces the previous one (NOAA 2006). Data for adult steelhead in southern California contain too many years of zero observations to effectively calculate a CRR; therefore, we did not attempt to estimate this ratio. We calculated the CRR for *O. mykiss* populations in the Santa Ynez, Ventura, and Santa Clara rivers, as well as Malibu and Topanga creeks to account for the possibility of some individuals from these populations contributing to the anadromous life-history form. These watersheds were also selected because there was sufficient data (i.e., years with nonzero data) to produce CRR estimates.

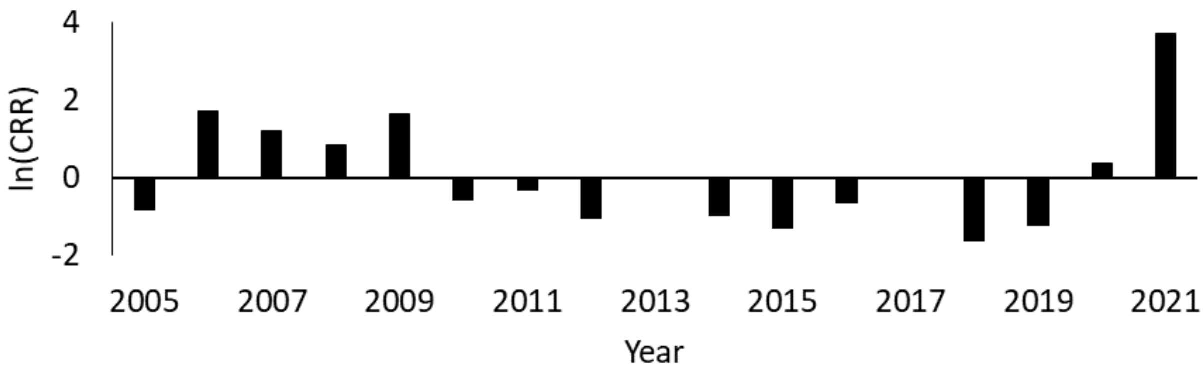
The CRR is defined as:

$$CRR = \ln (Nt{+}t4/Nt)$$

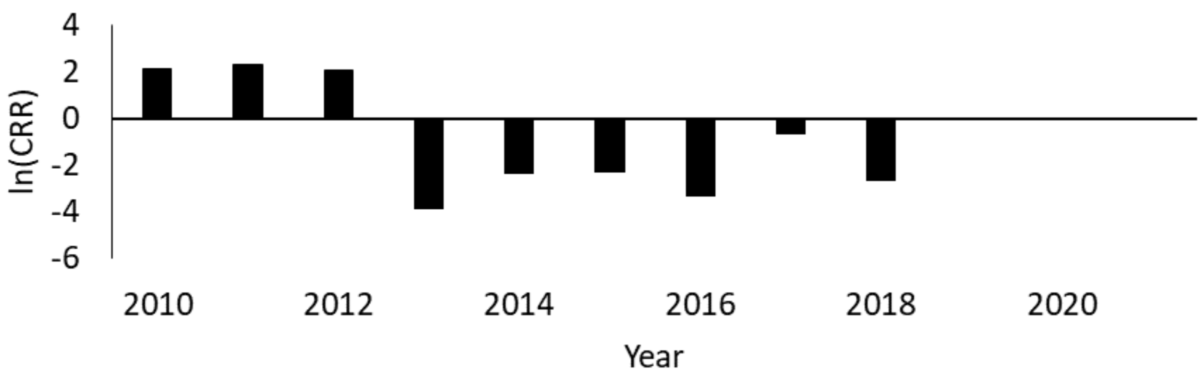
Natural log transformed CRRs greater than zero indicate that the cohort increased in size that year in relation to the brood year three years earlier, whereas a CRR less than zero indicates that the cohort decreased in size. This analysis assumes a generation time of four years, which has been determined to be reasonable based off our best understanding of the Pacific steelhead fluvial-anadromous life-history (NMFS 2012a; Shapovalov and Taft 1954).

Over the entire time series, CRR values for the Santa Ynez, Ventura, and Santa Clara River *O. mykiss* populations were more negative than positive (Figure 13). Negative CRRs most frequently occurred from 2013-2018, which coincide with the most recent extreme drought period and associated drought-related low flow conditions. The Santa Ynez River population may be recovering, as indicated by a high CRR in 2021. Topanga Creek had more positive CRRs than negative, however, 89% of the years with positive values occurred prior to 2012. The CRRs on Topanga Creek are consistent with a recent study that found a significant decline of the abundance of all life stages of *O. mykiss* due to the 2012-2017 drought (Dagit et al. 2017). Population growth rates on Malibu Creek appear to be declining as CRR values have been negative since 2012.

A.



B.



C.

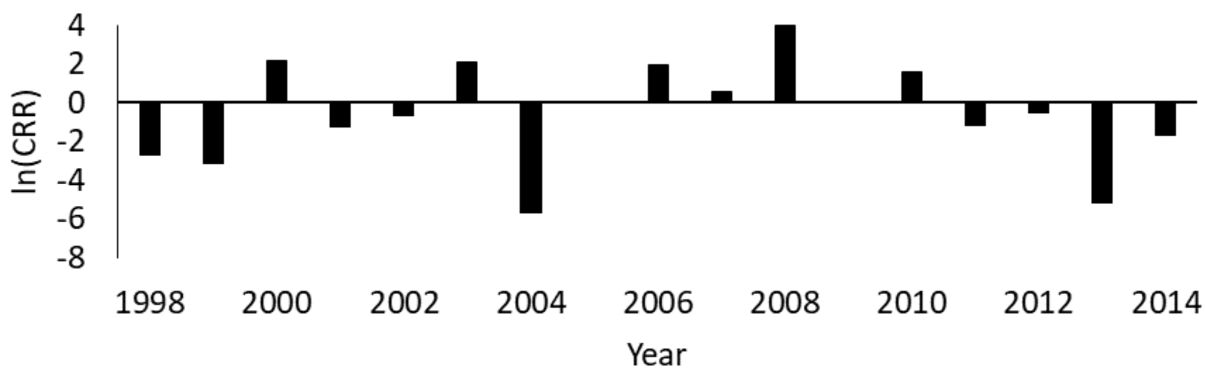
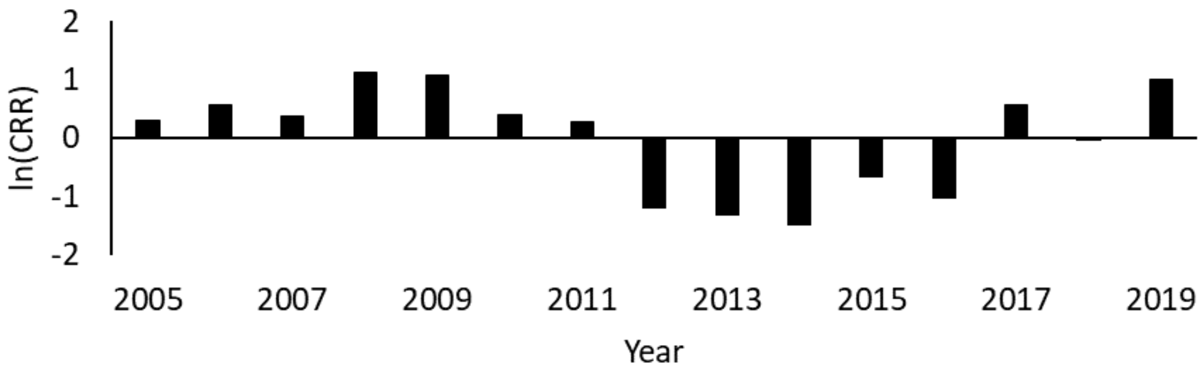


Figure 14a. Ln-Cohort Replacement Rates for O. mykiss (Other O. mykiss) populations, A) Santa Ynez River, B) Ventura River, and C) Santa Clara River; Biological Opinion Incidental Take provisions have been required since 2014. Gaps are a result of missing years of data. Note different scales on the Y-axis.

D.



E.

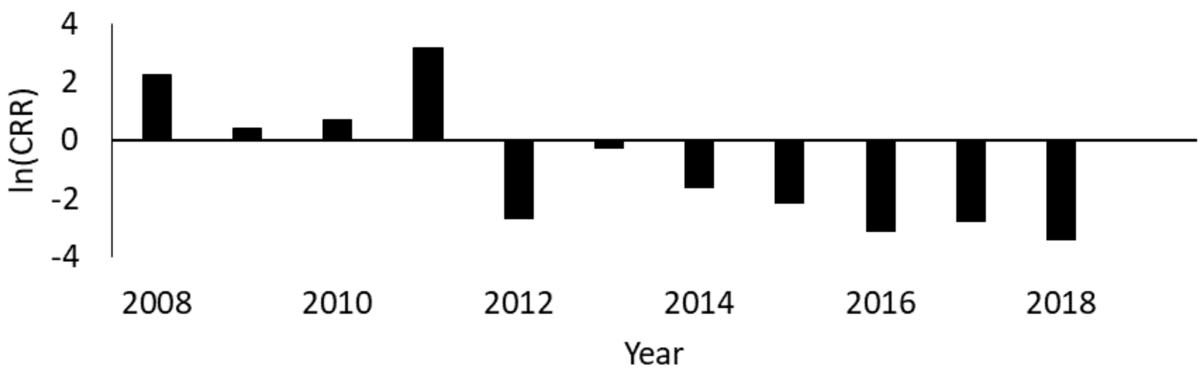


Figure 14b. Ln-Cohort Replacement Rates for O. mykiss (Other O. mykiss) populations, D) Topanga Creek, and E) Malibu Creek. Gaps are a result of missing years of data. Note different scales on the Y-axis.

4.6 Population Spatial Structure

Population spatial structure refers to the spatial distribution of individuals in the population and the processes that generate that distribution. Population spatial structure is a function of habitat quality, spatial configuration, and dispersal rates of individuals within different habitat types. Spatial structure reflects the extent to which a population's abundance is distributed among available or potentially available habitats at any life stage. All else being equal, a population with low abundance is likely to be less evenly distributed within and among watersheds and is more likely to experience extinction from catastrophic events. Furthermore, populations with low abundance have a reduced potential to recolonize extirpated populations.

Numerous discrete and spatially dispersed but connected populations are required to achieve long-term persistence of Southern SH/RT (NMFS 2012a). Though we cannot specifically classify the spatial structure necessary to maintain Southern SH/RT viability with certainty, examining similarities and differences between the species' historical and current spatial distribution can provide a better understanding of their present extinction risk. Southern SH/RT historically occupied at least 46 watersheds in southern California. Currently, only 37-43% of these watersheds are thought to still be occupied by the species (NMFS 2012a). This finding not only highlights the severe contraction of the distribution and abundance of Southern SH/RT in their range, but also indicates that the species is prone to range-wide extinction due to several factors such as low population growth rate, loss of genetic diversity, and the limited number of sparsely distributed individuals that may be necessary to recolonize extirpated neighboring populations.

The truncated Southern SH/RT spatial structure observed today can be attributed to the presence of numerous dams, artificial barriers, and other instream structures that have long impeded migration and access to high quality upstream habitat throughout southern California (NMFS 2012a). Dams and other barriers not only restrict access to upstream spawning and rearing habitat, but also prevent important ecological and genetic interactions with *O. mykiss* from occurring both upstream and downstream of the total barrier. Isolated *O. mykiss* populations containing ancestry of native Southern SH/RT continue to persist above barriers in approximately 77% of watersheds where the anadromous component has been lost below the barrier (Nielsen et al. 1997; Boughton et al. 2005; Clemento et al. 2009). The impact of dams and other artificial barriers is especially notable on the large rivers and small coastal streams in the northern portion of the species' range. For example, Cachuma, Gibraltar, and Juncal dams on the Santa Ynez River block access to at least 70% of historical spawning and rearing habitat within the watershed. Matilija and Casitas dams located on Matilija and Coyote creeks, respectively, restrict access to 90% of the available spawning habitat in Ventura River watershed. Similarly, Santa Felicia and Pyramid dams on Piru Creek block access to all upstream spawning habitat on this major tributary of the Santa Clara River. On Malibu Creek, the Rindge Dam and Malibu Lake dam blocks access to over 90% of historical anadromous spawning and rearing habitat within the watershed (NMFS 2012a).

Historically, the lower and middle reaches of streams in southern California were mainly used as migration corridors to higher quality upstream habitat. Today, these reaches are the only remaining accessible spawning habitat for Southern SH/RT and are characterized by high urban densities, channelization, impaired stream flows, instream diversions, and habitat that generally favors non-native fishes (NMFS 2012a). Furthermore, habitat loss and fragmentation has led to the loss of habitat diversity (i.e., riparian cover, instream habitat structure), which has prevented fish from utilizing these once connected and intact habitats. Because a population's spatial structure is partly a function of the amount of available suitable instream habitat, the loss of habitat below the barrier to anadromy is also attributed to the reduced Southern SH/RT spatial structure observed today.

The current distribution of Southern SH/RT across its range is inadequate for the long-term persistence and viability of the species (NMFS 2012a). The majority of watersheds in southern California contain dams and artificial barriers that restrict access to high quality upstream spawning and rearing habitat. Barriers to migration isolate and prevent ecological interactions with upstream native *O. mykiss* that would otherwise have the potential to be anadromous. Population level impacts include increased susceptibility to local extirpation due to natural demographic and environmental variation and the loss of genetic and life-history diversity (NMFS 2012a). Range-wide, the historically widespread Southern SH/RT are now sparsely distributed across the landscape with significant reductions in abundance. The degraded spatial structure of Southern SH/RT threatens the viability of the population because extinction rates of individual sub-basin populations are likely much higher than the rate of the formation of new populations from recolonization (McElhany et al. 2000). This is especially relevant for populations occurring in watersheds south of the Santa Monica Mountains; originally these watersheds supported infrequent Southern SH/RT populations that were likely characterized by repeated local extinction and recolonization events in dry and wet cycles.

4.7 Diversity

Diversity refers to the life-history (i.e., phenotypic) and genetic characteristics of a population. Life-history diversity allows populations to utilize a wide array of habitats and confers resilience against short-term spatial-temporal variation in the environment. Genetic diversity affects a population's ability to persist during long-term changes in the environment due to both natural and anthropogenic influences. The variation in the life history characteristics in any given population are typically the result of its genetic diversity interacting with environmental conditions. Populations lacking genetic diversity may not have as many genetic "options" to generate new or modified life history types in the face of changing environmental conditions, since natural selection may favor new or different genetic variants. As such, a genetically depauperate population that may be well adapted to the current steady state could be maladapted to new environmental conditions. The combination of both diversity types in a natural environment provides populations with the ability to adapt to long-term changes and be more resilient to these changes over both short- and long-term time scales (McElhany et al. 2000).

Our analysis in Section 4.4 demonstrates declines in *O. mykiss* populations across much of its southern California coast range and preserving Southern SH/RT life-history strategies and adaptations is a critical component for the recovery of the Southern California Steelhead DPS (NMFS 2012a). Ideally, all three Southern SH/RT life-history types (i.e., fluvial-anadromous, freshwater-resident, lagoon-anadromous) would be expressed within a single population, or the population would harbor the underlying genetic variation to express those life-history types when environmental conditions allow. The freshwater-resident life-history type is still present in many populations of Southern SH/RT; however, this form frequently occurs in the isolated upper reaches of the watershed where opportunities for gene flow with anadromous fish are prevented by barriers to migration. Bond (2006) demonstrated accelerated growth rates of juvenile *O. mykiss* expressing the lagoon-anadromous life-history form. Larger size at ocean entry is thought to enhance marine survival and improve adult returns (Bond 2006); however, it is unlikely that this life-history form is currently viable, because approximately 75% of estuarine habitat in southern California has been lost, and the remaining intact habitats are constrained by agricultural and urban development, highways, and railroads, and threatened by sea level rise (NMFS 2012a). The artificial breaching of lagoons also poses a significant threat to the lagoon-anadromous life-history form as a recent study observed considerable mortality of Southern SH/RT directly after artificial breaching (Swift et al. 2018). As presented in Section 4.4, the anadromous form of Southern SH/RT still occurs in very low abundances in a limited portion of their historical range. The preservation of this life-history component will require substantial habitat restoration and modifications or removal of the numerous artificial barriers that currently restrict access to upstream high-quality spawning habitat (NMFS 2012a).

Several recent studies highlight the important role that genetic factors have in determining the life-history expression of coastal steelhead. Pearse et al. (2014) identified two Omy5 haplotypes linked to the anadromous (“A”) and resident (“R”) life-history forms whereby “AA” and “AR” genotype are more likely to be anadromous than the “RR” genotype (Pearse et al. 2019). Rundio et al. (2021) found that age 1+ juveniles with “RR” and “AR” genotypes experienced higher growth rates than fish with the “AA” genotype, and that overall condition was slightly higher in future resident fish than in future smolts, particularly among resident males. The divergence of the “A” and “R” haplotypes in Southern SH/RT populations is influenced by the presence of numerous artificial barriers in southern California, which act as a strong selection pressure against the “A” haplotype in above barrier populations. For example, on the Santa Clara River, the Vern Freeman Diversion Dam and other instream diversions have restricted fish passage to spawning and rearing habitat on its tributaries, Sespe and Santa Paula creeks (NMFS 2012a). Populations of *O. mykiss* from both tributaries were found to display moderately high frequencies of the “R” haplotype (Pearse et al. 2019). Relative frequencies of the “R” and “A” haplotypes can also be altered in populations that have become introgressed with other strains of Rainbow Trout that may have much different haplotype frequencies.

The recognition of the “A” and “R” haplotypes provide insight on the genetic integrity and viability of Southern SH/RT. The frequency of the anadromous haplotype may substantially decline during periods of adverse conditions due to the low predicted survival of migrating smolts (i.e., “AA” and “AR” individuals). Likewise, “RR” and “AR” residents may be favored during adverse conditions, which could eventually lead to declines of the “A” haplotype over time and the gradual loss of the “AA” genotype from the population. Without considerable restoration of habitat connectivity through the removal of artificial barriers, the “A” haplotype in “AR” individuals in isolated populations above barriers is expected to be slowly lost over time (Apgar et al. 2017). While “AR” smolts may produce “AA” individuals when favorable migration conditions continue and retain the “A” haplotype in resident populations, it is unclear that the resident component can reliably sustain the anadromous component in the long term (Boughton et al. 2022a). Furthermore, climate change projections for Southern SH/RT range predict an intensification of typical climate patterns such as more intense cyclic storms, drought, and extreme heat (NMFS 2012a). These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form.

4.8 Conclusions

This section summarizes the abundance, trends, and productivity analyses. Because quantitative analyses were not conducted for population spatial structure and diversity, we do not provide conclusions for these metrics as we believe the qualitative discussions in Sections 4.6 and 4.7 provide sufficient detail and information.

4.8.1 Abundance and Trends

The data evaluated indicate an overall long-term declining trend of Southern SH/RT with critically low range-wide abundances. In the past decade, adult abundance counts have not been greater than ten for any watershed examined, and most streams have observed no adult returns during this time period. For the Monte Arido Highlands BPG, which is thought to be a potential source population for smaller coastal watersheds such as the Conception Coast BPG, only a single adult has been observed returning in the past five years. For each of the three populations analyzed, the data for this BPG shows a long-term declining trend in adult abundance. The steepest decline occurred in the Ventura River population, for which a statistically significant -7.54% per year was observed.

The data evaluated for the Santa Monica Mountains BPG indicate that these watersheds support small but consistent runs of adult steelhead ranging from zero to five individuals per year. However, like other salmonid-supporting streams in the Southern SH/RT range, few adults have been observed in the past five years, and it is unlikely that these streams historically supported large runs of Southern SH/RT due to their small size. The data also show declining but not statistically significant trends in adult abundance for Malibu and Topanga creeks. The Department's South Coast Region staff have not observed any *O. mykiss* in Malibu Creek since before the Woosley fire in 2018 and believe the watershed to be effectively extirpated below Rindge Dam (D. St. George, CDFW, personal communication). A combined total of five adults have been observed for the Conception Coast, Mojave Rim, and Santa Catalina Gulf Coast BPGs since 2017 (Dagit et al. 2020). Our finding of generally declining trends in the abundance of adult steelhead is consistent with the results of a recent viability assessment for the southern California Coast Domain produced by Boughton et al. (2022a).

O. mykiss trends also demonstrate measurable declines in overall abundance. Maximum abundance and long-term averages of *O. mykiss* have declined in all three Monte Arido Highland populations. Similarly, all populations in this BPG show declining trends in O. *mykiss* abundance with statistically significant declines of -8.81% and -19.39% per year on the Santa Ynez and Ventura rivers, and a non-statistically significant decline of -6.09% on the Santa Clara River. Within the Santa Monica Mountains BPG, both Malibu and Topanga creek *O. mykiss* populations have experienced a long-term decline. The *O. mykiss* population in Topanga Creek appears to be more viable than Malibu Creek as our results indicate only a small long-term decline. Our results indicate a trend of -25.56% per year on Malibu Creek, which is the steepest average annual decline for any of the Southern SH/RT populations that we analyzed.

The most recent prolonged drought from 2012-2017 correlates with significant reductions of all life-history forms and stages of Southern SH/RT. Drought conditions are associated with the loss of suitable spawning and rearing habitat, insufficient instream flows required for migration, diminished water quality, reductions in available food supply, and increases in direct mortality due to predation and stranding (Dagit et al. 2017). Our analyses show a relatively consistent range-wide pattern of higher abundances prior 2012 followed by consecutive years of lower abundances starting at the onset of the drought. It appears that few populations have recovered from the drought as current abundance estimates remain low relative to pre-drought conditions. The ability of Southern SH/RT abundances to recover is likely dependent on *O. mykiss* in perennial refugia streams to successfully produce downstream migrants. However, virtually all refugia populations are currently above impassable barriers. Furthermore, many southern California watersheds do not contain upstream drought refugia. In these instances, recolonization from source populations in other watersheds is likely the only mechanism for these populations to rebound (Boughton et al. 2022a).

Boughton et al. (2007) established a precautionary run size criteria for the southern California Coast Domain of 4,150 spawners per year to provide a 95% chance of persistence of the watershed’s population over the next 100 years. While this goal may not be feasible for many of the smaller coastal watersheds in southern California, NMFS (2012) speculated that this target may be more feasible for the larger watersheds (i.e., Monte Arido Highland BPG). Even if we applied a lower criterion of 834 spawners (Boughton et al. 2022a), the results of our analyses demonstrate that no population is near the criteria necessary to provide resilience from extinction.

It is important to highlight limitations of our analyses. First, our analysis may underestimate the true abundance of adult steelhead because data analyzed for this effort are usually collected during periods of high stream flows and turbidity, making monitoring difficult to conduct (Dagit et al. 2020). Second, the data used in this effort are derived from various single-basin monitoring efforts, each of which utilize different survey designs and approaches. Thus, we were required to interpret the data as reported, while recognizing the potential limitations in making inter-watershed comparisons in instances where the data were from various monitoring efforts that did not necessary meet standards established by the Department’s California Coastal Monitoring Program (CMP). Third, the lack of any monitoring of most watersheds occurring south of the Santa Monica Mountains inhibited our ability to make definitive and comprehensive range wide conclusions on Southern SH/RT abundance and trends. However, it is likely that abundance estimates for many watersheds in the southern portion of the range are so low that obtaining accurate estimates would remain difficult even with increased monitoring.

4.8.2 Productivity

The results of our CRR analysis for *O. mykiss* on the Santa Ynez, Ventura, and Santa Clara rivers show more years of negative than positive CRR values. Negative CRR values were observed during the 2012-2017 drought period for all populations. However, the most recent 2021 estimate for the Santa Ynez population was positive, which may suggest a recovering population. CRR values for Topanga Creek were more positive than negative; however, most positive values occurred prior to the onset of 2012 drought conditions. In recent years, Malibu Creek CRR values have been negative, particularly during the 2012-2017 drought period.

While the CRR values for *O. mykiss* do not necessarily reflect true spawner to spawner ratios due to the high likelihood that many observed fish were not actually part of the spawning cohort during that year, our results demonstrate that *O. mykiss* populations occurring below the barrier to anadromy in these watersheds do not appear to be viable because abundances are too low to sustain positive population growth rate on a yearly basis. This result is especially concerning given that the long-term resilience of the anadromous component of Southern SH/RT likely depends on the production of anadromous juveniles from the freshwater-resident life-history form.

5. HABITAT THAT MAY BE ESSENTIAL TO THE CONTINUED EXISTENCE OF THE SPECIES

5.1 Migration

Southern SH/RT migration into freshwater is linked with seasonal winter and spring high flows that establish connectivity between the ocean and freshwater spawning areas (NMFS 2012a).

Adult steelhead require water depths of at least 18 cm depth for upstream movement; however, 21 cm is considered to be more suitable for upstream passage of all possible sizes of individual fish, because it allows sufficient clearance so that contact with the streambed is minimized (Bjornn and Reiser 1991; SWRCB 2014). Low dissolved oxygen (<5 mg/L) and high turbidity can deter migrating salmonids such as steelhead (Bjornn and Reiser 1991). Delayed migration may also occur when stream temperatures are too high or low (Bjornn and Reiser 1991). Disease outbreaks can occur as a result of extreme high temperatures (Bjornn and Reiser 1991; Spence et al. 1996). Salmonids usually migrate when water temperatures are below 14°C (Spence et al. 1996); however, salmonids can adapt to higher thermal limits when slowly exposed to increased water temperatures over time (Threader and Houston 1983).

Instream structure, like waterfalls, sandbars, and debris jams can act as impediments to upstream fish migration. Steelhead are able to jump a maximum of 3.4 m (Spence et al. 1996) and typically, pool depth must be at least 25% greater than barrier height to achieve the required swimming velocity to pass the barrier (Spence et al. 1996). Pool shape can also influence if a barrier is passable by steelhead. For example, water flow over a steep waterfall into a plunge pool may increase jump height capacity due to upward thrust created by the hydrodynamics within the pool (Bjornn and Reiser 1991). Physical structures such as large woody debris and boulders within streams can offer flow and temperature refuge for resting fish during migration to upstream spawning areas (Spence et al. 1996). Wood structures, overhanging banks, and riparian flora can provide cover to steelhead for protection from terrestrial and avian predators. Deep pools provide important holding habitats for migrating adult salmonids (Chubb 1997).

5.2 Spawning

Habitat attributes necessary for successful spawning include cover, appropriate substrate, cool stream temperatures, and adequate streamflow (Reiser and Bjornn 1979). Salmonids select spawning sites in pool-riffle transitional areas where downwelling or upwelling currents occur that create loose gravel with minimal sediment and litter (Bjornn and Reiser 1991). Rainbow Trout can spawn in a relatively wide range of temperatures, from 2 – 22°C, but may respond to abrupt temperature declines with decreased spawning activity and production (Reiser and Bjornn 1979). Steelhead and Rainbow Trout require gravel substrate of 0.5 – 10.2 cm in diameter to construct their redds and a high proportion of the redd substrate must be comprised of smaller-sized gravel within this range (Reiser and Bjornn 1979). Cover habitat, which offers protection from predation, can include overhanging banks, riparian or aquatic vegetation, large and small woody debris, rocks, boulders, and other instream features. Having access to cover close to a redd is advantageous for Southern SH/RT and may influence spawning site selection (Reiser and Bjornn 1979). Minimum water depth must be sufficient to cover the spawning fish and, depending on individual fish size, is likely to range from 6-35cm (Bjornn and Reiser 1991).

Steelhead and Rainbow Trout have been documented to spawn in water velocities ranging from 21-117 cm/s (Reiser and Bjornn 1979; Bovee and Milhous 1978). Under moderate water velocities, increasing streamflow leads to a greater amount of covered gravel substrate for spawning; however, if water velocities and associated stream flows are too high, the additional suitable spawning habitat becomes unusable for salmonids and stream spawning capacity declines (Reiser and Bjornn 1979; Bjornn and Reiser 1991). Total suitable spawning area within a stream is dependent on the density and size of spawning fish, water depth and velocity, and amount of appropriately sized gravel substrate available (Bjornn and Reiser 1991). These factors combined drive habitat suitability for steelhead and other salmonids (Bjornn and Reiser 1991).

5.3 Instream Residency

Temperature, dissolved oxygen, salinity, water flow, and water depth are all factors that determine stream habitat suitability for *O. mykiss*. Water temperature is especially critical for survival in southern California, as stream temperature can vary drastically within the span of a single day, sometimes peaking at over 30°C during summer months (Sloat and Osterback 2013). For Southern SH/RT, changes in behavior occur above 25°C, such as decreased feeding or movement into refugia (Ebersole et al. 2001; Sloat and Osterback 2013) and the estimated mortality threshold is 31.5°C (Sloat and Osterback 2013), which is marginally higher than that of more northern steelhead populations (Rodnick et al. 2004; Werner et al. 2005). This increased temperature tolerance indicates that Southern SH/RT have acclimated to higher temperature conditions; however, it does not necessarily suggest that they have undergone local adaptation with genetic underpinnings (Sloat and Osterback 2013). Dissolved oxygen levels should generally be at or above 5 mg/L for Southern SH/RT survival (Reiser and Bjornn 1979; Bjornn and Reiser 1991; Moyle et al. 2017) but concentrations greater than 7 mg/L are ideal (Moyle et al. 2017). In cooler temperatures, Rainbow Trout can survive in minimal dissolved oxygen levels of 1.5-2.0 mg/L (Moyle 2002).

Adult Rainbow Trout preferentially select habitat in deeper water and can be found in runs or pools close to swift water (Moyle 2002). In such habitats, fish can move into fast water habitat for feeding and then return to hold and rest in slower water (Moyle 2002). Tobias (2006) found that Southern SH/RT in Topanga Creek exhibited a preference for pools over other habitat types. Trench pools were strongly favored and mid-channel pools and step pools were also selected; however, fish avoided plunge pools, corner pools, and lateral scour pools as well as riffles and cascades. Glides and step runs were neither avoided nor strongly selected.

Resident Rainbow Trout prey on aquatic and terrestrial invertebrates that drift by, both in the water column or on the surface, as well as benthic invertebrates and sometimes smaller fishes (Moyle 2002). Larger stream-dwelling salmonids (>270 mm) often exhibit an ontogenetic niche shift, moving away from consuming invertebrates and depending more on piscivory to achieve efficient growth (Keeley and Grant 2001). Size of invertebrate and fish prey increased with body length (Keeley and Grant 2001). Stomach contents from *O. mykiss* in Topanga Creek revealed that aquatic and terrestrial insects, other invertebrates, and fish comprised most of their diet during fall and spring. Consumption of Arroyo Chub (*Gila orcutti*) by Topanga Creek *O. mykiss* suggests that chub may be an important component of their diet in this stream, particularly during the late fall when aquatic macroinvertebrates may be less available (Krug et al. 2012).

5.4 Egg and Larval Development and Fry Emergence

Many environmental factors influence salmonid embryo incubation success, including dissolved oxygen, temperature, substrate size and porosity, and extra-gravel and inter-gravel hydrodynamics (Bjornn and Reiser 1991). Inter-gravel dissolved oxygen is particularly important to egg development and insufficient oxygen can lead to high mortality. Dissolved oxygen requirements increase as embryos grow and peaks just prior to hatching (Quinn 2018). Intra-gravel oxygen allows for embryo respiration, and oxygen concentrations of 8 mg/l or more contribute to high survival of steelhead embryos (Reiser and Bjornn 1979).

Water velocity is correlated with the amount of dissolved oxygen available to incubating eggs, and lower water velocity leads to higher embryo mortality (Bjornn and Reiser 1991). Reduced flows can also cause redd dewatering, which may result in egg mortality if there is no subsurface flow (Reiser and White 1983). The settling of fine sediment within gravels used to construct redds can prevent the interstitial flow of water and oxygen, and thus smother and kill embryos and post-hatch alevins (Bjornn and Reiser 1991). Finer sediment particles such as ash from wildfires or dust, are most effective at filling interstitial spaces within the redd substrate and can be a contributor to egg asphyxiation and recruitment failure (Beschta and Jackson 1979; Chapman 1988; Bjornn and Reiser 1991).

In addition to negative impacts from sediment deposition, unsuitable temperatures can have negative effects on embryonic development and survival (Bjornn and Reiser 1991). Higher temperatures are correlated with faster embryonic growth and development (Kwain 1975; Bjornn and Reiser 1991); however, if temperatures exceed upper suitability thresholds, mortality increases (Kwain 1975; Rombough 1988; Melendez and Mueller 2021). The ideal temperature range for incubation is 7-10°C (Kwain 1975) and incubation temperatures surpassing 15°C can result in considerable embryo mortality (Kwain 1975; Rombough 1988). Faster development and early hatching resulting from elevated temperatures can manifest in substantial reductions in body mass and length of newly hatched alevin (Melendez and Mueller 2021). These environmentally driven developmental changes could have negative implications for predation response and survival (Hale 1996; Porter and Bailey 2007). Alternatively, extremely cold water can induce mortality (Reiser and Bjornn 1979), although water temperatures that are below steelhead tolerances are likely a rare occurrence in southern California streams. Fry emerge in late spring or early summer and incubation time is dependent on water temperature (Moyle et al. 2017; Quinn 2018). Cold water temperatures, or those above 21.1°C, can decrease survival of emerging fry by restricting their ability to obtain oxygen from the water (McEwan and Jackson 1996).

5.5 Rearing and Emigration

Suitable rearing habitats for juvenile *O. mykiss* require adequate water temperature, flow velocity, water depth, dissolved oxygen concentrations, and availability of prey items. Juveniles generally occupy cool, clear, higher velocity riffles which provide cover from predators (Moyle 2002). Rearing juveniles require habitat with sufficient food production such as riffles with gravel substrate (Reiser and Bjornn 1979). Juvenile *O. mykiss* in southern California have been found to rear in both perennial and intermittent streams (Boughton et al. 2009). Intermittent streams are common in the southern California region and can in some cases benefit native fishes and other aquatic organisms that have evolved within these conditions. By seasonally fragmenting watersheds and disconnecting populations of introduced warm-water tolerant species, intermittent stream desiccation can reduce potential predation and competition from invasives. However, these same conditions can also negatively affect steelhead survival through loss of wetted habitat or degraded water quality conditions, prevent adult spawning migrations or juvenile/smolt emigration, and otherwise isolate subpopulations (Boughton et al. 2009).

Preferred water temperatures for juvenile *O. mykiss* range between 15 and 18°C (Moyle 2002), although they can tolerate temperatures up to 29°C if dissolved oxygen concentrations are high and there is an abundant food supply (Sloat and Osterback 2013). Southern SH/RT have been observed functioning in stream temperatures outside of the preferred range up to the mid to high twenties (Moyle et al. 2017; SYRTAC 2000). For example, the Santa Ynez River was determined to be thermally suitable, albeit thermally stressful, for Southern SH/RT in both normal and warm years, with thermal suitability characterized as a maximum daily temperature below 29°C and a mean daily temperature below 25°C (Boughton et al. 2015). Temporary or intermittent exposure to temperatures above the upper tolerance limit for salmonids can be tolerated in some populations (Johnstone and Rahel 2003), whereas chronic or long-term exposure to high temperatures is typically lethal (Dickerson and Vinyard 1999; Johnstone and Rahel 2003). Additionally, feeding behavior and activity level are generally reduced when fish are temporarily exposed to warmer temperatures that cause thermal stress (Johnstone and

Rahel 2003). However, Spina (2007) found that in Topanga Creek, there were no available daytime thermal refugia available for juvenile *O. mykiss,* yet they were able to tolerate temperatures up to 24.5°C without changes in behavior or activity level. These findings may indicate that Southern SH/RT are acclimated to higher daily stream temperatures than more northern *O. mykiss* populations. Juvenile salmonids acclimated to higher water temperatures, such as those in many Southern SH/RT streams, can sustain higher maximum thermal tolerances than those acclimated at lower temperatures (Lohr et al. 1996).

Metabolic demand increases with higher environmental temperatures. Warmer waters can result in faster growth rates where the forage base is abundant or may slow if food is scarce (Noakes et al 1983.; Brett 1971). Thus, freshwater growth is strongly dependent on primary productivity and food accessibility within the stream (NMFS 2012a). In Topanga Creek, juvenile Southern SH/RT had high growth rates during the summer despite temperatures that frequently surpassed known high temperature tolerances (Bell et al. 2011a).

Thermal refugia are especially important for summer rearing, when Southern SH/RT juveniles must find stream reaches that are sufficiently cool (NMFS 2012a). In southern California streams, higher altitude can provide thermal refuge as well as near-coastal areas that benefit from the ocean acting as a temperature sink (NMFS 2012a). Riparian cover is also important for moderating stream temperatures, as exposed or non-shaded streams are generally warmer than those shaded by riparian canopy (Li et al. 1994). These types of shaded, cool-water stream habitats are most frequently found in headwater reaches within the range of Southern SH/RT (NMFS 2012a).

In Sespe Creek, juvenile Southern SH/RT were observed to occupy the coolest areas of pools during daytime hours in summer months (Matthews and Berg 1997). Fish were consistently found congregating in a seep area that provided cool groundwater during the hottest times of day. The juvenile Southern SH/RT appeared to experience a trade-off between dissolved oxygen and water temperature but chose cooler temperatures, deeper within the temperature stratified pools, over higher levels of dissolved oxygen which were closer to the stream surface. In the spring, *O. mykiss* have been found to emigrate downstream into lower mainstem areas when tributaries may become warmer and/or drier (Spina et al. 2005). As flows increase in the fall and winter, fish may move upstream into tributary habitat to overwinter (Bramblett et al. 2002); however, this behavior has not been confirmed for Southern SH/RT (Spina et al. 2005).

Cover is also an important habitat component for juvenile Southern SH/RT survival, particularly during the winter months. Riparian cover, such as canopy and undercut banks, as well as instream cover like large woody debris (LWD) and deep pools, are important in providing shelter to rearing salmonids (Bjornn and Reiser 1991). Cover quality and availability have been correlated with local instream fish abundance for multiple salmonid species (Bjornn and Reiser 1991). In the mainstem Ventura River, juvenile Southern SH/RT densities were found to be positively correlated with velocity and cover (Allen 2015 p. 133). In western Oregon and Washington streams, juvenile steelhead were found in higher densities in reaches treated with LWD during the winter (Roni and Quinn 2001). Pool formation and enhancement can result from presence of live hardwood or LWD in a stream (Thompson et al. 2008). Instream tree roots can produce scour in high flow conditions leading to long-lasting pools. Trees in the stream channel can also anchor dead LWD and create wood jams. Jams constructed around standing trees are more durable and will last longer in watersheds dominated by hardwood species (Thompson et al. 2008).

Certain substrate types can also provide cover habitat for rearing salmonids. Larger substrate offers interstitial spaces for fish to avoid visual detection from predators. Boulders may be particularly important features in southern California streams, due to the paucity of LWD in these watersheds (Boughton et al. 2009; Tsai 2015). Boulders can assist in the formation of pools and create habitat complexity, which increases habitat suitability for Southern SH/RT (Roni et al. 2006; Tsai 2015). The presence of boulders in streams can also have a significant positive effect on *O. mykiss* survival and abundance due to their role in providing hiding areas and refuge from winter storms and associated flows (Tsai 2015). In contrast, areas with increased stream substrate embeddedness (more compacted stream bottoms) have been associated with lower juvenile salmonid densities (Bjornn and Reiser 1991).

Some Southern SH/RT will remain in freshwater through their life cycle, while those expressing the anadromous life history strategy will begin migrating downstream towards the ocean after two to three years of rearing in freshwater (NMFS 2012a). It is common in southern California for seasonal lagoons to be formed during the summer due to decreased stream flows and the natural accumulation of a sand berm at the point where the stream meets the ocean. Some juveniles take advantage of rearing in the warmer lagoon environment to achieve greater size prior to entering the ocean, which allows them a greater chance of survival (Bond et al. 2008; Hayes et al. 2008).

In Scott Creek (central California), during years when a seasonal lagoon formed, growth rates were 2-6 times greater for steelhead rearing in the estuary-lagoon than those in the cooler, less productive upstream habitat (Hayes et al. 2008). Juvenile *O. mykiss* in central California streams have been observed to exhibit a lagoon-anadromous, or “smolting” twice, life history strategy. These life history variants travel downstream to the closed estuary to rear during the summer, then migrate back upstream into more suitable conditions when the estuary starts to become less hospitable (Hayes et al. 2011; Huber and Carlson 2020). Juvenile *O. mykiss* also preferentially seek out areas with higher water quality when confined within a seasonally closed estuary (Matsubu et al. 2017). However, estuaries in poor condition, including lagoons that do not reconnect to the ocean, may lead to mortality of rearing juveniles if they do not have access to suitable habitat upstream. Seasonal lagoons in southern California typically do not reconnect to the ocean until the first rainfall occurs in the fall or winter (Booth 2020). Juvenile *O. mykiss* benefit from pulse flows initiated by storms and successful emigration is largely dependent on storm flow events matching the timing of *O. mykiss* smolt outmigration (Booth 2020). Smolts in southern California streams, such as the Santa Clara River are largely unable to take advantage of lagoon rearing and its associated benefits due to poor water quality in the estuary and dry reaches upstream (Booth 2020).

5.6 Ocean Growth

Little information exists specific to ocean growth of anadromous Southern SH/RT, but data from other west coast steelhead populations can provide some insight into habitat requirements of this life stage. Steelhead exhibit early ocean migratory behavior that is thought to maximize bioenergetic efficiency (Atcheson et al. 2012). In contrast to other Pacific salmon species, which typically remain relatively close to shore and feed in coastal waters along the continental shelf during their first summer at sea, steelhead quickly leave these productive coastal habitats for the open ocean (Atcheson et al. 2012; Daly et al. 2014). Many California steelhead juveniles spend only a few months feeding in the California Current Ecosystem (CCE) before they migrate northwest to cooler waters offshore (Daly et al. 2014). In the open ocean, steelhead maximize their energy intake by consuming high-energy prey items like fish and squid at moderate rates rather than consuming lower-energy food resources at high rates (Atcheson et al. 2012). Fish and squid make up a substantial portion of the juvenile steelhead diet for those rearing in the Gulf of Alaska, which serves as an important rearing location for west coast steelhead (Atcheson et al. 2012).

While feeding and growing in the ocean, steelhead typically occupy waters within the temperature range of 6-14°C (Hayes et al. 2016; Quinn 2018). Steelhead exhibit strong thermal avoidance, remaining within a narrow range of suitable sea surface temperatures (SSTs) during their ocean foraging and migrations, generally within 20 meters of the surface (Burgner et al. 1992 in Atcheson et al. 2012; Nielsen et al. 2010). Deviations outside of their thermal tolerance have negative consequences for growth and survival in the ocean (Atcheson et al. 2012) and generally poor ocean conditions can negatively affect survival especially during early ocean residence (Kendall et al. 2017). For example, warm SSTs were associated with lower post-smolt survival of Keogh River steelhead off the coast of Alaska (Friedland et al. 2014). In recent years, the CCE experienced a severe marine heatwave (Di Lorenzo and Mantua 2016), which impacted species abundance and distribution at multiple trophic levels, including the prey base for Pacific salmon (Daly et al. 2017; Peterson et al. 2017). During years with anomalously warm ocean conditions, young Chinook Salmon were observed to be much thinner, and their survival rates were depressed compared to years with cooler ocean temperatures, likely resulting from this shift in availability of prey species (Daly and Brodeur 2015; Daly et al. 2017).

Steelhead average a travel distance in the ocean of 2,013 km but have been tracked traveling up to 5,106 km (Quinn 2018). Steelhead are not typically captured in commercial fisheries possibly resulting from their swift movement offshore, and most catches of steelhead in research trawls are in the upper 30 meters of the water column (Moyle et al. 2017; Quinn 2018).

6. FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

6.1 Changes in Ocean Conditions

The long-term relationship between ocean conditions, food web structure, and Southern SH/RT productivity is not well understood; however, these relationships have been examined for steelhead populations in the Pacific Northwest. While the Pacific Northwest coastal rivers are distant from the coastal rivers of southern California in terms of both geography and ecology, these findings still improve our understanding of the relationship between ocean temperatures and the dietary composition and morphology of west coast steelhead populations. Comparisons may also offer insights into similar mechanisms that may potentially influence Southern SH/RT ocean diet compositions. Thalmann et al. (2020) detected significant differences in the prey items consumed by juvenile steelhead during warm ocean years compared to average or cold ocean years. They also found significant interannual variability in stomach fullness, with significantly lower than average stomach fullness associated with warm ocean years. Steelhead sampled during warmer years were thinner, on average, than those sampled during cooler years. In 2015 and 2016, when ocean conditions were anomalously warm, there was limited availability of cold-water prey species with higher energetic and lipid content. Although some level of plasticity was demonstrated in the juvenile steelhead diet, consumption of lower-quality prey items likely led to reduced growth and poorer body condition during those years (Thalmann et al. 2020).

In the North Pacific, the 2013–2020 period was characterized by exceptionally high sea surface temperatures coupled with widespread declines and low abundances for many west coast salmon and steelhead populations (Boughton et al. 2022a). For example, the abundance of southern Chinook salmon and steelhead populations reached very low counts between 2014 and 2019, leading to the designation of many stocks as overfished (PFMC 2020). Increased sea temperatures and associated impacts have resulted in a significant biological response at all trophic levels, from primary producers to marine mammals and birds. For the CCE region, surface water temperatures reached record highs from 2014–2016 (Jacox et al. 2018).

More recently, environmental conditions in 2020–2021 appeared more stable than the previous 5–10 years (NOAA 2022). Coastal productivity in the CCE is driven by upwellings caused by equatorward coastal winds, which drive cold, nutrient-rich water to the surface (NOAA 2022). Upwelling is usually the greatest along the Central California coast, with peaks in June. The vertical flux of water and nutrients in the CCE is measured by the Cumulative Upwelling Transport Index (CUTI) and the Biologically Effective Upwelling Transport Index (BEUTI) (Jacox et al. 2018). Overall, these two indices suggest strong upwelling events occurred in the Southern CCE in 2021, with multiple upwelling events with peaks greater than or equal to one standard deviation above the mean (Figure 15).

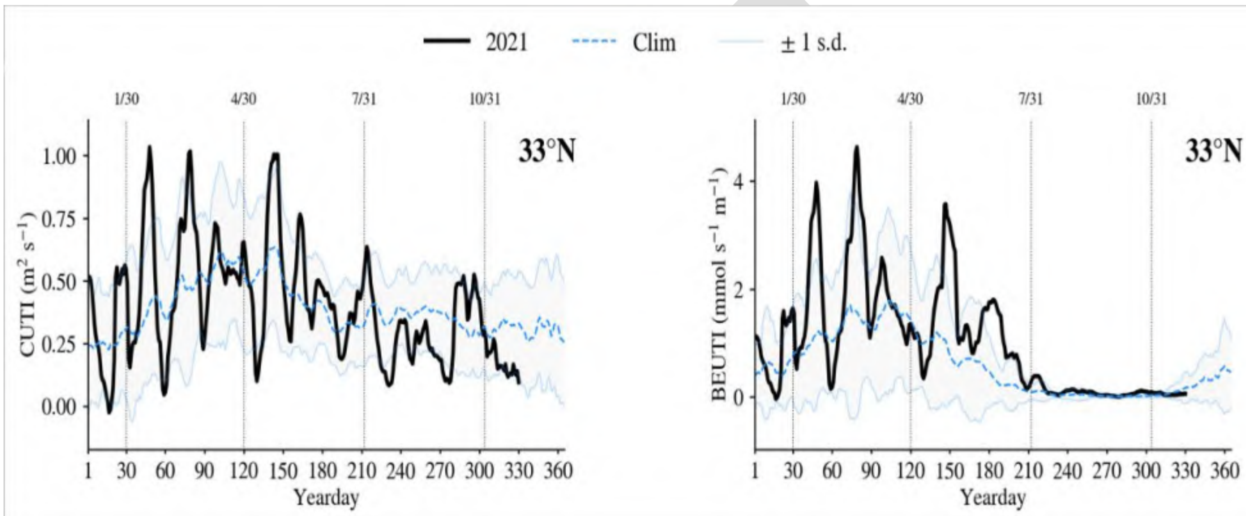


Figure 15. Daily estimates of vertical transport of water (CUTI, left) and nitrate (BEUTI, right) in 2021, relative to the 1988-2021 climatological average (blue dashed line) 1 standard deviation (shaded area) at latitude 33N (San Diego). From NOAA 2022.

Ecological indicators for the CCE suggest average to above-average feeding conditions in 2021, with sustained high abundances of zooplankton, anchovy, and apex predators (NOAA 2022). For the Southern CCE, sea lion production counts and condition at San Miguel Island are positively correlated with prey availability, particularly when prey such as sardines, anchovies, and mackerel are abundant in adult female diets (Melin et al. 2012). The 2021 cohort was the fifth consecutive year of above-average sea lion production, suggesting an abundant availability of prey during the summer months. Southern CCE forage data, which are derived from larval fish surveys, were also characterized by high abundances of anchovies, larval rockfish, and southern mesopelagic fishes. However, similar to previous years, coastal pelagic species such as mackerel and sardine occurred in low abundance. Based on the high abundance of forage fish and sea lions in the Southern CCE, it is likely that ocean conditions are currently favorable for Southern SH/RT and other marine predators.

6.2 Effects of Climate Change

The climate of the United States is strongly connected to the changing global climate (USGCRP 2017), and temperatures are projected to continue to rise another 2°F (1.11°C) to 4°F (2.22°C) in most areas of the United States over the next few decades (Melillo et al. 2014). The waters of the United States are projected to lose between 4 and 20% of their capacity to support cold water-dependent fish by the year 2030 and as much as 60% by 2100 due to climate change and its impacts (Eaton and Scheller 1996). The greatest loss of this important aquatic habitat capacity is projected for California, owing to its naturally warm and dry summer climate (O'Neal 2002; Preston 2006; Mote et al. 2018). The recent multidecadal (2000–2021) "megadrought" in the southwestern U.S., including California, has been the driest 22-year period over the past 1,000 years in this region (OEHHA 2022). Severe drought was documented across much of the southwest during this period, with record-breaking low soil moisture, extended heat waves, reduced precipitation, and intensifying weather extremes (Garfin et al. 2013; OEHHA 2022; Williams et al. 2022). These conditions are expected to continue or increase in the region (Gershunov et al. 2013), with predicted outcomes dependent upon the level and extent of human efforts to address and offset CO_2-driven climate change impacts, both within the United States and across the globe (Overpeck et al. 2013; NMFS 2016; USGCRP 2017; OEHHA 2022).

Since 1895, California has warmed more than both the North American and global temperature averages (NOAA 2021; OEHHA 2022). As such, the state is considered one of the most "climate-challenged" areas in North America (Bedsworth et al. 2018), facing increasingly extreme weather patterns and comparatively rapid shifts in regional climate- and local weather-based averages and trends (e.g., Overpeck et al. 2013; Pierce et al. 2018). California's temperatures have paralleled global trends in terms of increasing at an even faster rate since the 1980s (Figure 16; OEHHA 2022). The past decade has been especially warm; eight of the ten warmest years on record for California occurred between 2012 and 2022 (OEHHA 2022). In general, the portions of California with lower latitudes and elevations will be subject to the greatest increase in duration and intensity of higher air and water temperatures due to climate change (Wade et al. 2013). Thus, the southwestern part of California, which includes the range of Southern SH/RT, will likely face disproportionate climate change-related impacts when compared to other regions of the state. Southern SH/RT are, therefore, likely to face more severe and challenging conditions than their northern salmonid relatives.

The broad-scale climatic factors that appear to primarily shape the habitat suitability and population distribution of Southern SH/RT are summer air temperatures, annual precipitation, and severity of winter storms (NMFS 2012a). These factors and their influences on the landscape are predicted to intensify under long-term, synergistically driven conditions brought about by climate change. They are also expected to exacerbate existing stressors for Southern

SH/RT and other cold water-dependent native aquatic organisms in stream and river systems in southern California (NMFS 2012b). In a comprehensive rating of California native fish species, Moyle et al. (2013) determined southern California steelhead to be “critically vulnerable” to climate change and likely to go extinct by 2100 without strong conservation measures. This was reaffirmed by an analysis conducted by Moyle et al. (2017).

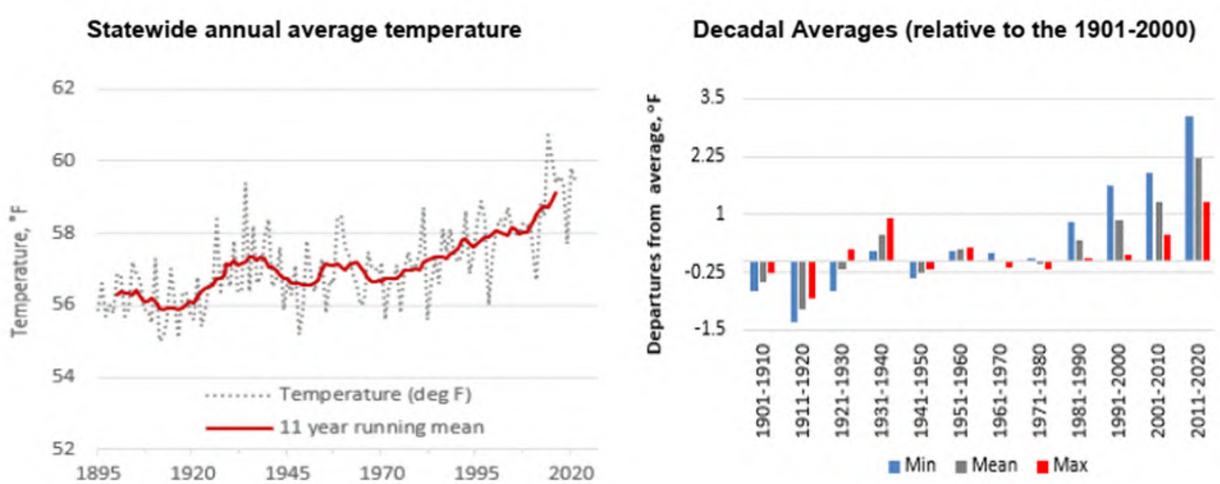


Figure 16. Temperature trend (left) and departure from average (right) graphs for California, from about 1900-2020 (source: OEHHA 2022).

6.2.1 Rising Temperatures

Extreme heat events in California have become more frequent, dating back to the 1950s; however, they have become especially pronounced in the past decade (OEHHA 2022). Heat waves, defined as two or more consecutive heat events (which are characterized by temperatures at or above the highest 5% of historical values), have also become more frequent during this period (OEHHA 2022). For context, over the past 70 years, extreme heat events increased at a rate of about 1 to 3 events per decade at 10 of a set of 14 statewide long-term monitoring sites across California (OEHHA 2022). Further, at several monitoring sites, daytime heat waves increased to as many as 6 events per year, and nighttime heat waves similarly increased to as many as 10 events per year (OEHHA 2022). Long-term regional climate observations for southern California also follow this pattern of long-term, steady temperature increases. Based on analyses of California South Coast National Oceanic and Atmospheric Administration (NOAA) Climate Division temperature records from 1896–2015, He and Gautam (2016) found significant upward trends in annual average, maximum, and minimum temperatures, with an increase of about 0.29°F (0.16°C) per decade. Likewise, every month of the year has experienced significant positive trends in monthly average, maximum, and minimum temperatures, across the same 100-year period (Hall et al. 2018).

Importantly, nighttime temperatures in California, which are reflected as minimum daily temperatures, have increased by almost three times more than daytime temperatures since 2012 (OEHHA 2022). Gershunov et al. (2009) showed that heat waves over California and Nevada are increasing in frequency and intensity while simultaneously changing in character and becoming more humid. This shift toward humid heat waves in the southwestern U.S. is primarily expressed through disproportionate increases in nighttime air temperatures (Garfin et al. 2013). These changes started in the 1980s and appear to have accelerated since the early 2000s (Garfin et al. 2013). Nighttime warming has been more pronounced in the summer and fall, increasing by about 3.5°F (1.94°C) over the last century, and southern California has warmed faster than Northern California (OEHHA 2022). These long-term regional changes will have disproportionate impacts on aquatic habitats due to elevated atmospheric humidity levels and diminished nighttime cooling effects on southern California waterways (Garfin et al. 2013).

In fact, water temperatures in many streams across California have risen for some time and are continuing to do so (Kaushal et al. 2010). Stream temperatures across the state have increased by an average of approximately 0.9–1.8°F (0.5–1.0°C) in the past 20+ years (e.g., Bartholow 2005 in Moyle et al. 2013). While such increases may seem small, they can push already marginal waters over thresholds for supporting cold water-dependent fishes (Moyle et al. 2015; Sloat and Osterback 2013). Summer water temperatures already frequently exceed 68°F (20°C) in many California streams and are expected to keep increasing under all climate change scenarios (Hayhoe et al. 2004; Cayan et al. 2008 in Moyle et al. 2015). Organisms that are adapted to California's traditional nighttime cooling influence on their habitats, including Southern SH/RT, are less prone to recover from extreme and extended periods of excessive daytime heat, particularly when humidity and temperatures remain high at night (Garfin et al. 2013; OEHHA 2022).

6.2.2 Drought

Overall, California has been getting warmer and drier since 1895; as part of this long-term climatic shift, droughts are becoming more frequent, extended, and severe in their impacts (OEHHA 2022). As noted, 2000–2021 was the driest 22-year period in the last millennium in the southwestern United States, including California (Williams et al. 2022). The 2012–2016 drought was one of the warmest and driest on record in California, negatively affecting both aquatic and terrestrial environments across the state (Figure 17; CDFW 2018a). Notable statewide aquatic habitat impacts from this and other prolonged droughts include seasonal shifts in stream hydrographs to earlier peaks with extended summer and fall low flow periods, contraction and desiccation of typically perennial aquatic habitats (Figure 18), poor water quality, elevated water temperatures, changes in migratory cues, spawn timing, and other fish behaviors, stranding, and both direct and indirect mortality of fish, along with estuary and lagoon habitat degradation, among other ecological impacts (CDFW 2018a; Bedsworth et al. 2018).

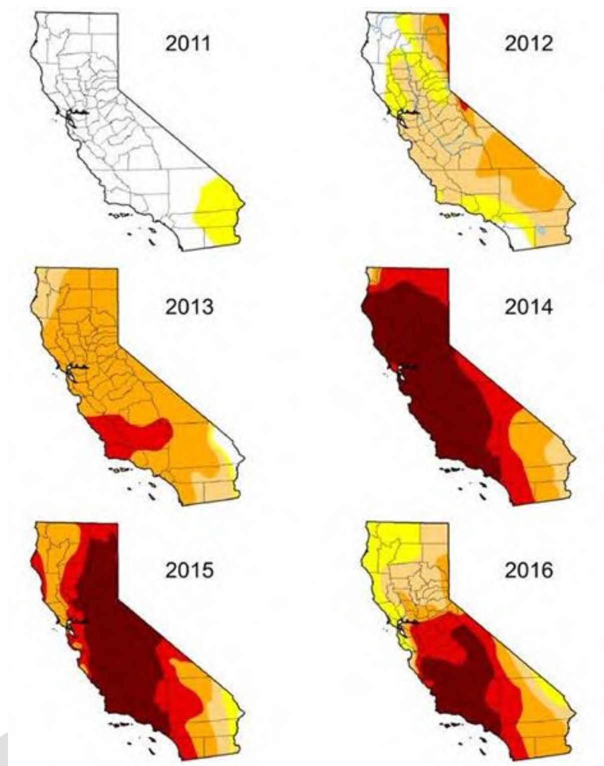


Figure 17. The distribution and progression of drought conditions in California from 2011 to 2016, depicting the level of drought at the beginning of each Water Year (October 1). White indicates no drought conditions, whereas yellow to dark red indicates increasing drought conditions, including duration and intensity (CDFW 2018a, based on U.S. Drought Monitor).

No part of the state has been more impacted by drought than southern California, with significant reductions in precipitation compared to long-term averages, along with record high temperatures, exceptionally dry soils, and low regional snowpack in surrounding mountain ranges in the past decade (Hall et al. 2018). Southern California is naturally arid and already prone to periods of extremely dry conditions (MacDonald 2007; Woodhouse et al. 2010), so increasing drought conditions have amplified many existing ecological stressors while also creating new ones. As an example, during normal water years, many streams in California's south-coastal region maintain perennial flows in their headwaters but become intermittent or dry in lower portions of their watersheds, especially in areas of concentrated urbanization or agriculture. The 2012–2016 drought dramatically exacerbated these conditions, leading to widespread stream drying in this region, even outside of areas that typically experience annual desiccation (CDFW 2018a). Not surprisingly, CDFW (2018) noted that the two most common causes of fish kills in southern California during the 2012–2016 drought were stream drying and reduced dissolved oxygen levels (impaired water quality).

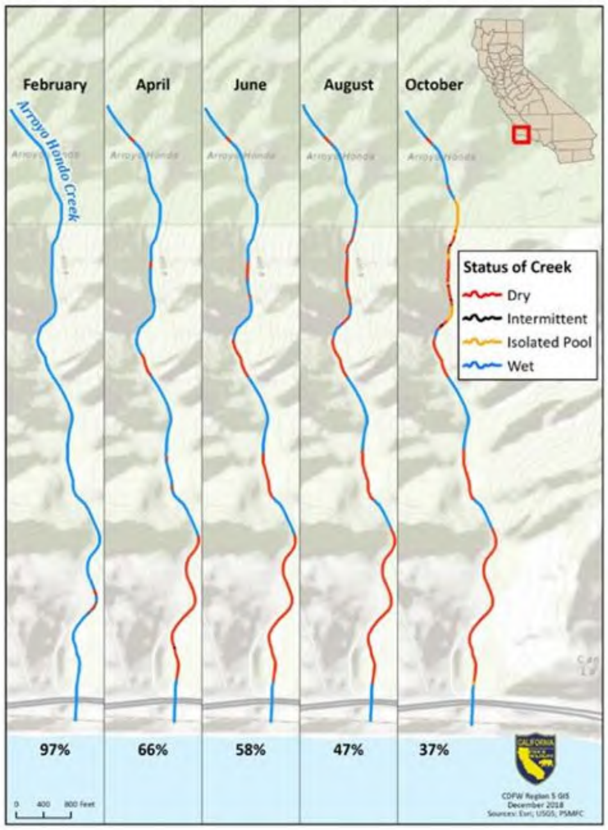


Figure 18. Example southern California stream (Arroyo Hondo Creek, Santa Barbara County), showing seasonal desiccation across 60% of its study area wetted length during February-October 2015 (source: CDFW 2018a). 2015 was a notably bad drought year in California, but the large extent of stream drying in this creek may be an indicator of future climate change-driven conditions in this and other southern California regional streams.

Further desiccation of Southern SH/RT habitats is expected due to climate change, leading to reduced natural spawning, rearing, and migratory habitats for already small and fragmented Southern SH/RT populations. This undesirable future state includes the increasing probability that low-precipitation years continue to align and coincide with warm years, further amplifying the risk of future severe droughts and low snowpack in California, especially in southern latitudes (Difenbaugh et al. 2015; Berg and Hall 2017; Williams et al. 2015).

In their five-year status review, NMFS (2016) concluded that ongoing “hot drought” conditions, among other negative factors, likely reduced salmonid survival across DPSs and ESUs for listed steelhead and salmon in California, including Southern SH/RT. It is likely that these same Southern SH/RT populations, already impacted and diminished in abundance and distribution, will face more frequent and severe drought periods in the future, along with more intense and destructive (albeit less frequent) winter storms, under all predicted scenarios. Both stressors, in combination, will further negatively affect the remaining suitable habitats for Southern SH/RT in California.

6.2.3 Reduced Snowpack

As air temperatures have warmed, more precipitation has been falling as rain instead of snow at high elevations in the western United States, where widespread snowpack declines of 15-30% have been documented since the 1950s (Mote et al. 2018; Siirla-Woodburn et al. 2021). Since 1950, California’s statewide snow-water content has been highly variable, ranging from more than 200% of the average in 1952, 1969, and 1983 to 5% in 2015 in the midst of the 2012–2016 drought (OEHHA 2022). The past decade included years that were among the lowest (2013, 2014, 2015, and 2022) and the highest (2011, 2017, 2019) on record for snowpack (OEHHA 2022). These patterns demonstrate increasing variability in the amount of overall precipitation the state receives, the frequency and intensity of storm systems, and the amount of precipitation received as rainfall versus snowfall. Annual snowpack in the Peninsular Ranges of southern California (e.g., Santa Ana Mountains, San Jacinto Mountains, and Laguna Mountains) is expected to continue to diminish, so future stream flows in the range of Southern SH/RT will be increasingly driven by rainfall events (Mote et al. 2018).

Snowmelt attenuates stream flows in basins that usually receive annual snowpack at higher elevations. An increase in the ratio of rain to snow and rain-on-snow events will result in more peak flows during winter and early spring, along with an increasing frequency of high flow events and damaging flooding. With earlier seasonal peak hydrographs, many southern California streams will experience diminished spring pulses and protracted periods of low flows through the summer and fall seasons (Moyle et al. 2015). These conditions will translate into warmer water temperatures at most elevations, reflecting both increases in air temperatures and reduced base flows (Moyle et al. 2017). Future shifts from snow to rain may also negatively impact overwintering rearing habitat for juvenile Southern SH/RT and reduce the availability of cold-water holding habitats as refuges in rivers and streams during the summer and fall months (Williams et al. 2016). Such abiotic shifts will affect the physical habitat availability and suitability for Southern SH/RT and are also anticipated to change species interactions, generally favoring introduced species with broader environmental tolerances (Moyle et al. 2013).

6.2.4 Increasing Hydrologic Variability – Reduced Stream Flows to Catastrophic Flooding

Climate change is likely to increase the impacts of El Niño and La Niña events, which are predicted to become more frequent and intense by the end of the century (OEHHA 2022). Increasingly dramatic swings between extreme dry years (or series of years) and extreme wet years are already occurring in California and are expected to escalate under various climate change scenarios (Swain et al. 2018; Hall et al. 2018). California’s recent rapid shifts from drought periods (2012-2016, 2020-2022) to heavy precipitation and flooding (winter 2016-2017, winter 2022-23) exemplify “precipitation whiplash” and its potential for widespread natural habitat and human infrastructure damage and destruction (OEHHA 2022). California’s river and stream systems will bear the brunt of these impacts since they are the natural conduits for water conveyance on the state’s landscape.

Such precipitation variability and intensity in California is now increasingly influenced by “atmospheric rivers,” or long, narrow bands of precipitation originating over ocean bodies from the tropics to the poles that transport large amounts of water vapor (USGCRP 2017; Hall et al. 2018). During the winter months, heavy precipitation associated with landfalling atmospheric rivers can produce widespread flooding in most of the southwestern U.S. states (Garfin et al. 2013). California is especially vulnerable to this source of destructive flooding because of its proximity to the Pacific Ocean, where atmospheric rivers are generated (USGCRP 2017). As a result of these changes, southern California stream flows will almost certainly become more variable and “flashy” on an annual basis. Predictions include likely extreme fluctuations in precipitation, with intermittent heavy winters producing high stream flows, coastal impacts, and extensive flooding during otherwise prolonged periods of drought, with low to no flows in many streams. Changes in seasonal flow regimes (especially flooding and low flow events) may also affect salmonid behavior. Expected behavioral responses include shifts in the seasonal timing of important life history events such as adult migration, spawning, fry emergence, and juvenile migration (NMFS 2016). The outmigration of juvenile steelhead from headwater tributaries to mainstem rivers and their estuaries may be disrupted by changes in the seasonality or extremity of stream hydrographs (NMFS 2016; Figure 18). Flood events can also disrupt incubation and rearing habitats due to increased bed mobility (Fahey 2006). Conversely, low flow periods with elevated water temperatures and impaired water quality can cause direct mortality to steelhead across wide portions of southern California’s mountain desert streams (CDFW 2018a). Stream drying can also further isolate and restrict subpopulations, potentially leading to genetic drift, interfering with gene flow and genetic mixing at the larger population/ESU level, and potentially further reducing overall fitness.

6.2.5 Sea Level Rise

Along California’s coast, mean sea levels have increased over the past century by about 8 inches (203 mm) at monitoring sites in San Francisco and La Jolla (OEHHA 2022). For the southern California coast, roughly 1-2 feet (0.3 m – 0.6 m) of sea level rise is projected by the mid-century, and the most extreme projections indicate 8–10 feet (2.4 m – 3.0 m) of sea level rise by the end of the century (Hall et al. 2018). Sea level rise is predicted to further alter the ecological functions and dynamics of estuaries and near-shore environments. Rising sea levels may impact estuary hydrodynamics with increased saltwater intrusion, potentially increasing salinity levels in estuaries and shifting the saltwater/freshwater interface upstream (Glick et al. 2007). Loss or degradation of already scarce estuary habitats in southern California's coastal areas due to sea level rise may negatively affect Southern SH/RT survival and productivity, since estuaries and lagoons serve as important nursery habitats for juvenile steelhead (Moyle et al. 2017). Alternatively, sea level rise may potentially increase the amount of available estuary habitat by inundating previously dry areas or creating additional brackish, tidal marsh, or lagoon habitats, which serve as important rearing habitats for juvenile salmonids (NMFS 2016). Overall, however, predictions indicate substantial reductions in southern California's coastal lagoon and estuary habitats, which may reduce steelhead smolt survival and numbers of outmigrants to the ocean, further constraining populations of Southern SH/RT (Moyle et al. 2017).

6.2.6 Ocean Acidification

Ocean acidification occurs when excess carbon dioxide (CO2) is absorbed from the atmosphere, acidifying or lowering the pH of sea water (CDFW 2021b). Ocean acidification is becoming evident along California's central coast, where increases in CO2 and acidity levels in seawater have been measured since 2010 (OEHHA 2022). Coupled with warming ocean waters and reduced dissolved oxygen levels, ocean acidification poses a serious threat to global marine ecosystems (OEHHA 2022). If left unchecked, ocean acidification could dramatically alter the Pacific Ocean's marine food webs and reduce the forage base for California's salmonids. Forage fish, which are a primary prey source for steelhead in the ocean (LeBrasseur 1966; Quinn 2018), may suffer declines in abundance due to reduced biomass of copepods and other small crustaceans resulting from ocean acidification (Busch et al. 2014). Ocean acidification makes it harder for the shells of ecologically and economically important species, including krill, oysters, mussels, and crabs, to form and potentially causes them to dissolve. Reduced seawater pH has also been shown to adversely affect olfactory discrimination in marine fish (Munday et al. 2009), which could result in impaired homing of Southern SH/RT to their natal streams.

6.2.7 Wildfires

Wildfires are a natural and fundamental part of California's ecological history in many parts of the state. Wildfires are an essential ecological process for the periodic renewal of chaparral vegetation communities (Sugihara et al. 2006), which dominate much of the south-coastal part of California. Historical fires were, therefore, important episodic ecological events with generally lower intensity impacts, at smaller geographic scales, and generally positive long-term outcomes for fish habitats (Boughton et al. 2007).

Euro-American influences and activities on the western landscapes of the U.S., coupled with climate change, have made modern western fires more frequent, severe, and catastrophic in nature (e.g., Gresswell 1999; Noss et al. 2006; and Moyle et al. 2017). Future frequency and size of wildfires in the range of Southern SH/RT is expected to increase, driven by rising atmospheric temperatures and prolonged droughts associated with climate change (NMFS 2012a, OEHHA 2022). Potter (2017) examined satellite data for the 20 largest fires that have burned since 1984 in the central and southern coastal portions of California and found that climate and weather conditions at times of ignition were significant controllers of the size and complexity of high-burn severity fire areas. Since 1950, half of California's largest wildfires (10 of 20) occurred between 2020 and 2021 (OEHHA 2022). One study predicted a nearly 70% increase in the area burned in southern California by the mid-21st century, due to warmer and drier climatic conditions (Jin et al. 2015). This study also evaluated southern California's wildfires in terms of their impacts in the presence or absence of regionally prominent Santa Ana winds. This research found that non-Santa Ana fires which occur mostly in June through August affected higher-elevation forests, while Santa Ana-driven fires which occur mostly from September through December spread three times faster and occurred closer to urban areas (Jin et al. 2015). Recent examples of devastating Santa Ana wind-driven fires include the destructive Thomas Fire (approximately 282,000 acres) in Ventura and Santa Barbara counties (December 2017) and the Woolsey Fire (approximately 97,000 acres) in Los Angeles and Ventura counties (November 2018), both of which were also influenced by preceding record-breaking heatwaves and extremely dry fall conditions (Hulley et al. 2020).

Projected increases in precipitation extremes will lead to increased potential for floods, mudslides, and debris flows (Hall et al. 2018). Wildfires and subsequent debris torrents in southern California were demonstrated to have destroyed Southern SH/RT habitats in 2004, 2006, and 2008 (Moyle et al. 2015). More recent events, including mass wasting and debris flows, such as those in Santa Barbara County in early 2018, resulted from heavy rains preceded by wildfires (Livingston et al. 2018). High-intensity wildfires can accelerate the delivery of sediments to streams (Boughton et al. 2007) by stripping the land of vegetative cover and eliminating stabilizing root structure, thereby degrading spawning habitats for salmonids and other fishes. Increased soil friability greatly increases rates of fine soil mobilization, erosion, transport, and deposition into watercourses affected by fire due to the elimination of vegetation, the input of large amounts of dry ash and charcoal, the lack of soil shading, and the associated increased solar warming and drying of soils (NMFS 2012a). These fine materials often become so dry after a fire that they become hydrophobic, making it much easier for runoff water to mobilize and transport. Fine sediments delivered to streams in large amounts have been shown to cover and smother coarser-grained spawning gravels, which are required for salmonid spawning success (Moyle et al. 2015). Largescale sediment mobilization events can also change the channel characteristics of streams, destroy instream and riparian vegetation, and possibly cause direct or indirect mortality to multiple life history stages of Southern SH/RT, while also facilitating the rapid spread of non-native plant and animal species. High flows and floods in fire scars can also scour redds, depending on their seasonal timing, possibly nearly eliminating a Southern SH/RT subpopulation’s cohort post-spawn if gravels are mobilized and eggs or juveniles are washed downstream.

6.3 Disease

Numerous diseases caused by bacteria, protozoa, viruses, and parasitic organisms can infect Southern SH/RT in both juvenile and adult life stages. These diseases include bacterial kidney disease (BKD), *Ceratomyxosis*, *Columnaris*, *Furunculosis*, infectious hematopoietic necrosis virus, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, and whirling disease (NMFS 2012a). Water quality and chemistry, along with warm stream temperatures, influence infection rates. As water temperatures rise and fish become thermally stressed, lower host resistance aligns with higher pathogen growth rates due to shorter generation times and can lead to a sharp increase in infection rates and associated mortality (Belchik et al. 2004; Stocking and Bartholomew 2004; Crozier et al. 2008). There is little current information available to evaluate the potential impacts of these kinds of infections on Southern SH/RT populations.

6.4 Hatcheries

Extensive stocking of hatchery-origin *O. mykiss* has occurred throughout the southern California region to support recreational fisheries, but no efforts have specifically targeted the conservation and supplementation of Southern SH/RT. Historical stocking records dating back to the 1930s occasionally reference the stocking of “steelhead”; however, it appears that these references represent nomenclature being used interchangeably rather than identification of fish from native migratory populations. Hatchery-origin *O. mykiss* were stocked widely for recreational fisheries up until the late 1990s. Stocking was ceased in the anadromous waters of southern California as a protective conservation measure starting in 1999 (J. O’Brien, CDFW, personal communication).

While restricted stocking of *O. mykiss* has continued in the region above barriers to anadromy, potential remains for the inadvertent introduction of hatchery stocks into anadromous waters due to downstream movement or during reservoir spill events. To mitigate the risk of hatchery-origin fish interbreeding with wild fish, the Department shifted to stocking only triploid hatchery-origin *O. mykiss* in waters above anadromous barriers following the adoption of the Hatchery and Stocking Program Environmental Impact Report (EIR) in 2010 (Jones and Stokes 2010). Triploid *O. mykiss* have been used across the western United States to reduce the risks of introgression and hybridization associated with stocking programs that support recreational fisheries. The application of heat- or pressure-induced “triploiding” on salmonid eggs, including *O. mykiss*, has a proven 91-100% sterilization rate, often at the upper end of that range (Kozfkay et al. 2011). Using triploid hatchery-origin *O. mykiss* for recreational fisheries has mitigated some of the inherent risk of potential hybridization and introgression with native and wild stocks, although some risks to Southern SH/RT may still exist. Competition and predation from hatchery stocks remain of concern since the degree to which triploid *O. mykiss* may compete with or prey upon native *O. mykiss* is not well understood.

Hatchery-origin *O. mykiss* have been tagged prior to stocking into select regional reservoirs to attempt to evaluate if and the extent to which they may be escaping these impoundments and entering anadromous waters below dams. No reservoir spills have occurred across the region since tagging began due to the predominance of drought conditions, except for during the winter and spring of 2023. To date, downstream monitoring has not been conducted since the inception of the tagging study (J. O’Brien, CDFW, personal communication). Due to climate change impacts and the decreased frequency with which many southern California reservoirs are filling or overspilling, it is expected that threats from interactions between hatchery-stocked *O. mykiss* and remaining native stocks of Southern SH/RT will be considerably reduced in the future. However, the large number of atmospheric rivers that impacted much of California during the recent winter of 2022–2023, causing some southern California reservoirs to fill and overspill, is a reminder that such events remain possible.

While exclusively triploid hatchery-origin *O. mykiss* are stocked above barriers to anadromy in southern California, historical regional stocking practices of non-triploid fish have led to introgression, or hybridization with hatchery stocks, in some Southern SH/RT populations. Levels of introgression appear to vary across the landscape, differing between populations and watersheds. Some populations retain high levels of native southern California steelhead ancestry, while others are highly introgressed and exhibit high levels of hatchery-origin genetics (primarily Central Valley *O. mykiss* genetics), while some are in between, with genetic signatures from both native and hatchery origins (NMFS 2016; Jacobson et al. 2014). See Section 6.7 in this Status Review for more information.

6.5 Predation

6.5.1 Predation in Freshwater Environments

California’s salmonids have evolved under selective pressure from a variety of natural predators, including many species of fish, birds, and mammals; however, a growing number of non-native aquatic species have also become established within the range of Southern SH/RT (Busby et al. 1996; NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022).

Established populations of non-native fishes, amphibians, and invertebrates, combined with anthropogenic habitat alterations that often favor non-native species, have led to increased impacts from predation, competition, and other stressors on Southern SH/RT across much of its range (NMFS 1996b). Stream habitat alteration can also directly affect predation rates by reducing available cover for prey species, creating flow and velocity regimes that favor non-native predators, and creating obstructions to passage that can lead to migration delays and increased exposure to predators (Moyle et al. 2013; Dagit et al. 2017). Further, stream habitat alterations can influence water temperatures, often increasing them, which may then lead to higher metabolic rates for piscivorous fishes and increased predation pressure (Michel et al. 2020). In addition to physical habitat alterations, chemical habitat alterations in the form of contaminants known to alter fish behavior and reduce avoidance or cover-seeking activities are also likely to increase predation rates, particularly from avian predators (Grossman 2016).

Established populations of non-native catfish and centrarchids occur in the lower reaches of many watersheds throughout the range of Southern SH/RT, leading to widespread predation risk (NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022). Grossman (2016) found that non-native Channel Catfish (*Ictalurus punctatus*) may be a primary predator of Central Valley steelhead in the San Joaquin River, suggesting they may pose the same level of risk to Southern SH/RT. Non-native centrarchids have been demonstrated to negatively impact salmonid populations through direct predation on rearing juveniles and resident adult *O. mykiss* (Dill and Cordone 1997; Marks et al. 2010; NMFS 2012a; Bonar et al. 2005). In Washington state, non-native smallmouth bass (*Micropterus dolomieu*) have been a major predator of native salmonids (Poe et al. 1991; Vigg el al. 1991; Tabor et al. 1993; Zimmerman 1999). Interestingly, the smallest bass size classes have been shown to have the highest predation rates on juvenile Chinook salmon (Fritts and Pearsons 2006); therefore, small bass can present a major risk of predation on juvenile salmonids. This is especially true since smaller -sized bass can achieve potentially high densities in altered habitats, leading to increased predation rates. Additionally, largemouth bass (*Micropterus salmoides*) are better thermally adapted to higher temperatures than salmonids. They may also consume salmonids at higher rates as the waters warm (McInturf et al. 2022).

In addition to piscivorous fishes, non-native invertebrates and amphibians have also been introduced and spread across the Southern SH/RT range. American bullfrogs (*Lithobates catesbeianus*) have become widely established and can prey upon rearing juvenile steelhead (COMB 2022; Cucherousset and Olden 2011; Dagit et al. 2019; Stillwater Sciences 2019). Non-native Red Swamp Crayfish (*Procambarus clarkia*) populations have also increased in some Southern SH/RT waters (Garcia et al. 2015; Dagit et al. 2019). Direct observations of YOY Southern SH/RT being attacked by crayfish in shallow riffle-run habitat suggest that predation poses a threat to the survival of juvenile steelhead (Dagit et al. 2019).

6.5.2 Predation in Marine Environments

Marine predation influences on Southern SH/RT are not well documented or understood. Primary predators of salmonids in the marine environment are pinnipeds, such as harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) (Cooper and Johnson 1992; Spence et al. 1996). Although fish are a major dietary component of marine pinnepeds, their predation on Southern SH/RT may be minimal at present, given the very low relative abundances of Southern SH/RT.

6.6 Competition

Competition is the interaction between individuals of the same or different species that compete for a limited supply of a common resource (Holomuzki et al. 2010). The extent to which competition impacts the distribution, abundance, and productivity of Southern SH/RT populations is not well understood. Pacific steelhead typically compete with other salmonid species like Coho and Chinook salmon in freshwater; however, unlike northern populations of steelhead that typically co-occur with other salmonid species, Southern SH/RT are the only salmonids that occur in their range. While inter-specific competition with other salmonids is unlikely to occur, intraspecific competition among Southern SH/RT may be prevalent in southern California watersheds, especially those that are highly degraded. Poor and degrading habitat conditions can contribute to increased competition, which, in turn, can adversely affect fish during the juvenile life-history stage and lead to reduced recruitment and reproductive performance over the entire life cycle (Chilcote et al. 2011; Tatara et al. 2012). Limited habitat space, coupled with high juvenile densities, is associated with reduced growth, premature emigration, increased competition for food, decreased feeding territory sizes, and increased mortality (Kostow 2009).

Juvenile steelhead are habitat generalists, occupying a variety of microhabitat types in streams depending on the size and age of individuals (Spina et al. 2005). Non-native fish species can competitively restrict the spatial distribution of juvenile steelhead to suboptimal habitats such as shallower, higher-velocity rifles, where the energetic cost to forage is higher (Rosenfeld and Boss 2001). Non-native fish species may also exclude juvenile steelhead from areas of suitable habitat. For example, recent watershed-wide surveys in Sespe Creek, a large and unregulated tributary to the Santa Clara River, documented the absence of Southern SH/RT in several stream reaches with suitable steelhead habitat (i.e., cool water with deep pools) that were dominated by multiple species of non-native juvenile fishes (Stillwater Sciences 2019). According to Krug et al. (2012), Arroyo Chub may also compete with Southern SH/RT juveniles for food resources. Like juvenile steelhead, Arroyo Chub are opportunistic feeders and consume benthic and drift invertebrates, sometimes switching preferences depending on food abundance. Southern SH/RT and Arroyo Chub are frequently part of the same native southern California fish assemblages and generally habitat partition, with juvenile steelhead mostly feeding on drift invertebrates while chub have a more benthic diet. However, periods of diet overlap may lead to strong interspecific competition between the two species. While other native fishes may impose some level of competitive threat to Southern SH/RT, it remains likely that non-native competitors pose the greater threat, especially with these species continued expansion and proliferation (O'Brien and Barabe 2022).

6.7 Genetic Diversity

West coast steelhead have considerable genetic diversity, both within and across populations, including variation in traits linked to anadromy, morphology, fecundity, spawning, and run timing, as well as age at smolting and maturation (McElhany et al. 2000). While some traits are entirely genetically based, the expression of most traits usually varies, due to a combination of both genetic and environmental factors. Species with high genetic diversity typically occupy a wider range of habitats than those with lower diversity and are more resilient to both short-and long-term spatial-temporal fluctuations in the environment such as ecological disturbances (i.e., wildfires, floods, and landslides) and human-caused impacts. Generally, populations need to be large enough to maintain long-term genetic diversity and avoid genetic problems, such as loss of variation, inbreeding depression, bottlenecks, and the accumulation of deleterious mutations, all of which occur more frequently in smaller populations.

A range-wide genetic analysis demonstrated that populations in the southernmost portions of the Southern SH/RT range are dominated by hatchery ancestry, indicating genetic introgression of native lineages with hatchery strains (Jacobsen et al. 2014; Abadia-Cardoso et al. 2016). Most of these hybridized wild populations occur above barriers in the upper reaches of the Los Angeles, San Gabriel, Santa Ana, San Juan, San Diego, and Sweetwater rivers. It is unclear whether introgression will decrease the viability of these southern populations, since the introduction of small amounts of novel genetic material, even from hatchery stocks, can lead to increased diversity and the phenomenon known as "hybrid vigor," conferring adaptive resilience to changing environments and the negative impacts of inbreeding. This study also confirmed that the northernmost populations of Southern SH/RT within the species range, including all watersheds in the Monte Arido Highlands BPG, contain native steelhead ancestry and generally higher genetic diversity than more southern populations (Clemento et al. 2009; Abadia-Cardoso et al. 2016).

As with other salmonids, natural straying and the resultant gene flow between populations maintain the genetic diversity of Southern SH/RT. A recent study, which examined the otoliths of seven adult steelhead from a small basin on the Big Sur coast of California, revealed that all adults were strays, coming from at least six different source populations, including neighboring ones on the Big Sur coast as well as distant populations such as the Klamath River (Donohoe et al. 2021). As is the case for many coastal steelhead populations, the genetic diversity of Southern SH/RT has been compromised by human impacts on their habitats, such as the blocking of migration corridors by artificial dams and widespread reductions in streamflow, at least partially due to locally and regionally intensive water diversions for municipal, agricultural, and other human consumptive uses (NMFS 2012a).

Measures of genetic diversity, such as heterozygosity and allelic richness, indicate that Southern SH/RT populations have lower diversity than northern coastal populations. Within the range of Southern SH/RT, the northernmost populations in the Santa Maria, Santa Ynez, Ventura, and Santa Clara rivers have higher genetic diversity than the southernmost populations (Abadia-Cardoso et al. 2016). Previous genetic studies have revealed that populations occurring downstream of modern artificial barriers are genetically more similar to above-barrier populations in the same basin than they are to populations below barriers in neighboring basins (Clemento et al. 2009). While above- and below-barrier populations within the same drainage are usually each other's closest relatives, they appear divergent in respect to the frequencies of the anadromous (A) and resident (R) haplotypes found in each subpopulation (see Section 4.7). The A haplotype is more common below dams, while the R haplotype is found more frequently above dams. This evidence of genetic drift is likely a product of artificial dams or other barriers blocking anadromous adults from returning to these upstream areas to reproduce and provide A haplotype genetic influx to the above-barrier population (Pearse et al. 2014; Pearse et al. 2019). Apgar et al. (2017) found that the frequency of the A haplotype in above-barrier populations is strongly associated with several factors, including the extent of migration barriers present, barrier type (complete, partial, artificial, or natural), barrier age (recent or longstanding), and migration distance.

Because migratory phenotypes are primarily genetically based, variation in the reproductive success of anadromous and resident individuals can influence the tendency of populations to produce anadromous offspring, corresponding to changes in the frequency of the A haplotype. Moreover, environmental factors, such as intra-and inter-annual climate variation, food availability, and water temperature, also influence the expression of anadromy in Southern SH/RT populations (Satterthwaite et al. 2009; Ohms et al. 2014; Kendall et al. 2015). Furthermore, climate change projections for Southern SH/RT range predict an intensification of climate patterns, such as more intense cyclic storms, droughts, and extreme heat (NMFS 2012a). These projections suggest that Southern SH/RT will likely experience more frequent periods of adverse conditions and continued selection pressure against the anadromous life-history form.

6.8 Habitat Conditions

The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions, particularly in the lower and middle reaches of most watersheds in the Southern SH/RT range (NMFS 2012a). Southern California is home to over 20 million people and 1.8 million acres of metropolitan, urban, and suburban areas (DWR 2021) which has resulted in highly urbanized watersheds that are impacted by surface and groundwater diversions and associated agricultural, residential, and industrial uses. Major rim dams, instream diversion dams, and other water conveyance infrastructure have significantly reduced or eliminated access to the majority of historical upstream rearing and spawning habitat for southern steelhead. While some of these human activities have been reduced, eliminated, or mitigated, the cumulative impacts of these activities remain throughout most of the Southern SH/RT range, particularly in larger systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, and Santa Margarita watersheds, as well as in smaller coastal systems such as Malibu Creek.

6.8.1 Roads

High human population densities in southern California have led to the development of an extensive network of transportation corridors throughout the range of Southern SH/RT. The extensive road and highway networks across much of the Southern SH/RT range, especially in areas proximate to rivers and streams, are attributed to increases in a number of negative habitat impacts. Among these are: non-point pollution (e.g., oil, grease, and copper from braking systems); sedimentation; channel incision due to bankside erosion; substrate embeddedness; floodplain encroachment and loss of floodplain connectivity; loss of channel heterogeneity (e.g., filling of pool habitats); and higher frequencies of flood flows (NMFS 2012a). Additionally, extensive road and highway networks require many road crossings (e.g., culverts and bridges) that are often improperly designed for the volitional passage of aquatic organisms (CalTrans 2007; NMFS 2012a).

NMFS (2012) assessed the impacts of roads and transportation corridors on Southern SH/RT using roads per square mile of watershed and the density of roads within 300 feet of streams per square mile of watershed as metrics. The results of their analysis demonstrated that roads and associated passage barriers have the highest impact on rivers and streams in the Santa Monica Mountains and Conception Coast BPG regions: 60% of watersheds in the Conception Coast BPG ranked “very high” or “high” in severity for roads as a stressor, while 100% of the watersheds that drain the Santa Monica Mountains received the same ranking. Highway 101 and the Union Pacific Railroad cross the mainstem of each watershed along the Conception

Coast BPG region (as well as the Monte Arido Highlands BPG region) near their river mouths. At each major transportation crossing, culverts were constructed to allow stream flows to pass through to the Pacific Ocean, but they were not necessarily engineered to allow upstream fish passage. For example, the Highway 101 culvert on Rincon Creek serves as a total barrier to upstream migration, preventing Southern SH/RT from reaching any of its historical habitats upstream of the barrier. Road development, bridges, and other transportation corridors are also partly responsible for the significant (70-90%) reduction of estuarine habitat across all BPGs (Hunt and Associates 2008).

The Mojave Rim and Santa Catalina Gulf Coast BPG regions are home to the highest urban densities across the Southern SH/RT range, and both BPGs are impacted by high road densities. For example, in the Santa Catalina Gulf Coast BPG region, the Rancho Viejo Bridge, Interstate-5 Bridge array, and the Metrolink drop structure are all recognized as total fish passage barriers on Arroyo Trabuco Creek, a tributary to San Juan Creek. On the Santa Margarita River, an outdated box culvert at the Sandia Creek Bridge serves as a significant fish passage barrier on the river (Dudek 2001). Recently, efforts have been undertaken to repair and modify these barriers to provide upstream steelhead passage and again allow access to many miles of historical habitat in these watersheds (see Chapter 6: Influence of Existing Management Efforts).

6.8.2 Dams, Diversions, and Artificial Barriers

A number of anthropogenic impacts, including water diversions, dams, and other artificial barriers, influence stream flows in most Southern SH/RT-supporting watersheds. Surface water diversions can lead to reduced downstream flows, as well as changes to the natural flow regime (e.g., magnitude, timing, and duration of flow events), stream hydrodynamics (e.g., velocity, water depth), and degradation of both habitat quality and quantity needed to support Southern SH/RT (NMFS 2012a; Yarnell et al. 2015). Changes to the natural flow regime can result in elevated downstream water temperatures, reduced water quality, shifts in fish community composition and structure, increased travel times for migrating fish, increased susceptibility of native aquatic organisms to predation, and reduced gravel recruitment from upstream areas of watersheds to the lower reaches of rivers (NMFS 1996b; Axness and Clarkin 2013; Kondolf 1997). Dams physically separate fish populations into upstream and downstream components, leading to population and habitat fragmentation, along with potential changes to population spatial and genetic structure over time (NMFS 2012a). Large dams often trap upstream sediments, which naturally would be transported downstream and deposited, augmenting substrates and improving spawning habitats for salmonids and other fish. It is common for rivers and streams with large dams to exhibit more scouring and streambed degradation downstream of the impoundment (Kondolf 1997; Yarnell et al. 2015). Stream flow reductions also interfere with the downstream transport and influx of freshwater to estuaries. The consequences of reduced inflows to estuaries include wetland and edge habitat loss, changes to the amount and location(s) of suitable habitat for aquatic organisms and accelerated coastal erosion (Nixon et al. 2004).

Many types of artificial stream barriers exist throughout the range of Southern SH/RT, including dams, concrete channels for flood control, gravel and borrow pits, roads and utility crossings, fish passage facilities, and other non-structural features such as velocity barriers. In the South Coast hydrologic region, a total of 164 known total migration barriers were identified as part of a larger effort to inventory fish passage barriers across California's coastal watersheds (California Coastal Conservancy 2004). Of the 164 total barriers, 11 were identified as requiring modification or removal to improve fish passage. Dams were identified as the most numerous barrier type, followed by stream crossings and non-structural barriers. The Santa Maria River, San Antonio Creek, Cuyama River, Santa Ynez River, and Santa Barbara coastal watersheds, which all belong to the Central Coast hydrologic region, also contain hundreds of known barriers scattered throughout the area, with the highest number found along the Santa Barbara coastal area (California Coastal Conservancy 2004).

Artificial barriers act as physical impediments but may also contribute to, or enhance, non-structural barriers to steelhead spawning migrations. For example, the three major watersheds of the Los Angeles basin have channelized concrete aqueducts in their lower reaches, with some extending from their mouths upstream for miles. As a result, adult Southern SH/RT can no longer access the lower reaches of these three major regional rivers (Titus et al. 2010). Furthermore, if Southern SH/RT were to successfully enter into the channelized reaches of these rivers, migration success would be limited because individuals would encounter non-structural velocity barriers that would require greater swimming speeds than could be sustained (Castro-Santos 2004). Other non-structural barriers may exist in the form of low flows, disconnected wetted habitat, and poor or lethal water quality in these largely metropolitan lower river aqueduct reaches.

Most of the large rivers in the Monte Arido Highlands BPG region contain multiple large, impassable dams. Twitchell Dam on the Cuyama River is primarily managed for groundwater recharge in the Santa Maria Valley. Operations of Twitchell Dam limit downstream surface flows into the mainstem Santa Maria River (NMFS 2012a). Cachuma, Gibraltar, and Juncal dams on the mainstem Santa Ynez River prevent upstream migratory access to approximately 70% of historical spawning and rearing habitat in the watershed (NMFS 2012a). In the Ventura River watershed, Matilija and Casitas dams on Matilija Creek and Coyote Creek, respectively, block access to 90% of historical Southern SH/RT spawning and rearing habitat. However, the recent Matilija Dam Ecosystem Restoration Project is aimed at restoring over 20 miles of perennial

Southern SH/RT habitat in the Matilija Creek watershed through the removal of Matilija Dam. Santa Felicia Dam and Pyramid Dam on Piru Creek, as well as Castaic Dam on Castaic Creek, block access to historical habitat in the tributaries of the mainstream Santa Clara River. Several of these large dams are operated along with smaller downstream diversion dams: primarily the Robles Diversion Dam on the Ventura River and the Vern Freeman Diversion Dam on the Santa Clara River. The Robles Diversion Dam diverts water from the upper Ventura River into storage at Lake Casitas, while the Vern Freeman Diversion diverts water for groundwater recharge purposes in the Santa Clara Valley.

Two major dams impair habitat connectivity and hydrologic function in the Malibu Creek watershed: Rindge Dam and Malibu Lake Dam. Both dams have created favorable habitat conditions for non-native species, including crayfish, snails, fish, and bullfrogs. As a result, invasive aquatic species have been documented in high abundance in Malibu Creek (NMFS 2012a). Rindge Dam is located only 2 miles upstream of the mouth and is no longer functional, so it is targeted for future removal. The removal of this dam alone would allow Southern SH/RT access to 18 miles of high-quality spawning and rearing habitat in the Malibu Creek watershed.

Dams are ranked “high” or “very high” as a threat in 88% of the component watersheds that comprise the Mojave Rim BPG region (NMFS 2012a). There are also at least 20 jurisdictional-sized dams (i.e., a dam under the regulatory powers of the State of California) within each of the three major watersheds of the Los Angeles basin, owned by federal, state, local, and/or private entities and operated for multiple purposes, including: irrigation, flood control, storm water management, and recreation. The principal impoundments in the San Gabriel River watershed are Whittier Narrows, Santa Fe, Morris, San Gabriel, and Cogswell dams. Sepulveda Dam on the Los Angeles River is operated as a flood control structure approximately 8 miles downstream from the river’s source. Prado Dam on the Santa Ana River is also primarily operated as a flood risk management project. These dams alter the physical, hydrological, and habitat characteristics of the lower and middle reaches of the mainstem rivers in this BPG. They also create favorable habitat for non-native species such as crayfish, largemouth bass, and bullfrogs, which have all been documented in the Los Angeles, San Gabriel, and Santa Ana rivers. Periodic removal of sediments accumulated behind dams on the San Gabriel River also degrades downstream riparian and instream habitat conditions (Hunt and Associates 2008).

In the Santa Catalina Gulf Coast BPG, dams also ranked “high” or “very high” as a threat in 90% of constituent watersheds. At least 20 major dams and diversions without fish passage facilities occur throughout the BPG’s distribution. Prominent dams in this BPG include Agua Tibia, Henshaw, and Eagles Nest dams in the San Luis Rey watershed; and the O’Neill Diversion and Vail dams in the Santa Margarita River watershed. Dams in this BPG are generally not operated with fish passage as a consideration in flow release schedules, and many of these facilities lack fish passage provisions (NMFS 2012a).

Municipalities and agricultural beneficial uses comprise the majority of water demand in the South Coast region (Mount and Hanak 2019). Approximately 1.57 million acre-feet of groundwater are used on an annual basis in southern California to meet both urban and agricultural water demands (DWR 2021). Reservoir releases are typically increased during the summer and fall months for the purposes of recharging groundwater for future diversions. Unsustainable water diversions have led to the depletion of several large groundwater aquifers in the region. Recently, the Sustainable Groundwater Management Act priority process identified several groundwater basins across the South Coast hydrologic region as either critically over drafted (i.e., Santa Clara River Valley, Cuyama River Valley, and Pleasant Valley) or medium-to-high priority basins for water conservation (e.g., the Coastal Plain of Orange County) based on several metrics such as population growth rates, the total number of wells, and the number of irrigated acres (DWR 2020). Groundwater sustainability agencies overseeing critically overdrafted and medium-to-high priority basins are responsible for developing and realizing groundwater sustainability plans (GSPs) to achieve basin sustainability within a 20-year implementation horizon.

6.8.3 Estuarine Habitat

The estuaries of many coastal watersheds in southern California form freshwater lagoons that are seasonally closed to the ocean. Lagoons form when low summer baseflows are unable to displace sand deposition at the mouth of the estuary, which results in the formation of a sandbar that blocks connectivity with the ocean. This closure creates an environment characterized by warmer and slower-moving (i.e., longer residence times) freshwater that is relatively deep (Bond et al. 2008). These habitat characteristics provide important, high-quality nursery conditions for rearing juveniles and transition areas for smolts acclimating to the ocean environment. Adult steelhead also acclimate in these areas prior to upstream migration during the winter months when the estuary is fully open (NMFS 2012a). The importance of such habitats was demonstrated by the observed doubling of growth in juvenile *O. mykiss,* which reared throughout the summer in a typical northern California coastal watershed (Bond et al. 2008). The same study examined scales from returning adult steelhead and found that estuary-reared individuals dominated adult returns, despite comprising only a small part of the annual outmigrating population. Another study conducted in the same watershed also reported higher growth rates for estuary-reared juvenile steelhead than for their cohorts reared in the upper watershed (Hayes et al. 2011). Hayes et al. (2011) also found that the lagoon environment provided warmer water temperatures and a diverse abundance of invertebrate prey resources for rearing juvenile *O. mykiss* to consume. Trade-offs between accelerated growth and survival likely exist in lagoon habitats because they represent a relatively high-risk yet high-reward environment in which accelerated growth may come at the cost of increased metabolic demand and potentially increased predation risk (Osterback et al. 2013; Satterthwaite et al. 2012).

The southern California Bight, which encompasses the entire southern California coastline, from Point Conception to San Diego, historically supported around 20,000 hectares of estuary habitat (Stein et al. 2014). Over half of all historical estuaries were found in San Diego County (e.g., Mission Bay and San Diego Bay), while Los Angeles and Orange counties contained about 15% each of the total estimated historical area. Estimates of the amount of estuarine habitat loss from historical levels, based on wetland acreage, range from 48-75% (Brophy et al. 2019; NMFS 2012a; Stein et al. 2014). The magnitude of the loss varies depending on the watershed. For example, the estuaries of the Santa Maria and Santa Ynez rivers in the northern portion of the Southern SH/RT range remain almost entirely intact, while the estuaries of the Los Angeles, San Gabriel, and Santa Ana rivers have been reduced to 0-2% of their historical extent (NMFS 2012a). Overall, estuary habitat loss in southern California is likely underestimated because early landscape modifications (e.g., housing and transportation development and associated filling of wetlands with sediment) had substantially altered the landscape before attempts were made to quantify the extent of historical habitat (Brophy et al. 2019).

The primary cause of estuarine loss in southern California is the conversion of habitat to other land use practices such as agriculture, grazing, and urban development activities, which require the construction of infrastructure and the subsequent filling, diking, and draining of coastal wetlands (NMFS 2012a). Currently, estuary habitats in the range of Southern SH/RT remain highly degraded and prone to further degradation by urban impacts such as point and nonpoint source pollution, coastal development, and dams. These environmental stressors can cause declines in water quality and the proliferation of harmful algal blooms that can lead to the rapid die-off of both aquatic and terrestrial organisms (Lewitus et al. 2012; Smith et al. 2020). Artificial breaching of estuaries also poses a mortality risk to Southern SH/RT. Seven moribund juvenile steelhead were observed in the lagoon at the mouth of the Santa Clara River shortly after the sandbar was artificially breached in 2010 (Swift et al. 2018). The authors of this study noted that the Santa Clara River, upstream of the lagoon, was dry during this time and that the observed fish were relatively large and in robust condition, indicating that favorable rearing conditions existed prior to the artificial breaching.

6.8.4 Water Quality and Temperature

Contaminants and pollutants are well-documented to alter water quality parameters that affect the growth and survival of Pacific salmonids in both freshwater and estuarine environments (Arkoosh et al. 1998; Baldwin et al. 2009; Laetz et al. 2008; Sommer et al. 2007; Sullivan et al. 2000). Both are generally introduced into southern California rivers and streams by urban runoff, agricultural and industrial discharges, wastewater treatment effluent, and other anthropogenic activities. Recent monitoring conducted by the USGS measured between 20 and 22 current-use pesticides in samples collected from urban sites at Salt Creek and the Sweetwater River in Orange and San Diego counties (Sanders et al. 2018). Diminished water quality conditions, including contaminants and associated toxicity, elevated nutrients, low dissolved oxygen, increased temperature, and increased turbidity, can all adversely affect Southern SH/RT as well as other native fish and aquatic organisms. The effects of individual pollutants and combinations thereof can impact populations by altering growth, reproduction, and mortality rates of individual fish (Sommer et al. 2007). These impacts can ultimately manifest in direct mortality due to acute and long-term physiological stress or may act through indirect pathways such as changes to food webs, ecosystem dynamics, increased susceptibility to disease and predation, and more frequent occurrences of harmful algal blooms. Aquatic stressors that impair water quality can also interact with each other in an additive or synergistic fashion, such that they are generally interdependent and can greatly amplify negative impacts on aquatic ecosystems (Sommer et al. 2007). Dissolved oxygen concentrations, turbidity, and water temperatures are all parameters directly influenced by flow management. Lower flows can lead to warmer water temperatures that hold less dissolved oxygen than cold water. Higher water temperatures also increase the metabolic and oxygen consumption rates of aquatic organisms, making these conditions particularly stressful for aquatic life (Myrick and Cech 2000). See Section 6.2.1 in this Status Review for a full description of air and water temperature influences and trends.

Many watersheds that support Southern SH/RT are listed under Section 303(d) of the Federal Clean Water Act (CWA). Section 303(d) requires states to maintain a list of waters that do not meet prescribed water quality standards. For waters on this list, states are required to develop TMDLs that account for all sources (i.e., point and non-point sources) of the pollutants that caused the water to be listed as impaired under the CWA. Approved TMDLs and their implementing regulations are incorporated into water quality control plans required by the Porter-Cologne Act of 1969. In southern California, there are many impaired water bodies and pollutant combinations listed under Section 303(d). While contaminant and discharge sources have changed over the years and there have been significant improvements in controlling many of these sources, many 303(d)-listed waters do not yet have approved TMDLs (SWRCB 2020). All four of the major rivers in the Monte Arido Highlands BPG region are listed as 303(d)-

impaired, and each system contains over five sources of pollutants. Seven Southern SH/RT-supporting watersheds in the Conception Coast BPG region and three in the Santa Monica Mountains BPG region are 303 (d) listed, including Jalama, Gaviota, Mission, Carpinteria, Rincon, Big Sycamore Canyon, Malibu, and Topanga creeks. All three of the major watersheds in the Mojave Rim BPG region, as well as eight out of ten in the Santa Catalina Gulf Coast BPG region, are 303(d)-listed, including the Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Diego, and Sweetwater rivers and the San Juan, San Mateo, San Luis Rey, and San Dieguito creeks. Essentially, all rivers and streams supporting Southern SH/RT that are 303(d)-listed are impaired by multiple pollutants, including water temperature, benthic community effects, indicator bacteria, trash, toxicity, and invasive species. Furthermore, southern California's coastal and bay shorelines, estuary environments, and tidal wetlands are also frequently 303(d)-listed as impaired. As examples, the estuaries of Malibu, Aliso, San Juan, and Los Penasquitos creeks; the entirety of Santa Monica Bay; and the estuaries of the Los Angeles, Santa Clara, Santa Margarita, and Tijuana rivers are all listed as 303(d)-impaired waterbodies.

6.8.5 Agricultural Impacts

The impacts of agricultural development have lessened over time as farm and pasturelands continue to be converted to urban development in southern California (NMFS 2012a). Historically, the loss of riparian and floodplain habitat was due first to conversion for livestock ranching, followed by irrigated row-crop agriculture, and then urban development. For example, interior portions of the Santa Clara River floodplain were originally converted to agriculture but are now dominated by urban growth and major human population centers, such as the cities of Santa Paula and Fillmore. Today, the South Coast hydrologic region supports approximately 159,000 acres of agricultural land, with avocados, citrus, truck crops, and strawberries comprising the highest agricultural production by acreage (DWR 2021). Approximately 530,000 acre-feet of groundwater are annually pumped from underlying basins to support agricultural production in southern California (DWR 2021). Agricultural activities produce wastewater effluent containing nutrients that can either directly or indirectly be introduced into the rivers, streams, and estuaries that support Southern SH/RT, particularly when agricultural best management practices and water quality objectives have not been established. Agricultural production is prevalent in several watersheds, including the lower Santa Maria and Santa Ynez rivers; many of the smaller coastal watersheds along the Santa Barbara coast, such as the Goleta Slough complex and Rincon Creek; the upper Ventura River and the Ojai basin; and portions of the San Mateo Creek, San Luis Rey, and San Dieguito River tributaries in the southernmost portion of the range. Statewide, the counties of Ventura, Santa Barbara, and San Diego are each ranked in the top fifteen for total value of agricultural production (CDFA 2021).

While the impacts of agricultural development on Southern SH/RT and their habitats have decreased over time due to land use conversion, both activities have resulted in considerable cumulative regional habitat loss and degradation. These changes have led to greatly reduced habitat complexity and connectivity in the lower and middle reaches of many southern California watersheds. Currently, agricultural impacts on Southern SH/RT are most evident during the summer dry season, when agricultural and residential water demands are the highest. This period coincides with the juvenile *O. mykiss* rearing life-history stage, which is dependent on adequate summer base flows to maintain suitable habitat conditions for growth and survival (Grantham et al. 2012). Agricultural groundwater diversions can lead to rapid stream drying by depleting aquifer groundwater that contributes to stream base flows, which limits the extent of summer rearing habitat for fish (Moyle et al. 2017). Naturally occurring surface waters supported only by groundwater recharge can be rapidly dewatered due to excessive groundwater pumping or diversions. These areas have been shown to provide adequate depth, surface area, and habitat for steelhead in streams lacking cold-water refuges (Tobias 2006).

6.8.6 Invasive Species

Invasive and non-native species are abundant and widely distributed in many watersheds that support Southern SH/RT. Non-native species frequently occur in both anadromous and non-anadromous waters that have been extensively stocked by a variety of public and private entities (NMFS 2012a). Most reservoirs contain non-native species, such as largemouth and smallmouth bass, carp, sunfish, bullfrogs, and bullhead catfish, that can all establish reproducing populations in the river and stream reaches above and below the dams. Range-wide habitat alteration has also facilitated the widespread distribution and increased abundance of non-native fish species, which typically favor slower-moving, warmer-water habitats with lower dissolved oxygen concentrations and higher sediment loads (Moyle et al. 2017). While the introduction of non-native game species has historically been viewed as a fishery enhancement, these species can have negative impacts on Southern SH/RT due to predation, competition, disease, habitat displacement and alteration, as well as behavior modifications (Cucherousset and Olden 2011).

Invasive species have recently been documented in high densities in Sespe Creek, an unregulated tributary to the Santa Clara River and a Department-designated Wild Tout Water (Stillwater Sciences 2019). High abundances of invasive species are due to the historic and ongoing stocking of non-native fish in the Rose Valley Lakes on Howard Creek, a tributary to Sespe Creek. In both Malibu and Topanga creeks, red swamp crayfish abundances have increased with recent warmer stream temperatures and lower flow conditions despite regular removal efforts (Dagit et al. 2019). High densities of crayfish likely have a direct (predation) and indirect (competition) effect on Southern SH/RT in both creeks. A variety of warm-water, non-native fish species are frequently observed in the lower Santa Ynez River, including multiple species of sunfish and catfish, carp, and largemouth bass, all of which are known predators of Southern SH/RT early life stages. In the lower Ventura River, annual monitoring efforts have consistently detected higher numbers of non-native fish species than Southern SH/RT in recent years (CMWD 2021).

Non-native plant and amphibian species also occur in several watersheds that support Southern SH/RT. Invasive plants such as giant reed and tamarisk have displaced extensive areas of native riparian vegetation in major drainages, such as the Santa Clara and San Luis Rey rivers (NMFS 2012a). These water-intensive plant species both reduce instream flows through groundwater uptake and severely reduce the extent of riparian cover and shading. These habitat changes often affect stream flow and thermal regimes, potentially increasing susceptibility of Southern SH/RT to predation, disease, and competitive exclusion. Other non-native plant species, such as water primrose and hyacinth, both of which form dense, sprawling mats on the water's surface, can alter the structure and function of aquatic ecosystems by outcompeting native aquatic plants, reducing the amount of open water habitat, altering the composition of invertebrate communities, physically blocking fish movement, and inducing anoxic conditions detrimental to fish (Khanna et al. 2018). In the Santa Clara River watershed, bullfrogs and African clawed frogs are abundant and widespread throughout the mainstem reaches, from the estuary upstream to Fillmore, including tributaries such as Santa Paula Creek and Hopper Canyon Creek (NMFS 2012a). Both species represent a threat to native aquatic communities because they opportunistically consume a variety of native prey, and eradication of either species is unlikely (Wishtoyo Foundation 2008).

6.8.7 Cannabis Cultivation

The cultivation, manufacturing, and distribution of cannabis products have increased since recreational use became legal in California in 2016 (Butsic et al. 2018). Threats and stressors on aquatic ecosystems associated with the cultivation of cannabis include stream flow and bank modifications, water pollution, habitat degradation, and species invasions (CDFW 2018b). Cannabis is a water-and nutrient-intensive crop that requires an average of up to 6 gallons of water per day, per plant, during the growing season, which usually spans a total of 150 days from June to October (Zheng et al. 2021). Water diversions can lead to changes in flow regimes, the creation of fish passage barriers, the loss of suitable spawning and foraging habitat, and the rerouting and dewatering of streams, especially during drought years or during the dry season (CDFW 2018b; see Section 6.8.2).

A number of local and state agencies, including counties, cities, the State Water Resource Control Board (SWRCB), the Department of Cannabis Control, the Department of Pesticide Regulation, and the Department, regulate the legal cannabis cultivation industry in southern California. These entities issue permits and licenses related to cultivation practices, discharge requirements, diversion rules, and environmental protections. The SRWCB, which issues water rights permits to cannabis cultivators, prohibits the diversion of surface water during the dry season from April 1 through October 1 each calendar year. Surface water diversions to off-stream storage are allowed for collection during the wet season and are later used during the dry season. Many Southern SH/RT-bearing streams are regulated by numerical instream flow requirements that must be met in order for cultivation diversions to occur. For example, instream flow requirements for the Santa Ynez River near Lompoc, California, range between 61.1 and 310 cubic feet per second (cfs) from November to March (SWRCB 2020). These wet-season requirements were developed to address the life history needs of threatened and endangered anadromous salmonids, including maintaining the natural abundance and availability of spawning habitat, minimizing adult exposure, stress, predation, and migration delay during the adult spawning season, and sustaining high-quality and abundant juvenile salmonid winter-rearing habitat.

Illegal cannabis cultivation operations are still prevalent on public lands in southern California, despite the now legal status of recreational use of cannabis in the state. The impacts of illegal cultivation sites are similar to those described for legal operations; however, the severity is likely higher due to the illicit nature of illegal cultivation sites, the higher likelihood of point-source pollution and unregulated diversions, along with the use of illegal and/or unauthorized pesticides, which are all common practices observed at illegal grow sites. As of January 2020, the Department’s South Coast Regional Cannabis Unit has inspected 143 illegal cultivation sites and identified threats to 303(d)-listed water bodies and Regional Water Quality Control Board priority water systems (Covellone et al. 2020). According to Wengert et al. (2021), illegal cannabis cultivation sites in Northern California typically occur at low to mid-elevations (800 m to 1600 m) in forested areas with moderate slopes. If the same distribution patterns hold true in areas of southern California, illegal grow operations within these elevation ranges could overlap with the upper reaches of watersheds on national forest lands that currently support headwater populations of Southern SH/RT. The impact of these illegal grows could have significant adverse impacts on above-barrier resident populations, which have been shown to retain native steelhead genetics important to conserving the genetic diversity of Southern SH/RT. These isolated headwater populations may offer important conservation tools via native genetic stock that can be utilized to re-establish and support the fluvial-anadromous and lagoon-anadromous life history strategies in restored areas no longer occupied by Southern SH/RT (NMFS 2012a; Clemento et al. 2009).

6.9 Fishing and Illegal Harvest

Southern SH/RT traditionally supported important recreational fisheries for both winter adults and summer juveniles in coastal streams. Angling-related mortality may have contributed to the decline of some small populations but is generally not considered a leading cause of the decline of the Southern California Steelhead DPS as a whole (Good et al. 2005; Busby et al. 1996; NMFS 1996b). After the southern California steelhead DPS was federally listed as endangered in 1997, Department fishing regulation modifications led to the closure of recreational fisheries for Southern SH/RT in marine and anadromous waters with few exceptions. That closure continues, and there is currently no legal recreational fishery for Southern SH/RT (CDFW 2023).

Southern SH/RT take is primarily from poaching rather than legal commercial and recreational fishing. While illegal harvest rates appear to be very low, the removal of even a few individuals in some years could be a threat to the population because of such low adult abundance in most populations (Moyle et al. 2017). Southern SH/RT are especially vulnerable to poaching due to their high visibility in shallow streams. Estimates of fishing effort from self-report cards for 1993–2014 suggest extremely low levels of angling effort for Southern SH/RT, primarily due to the statewide prohibition of angling in anadromous waters starting in 1998 (NMFS 2016; Jackson 2007). Historic commercial driftnet fisheries may have contributed slightly to localized declines; however, Southern SH/RT are targeted in commercial fisheries, and reports of incidental catch are rare. Commercial fisheries are not believed to be a leading cause of the widespread declines of Southern SH/RT over the past several decades (NMFS 2012a).

7. INFLUENCE OF EXISTING MANAGEMENT EFFORTS

7.1 Federal and State Laws and Regulations

Several state and federal environmental laws apply to activities undertaken in California that may provide some level of protection for Southern SH/RT and their habitat. There are also restoration, recovery, and management plans, along with management measures specific to habitat restoration, recreational fishing, research, and monitoring that may benefit Southern SH/RT. The following list of existing management measures is not exhaustive.

7.1.1 National Environmental Policy Act and California Environmental Quality Act

The National Environmental Policy Act (NEPA) was enacted in 1970 to evaluate the environmental impacts of proposed federal actions. The NEPA process begins when a federal agency proposes a major federal action. The process involves three levels of analysis: 1) Categorical Exclusion determination (CATEX); 2) Environmental Assessment (EA) or Finding of No Significant Impact (FONSI); and 3) Environmental Impact Statement (EIS). A CATEX applies when the proposed federal action is categorically excluded from an environmental analysis because it is not deemed to have a significant impact on the environment. If a CATEX does not apply, the lead federal agency for the proposed action will prepare an EA, which concludes whether the action will result in significant environmental impacts. A lead agency will issue a FONSI document if significant impacts are not expected. Alternatively, if the action is determined to have a potentially significant effect on the environment, an EIS containing an explanation of the purpose and need for the proposed action, a reasonable range of alternatives that can achieve the same purpose and need, a description of the affected environment, and a discussion of environmental consequences of the proposed action is required (EPA 2017). The United States Environmental Protection Agency is responsible for reviewing all EIS documents from other federal agencies and must provide NEPA documentation for its own proposed actions. Because the Southern California DPS is listed as endangered under the federal ESA, proposed actions that may impact the species are evaluated as biological resources in the project area concurrently and interdependently with the federal ESA Section 7 consultation process.

The California Environmental Quality Act (CEQA) is similar to NEPA in that it requires environmental review of discretionary projects proposed by state and local public agencies unless an exemption applies (Pub. Resources Code, § 21080). Under CEQA, the lead agency is responsible for determining whether an EIR, Negative Declaration, or Mitigated Negative Declaration is required for a project (Cal. Code Regs., tit. 14, § 15051). When there is substantial evidence that a project may have a significant effect on the environment and adverse impacts cannot be mitigated to a point where no significant effects would occur, an EIR must be prepared that identifies and analyzes environmental impacts and alternatives (Pub. Resources Code, § 21082.2, subds. (a) & (d)). Significant effects for a proposed project may occur if project activities have the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species (Cal. Code Regs., tit. 14, §§ 15065, subd. (a)(1) & 15380). CEQA requires public agencies to avoid or minimize significant effects where feasible (Cal. Code Regs., tit. 14, § 15021); NEPA does not include this requirement. Further, CEQA requires that when a lead agency approves a project which will result in significant effects which are identified in the final EIR but are not avoided or substantially lessened, the agency shall make a statement of overriding considerations in which the agency states in writing the specific reasons to support its action based on the final EIR and/or other information in the record (Cal. Code Regs., tit. 14, § 15093).

7.1.2 Federal Endangered Species Act

The ESA was established in 1973 to conserve and protect fish, wildlife, and plants that are listed as threatened or endangered. The ESA provides a mechanism to add or remove federally listed species, cooperate with states for financial assistance, and develop and implement species recovery. The ESA also provides a framework for interagency coordination to avoid take of listed species and for issuing permits for otherwise prohibited activities. The lead federal agencies for implementing the ESA are the USFWS and NMFS. Federal agencies are required to consult with either the USFWS or NMFS to ensure that actions they undertake, fund, or authorize are not likely to jeopardize the continued existence of any listed species or their designated critical habitat. The federal ESA prohibits the take, import, export, or trade in interstate or foreign commerce of ESA-listed species.

NMFS listed the Southern California Steelhead DPS as endangered under the federal ESA in 1997 as part of the South-Central/Southern California Coast recovery domain and designated critical habitat for that DPS in 2005 (NMFS 2012a). The scope of the DPS is naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Santa Maria River to the U.S.-Mexico border. NMFS's West Coast Region manages recovery planning and implementation for this domain, and in 2012 the region adopted a Recovery Plan for the Southern California Steelhead DPS, which provides the foundation for recovering populations to healthy levels. The listing of the DPS afforded the DPS ESA protections through the consultation provisions of ESA Section 7(a)(2); habitat protection and enhancement provisions of ESA Section 4 and 5; take prohibitions through ESA Sections 4(d) and 9; cooperation with the State of California through ESA Section 6; and research, enhancement, and species conservation by non-federal actions through ESA Section 10.

Section 7(a)(2) of the ESA requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of the species or adversely modify designated critical habitat. The agency requesting consultation will typically produce and submit a biological assessment that documents potential effects on listed species or their habitats to either the USFWS or NMFS. USFWS or NMFS then produces and submits a Biological Opinion to the requesting agency that contains conservation recommendations and actions to minimize any harmful effects of the proposed action. Currently, NMFS spends a significant amount of its resources and time fulfilling Section 7 consultation requirements for federal actions that may impact the Southern California Steelhead DPS (NMFS 2012a). This includes working with agencies to avoid and minimize the potential impacts of proposed actions and to ensure project activities do not jeopardize the species or destroy critical habitat. NMFS has issued Biological Opinions for several large federally owned and operated projects, including the Santa Felicia Hydroelectric Project on Piru Creek (2008), USBR's operation and maintenance of the Cachuma Project on the Santa Ynez River (2000), USBR's construction and operation of the Robles Diversion Fish Passage Facility on the Ventura River (2003), the U.S Army Corp of Engineer's (USACE) Matilija Dam Removal and Ecosystem Restoration Project on Matilija Creek (2007), USACE's Santa Paula Creek Flood Control Project (2013). However, the application of Section

7(a)(2) is limited in scope because it applies only to federal actions and areas under federal ownership, and without a related federal action it does not apply to the significant areas of public and private ownership in southern California (NMFS 2012a).

7.1.3 Clean Water Act and Porter-Cologne Water Quality Act

The CWA was established in 1972 to regulate the discharge of pollutants into the waters of the United States and create surface water quality standards. Section 401 of the CWA requires any party applying for a federal permit or license for a project that may result in the discharge of pollutants into the waters of the United States to obtain a state water quality certification. This certification affirms that the project adheres to all applicable water quality standards and other appropriate requirements of state law. Section 404 of the CWA prohibits the discharge of dredged or fill material into the waters of the United States without a permit from the USACE. Activities regulated under this program include fill for development, water resource projects, infrastructure development, and mining projects. Applicants for a 404 permit must demonstrate that all steps have been taken to avoid impacts to wetlands, streams, and aquatic resources and that compensation is provided for unavoidable impacts prior to permit issuance from the USACE.

Since 1969, the Porter-Cologne Water Quality Act (Porter-Cologne Act) has been the principal law governing water quality in California. The Porter-Cologne Act includes goals and objectives that align with those of the federal CWA, such as water quality standards and discharge regulations. The SWRCB and nine regional water quality control boards share responsibility for the implementation and enforcement of the Porter-Cologne Act. These entities are required to formulate and adopt water quality control plans that describe beneficial uses, water quality objectives, and a program of implementation that includes actions necessary to achieve objectives, a time schedule for the actions to be taken, and monitoring to determine compliance with water quality objectives and the protection of beneficial uses of water.

Under Section 401 of the CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certification is issued or certification is waived. The SWRCB and the regional water quality control boards administer Section 401 water quality certifications in California.

In accordance with Section 303(d) of the CWA, the U.S. Environmental Protection Agency (EPA) assists the SWRCB and the regional water boards in listing impaired waters and developing TMDLs for waterbodies within the state. TMDLs establish the maximum concentration of pollutants allowed in a waterbody and serve as the starting point for restoring water quality. The primary purpose of the TMDL program is to assure that beneficial uses of water, such as cold freshwater and estuarine habitat, are protected from detrimental increases in sediment, water temperature, and other pollutants defined in Section 502 of the CWA. TMDLs are developed by either the regional water quality control boards or the EPA. TMDLs developed by the regional water quality control boards are included as water quality control plan amendments and include implementation provisions, while those developed by the EPA contain the total load and load allocations required by Section 303(d) but do not contain comprehensive implementation provisions. The EPA is required to review and approve the list of impaired waters and each TMDL. If the EPA cannot approve the list or a TMDL, it is required to develop its own. There can be multiple TMDLs on a particular waterbody, or there can be one TMDL that addresses numerous pollutants. TMDLs must consider and include allocations to both point and non-point sources of the listed pollutants.

Waters within the range of the Southern SH/RT are under the jurisdiction of the Central, Los Angeles, Santa Ana, and San Diego regional water quality control boards. There are many 303(d)-listed impaired waterbodies within the jurisdiction of each of these regional boards, and most waterbodies have more than one pollutant that exceeds water quality standards designed to protect beneficial uses of water, water quality criteria, or objectives. More information on 303(d) listed waters in southern California can be found at: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2018_integrated_report.html

The National Pollution Discharge Elimination System (NPDES) delegated implementation responsibility for the regulation of wastewater discharges to the State of California through the SWRCB and the regional water quality control boards. In southern California, tertiary wastewater treatment plants commonly discharge treated water into the rivers, streams, and estuaries that support Southern SH/RT. For example, the Tapia Water Reclamation Facility discharges tertiary treated effluent into Malibu, Las Virgenes, and Arroyo Calabasas creeks. While wastewater effluent is often the primary source of streamflow for southern California rivers and streams during the summer months, the potential impacts of wastewater effluent on adult and juvenile life stages are not well understood (NMFS 2012a). The review, assessment, and potential modification of NPDES wastewater discharge permits is a key recovery action in the federal recovery plan for the Southern California DPS to address the threat of urban effluents (NMFS 2016).

7.1.4 Federal and California Wild and Scenic Rivers Act

In 1968, Congress enacted the National Wild and Scenic Rivers Act (WSRA) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing state. Under the National Wild and Scenic Rivers System, rivers are classified as either wild, scenic, or recreational. Designation neither prohibits development nor gives the government control over private property; recreation, agricultural practices, residential development, and other land uses may continue. However, the WSRA does prevent the federal government from licensing, funding, or otherwise assisting in dam construction or other projects on designated rivers or river segments. Designation does not impact existing water rights or the existing jurisdiction of states and the federal government over waters. In California, approximately 2,000 miles of river are designated as wild and scenic, which comprises about one percent of the state's total river miles. The California Wild and Scenic Rivers Act was passed by the California Legislature in 1972. The state act mandates that "certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state." (Pub. Res. Code, § 5093.50). Designated waterways are codified in Public Resources Code Sections 5093.50-5093.70.

The designated state and federal wild and scenic rivers within the range of Southern SH/RT are the Sisquoc River, Piru Creek, and Sespe Creek. The Sisquoc River, which is a tributary of the Santa Maria River, contains 33 miles of designated water from its origin in the Sierra Madre Mountains downstream to the Los Padres National Forest boundary. Piru and Sespe creeks are both tributaries of the Santa Clara River and encompass a combined 38 miles of designated waters. The downstream end of Pyramid Dam and the boundary between Los Angeles and Ventura counties constitute the start and end points of the designated reach for Piru Creek. The designated reach for Sespe Creek is the main stem from its confluence with Rock Creek and Howard Creek downstream, near its confluence with Tar Creek. Both Sespe Creek and the Sisquoc River have comprehensive river management plans that address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of the WSRA (USDA 2003a; USDA 2003b).

7.1.5 Lake and Stream Bed Alteration Agreements

Fish and Game Code Section 1602 requires entities to notify the Department prior to beginning any activity that may "divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake." The requirement applies to both intermittent and perennial waterbodies. If an activity will adversely affect an existing fish and wildlife resource, the Department's Lake and Streambed Alteration Program is responsible for issuing a Lake or Streambed Alteration (LSA) Agreement that includes reasonable measures necessary to protect the resource (Fish & G. Code, §1602, subd. (a)(4)(B)). There are several types of LSA agreements that entities can request from the Department, including standard; general cannabis; gravel, sand, or rock extraction; routine maintenance; timber harvest; and master.

Recently, severe storms during the winter of 2023 in southern California caused flooding, landslides, and mudslides within the watersheds that Southern SH/RT occupy. As a result, multiple emergency actions were conducted to protect life and property. In these circumstances, Fish and Game Code Section 1610 exempts entities that conduct certain emergency work from notification requirements prior to the start of any work activity and instead allows them to notify in writing within fourteen days after the work begins.

In the South Coast Region, legal cannabis cultivation is currently focused in Santa Barbara County, with a concentration of the larger notifications in the Santa Ynez River watershed. The Santa Ynez River and its tributaries are a high priority wildlife resource that supports *O. mykiss*, the Southern California Steelhead DPS listed as endangered under the federal ESA; southwestern willow flycatcher, which is listed as endangered under both the federal ESA and CESA; least Bell's vireo, which is listed as endangered under both the federal ESA and CESA; and California red-legged frog, which is listed as threatened under the federal ESA. There are currently about 453 acres of permitted cannabis in the Santa Ynez watershed. Project water use adjacent to the Santa Ynez River can have significant individual and/or cumulative impacts on Southern SH/RT and other species along this reach and adjacent up- and downstream areas. The predominant water source for these large grows along the Santa Ynez River and within the region are well diversions that can be located within or immediately adjacent to the stream. These diversions have the potential to substantially affect surface flows, hydrology, and vegetation within the Santa Ynez River. Where this situation occurs along the Santa Ynez River, Department staff have included appropriate measures to report on water use in any agreements that have been issued. Such measures include having an established protocol for monitoring and reporting water use throughout the season. Permittees must also abide by the SWRCB forbearance period for diversion of surface water during the dry season, from April 1 through October 1 of each calendar year.

7.1.6 Medicinal and Adult-Use Cannabis Regulation and Safety Act

Regulation of the commercial cannabis cultivation industry under the Medicinal and Adult-Use Cannabis Regulation and Safety Act requires that any entity applying for an annual cannabis cultivation license from the California Department of Food and Agriculture include "a copy of any final lake or streambed alteration agreement… or written verification from the California Department of Fish and Wildlife that a lake or streambed alteration agreement is not required" with their license application (Cal. Code Regs., tit. 3, § 8102, subd. (w)). Waste discharge and water diversions associated with cannabis cultivation are regulated by the SWRCB (Cal. Code Reg., tit. 3, § 8102, subd. (p)).

7.1.7 Federal Power Act

The Federal Energy Regulatory Commission (FERC) implements and enforces the Federal Power Act. FERC has the exclusive authority to license most non-federal hydropower projects that are located on navigable waterways, federal lands, or are connected to the interstate electric grid. The term for a hydropower license granted by FERC is typically 30-50 years. FERC must comply with federal environmental laws prior to issuing a new license or relicensing an existing hydropower project, including NEPA and ESA. Section 10(a) of the Federal Power Act instructs FERC to solicit recommendations from resource agencies and tribes (when applicable) on ways to make a project more consistent with federal or state comprehensive plans. Section 10(j) allows NMFS, USFWS, and the Department to submit recommendations to protect, mitigate damage to, and enhance fish and wildlife resources affected by a proposed project. FERC is not required to incorporate these recommendations into a hydropower license if it determines the recommendations are outside the scope of Section 10(j) or inconsistent with the Federal Power Act or any other applicable law.

Pursuant to Section 401 of the CWA, FERC may not issue a FERC license to a project unless a Section 401 water quality certification is issued to that project or that certification is waived. The SWRCB administers 401 water quality certifications for projects that involve a FERC license.

UWCD owns and operates Santa Felicia Dam, which is the main component of the Santa Felicia Project *(FERC Project Number 2153)*. The project is located on Piru Creek, a tributary of the Santa Clara River, in Ventura County. Santa Felicia Dam, which is located five miles north of the town of Piru, impounds Piru Creek to form Lake Piru Reservoir. Lake Piru has a usable storage capacity of 67,997 acre-feet, and the spillway of the Santa Felicia Dam has a capacity of 145,000 cfs. A small powerhouse located on the west embankment of the dam is capable of producing up to 1,420 kilowatts of energy. UWCD owns two appropriative water rights for the project for the purposes of power, domestic, industrial, municipal, irrigation, and recreational uses. The project currently operates under a 2014 water quality certification that contains provisions to protect fish and wildlife beneficial uses in lower Piru Creek, including a reservoir release schedule to protect Southern SH/RT migration flows each year from January 1 through May 31 (see https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/santafelicia_ferc2153.html for more information).

7.1.8 Sustainable Groundwater Management Act

In September 2014, the Governor signed legislation to strengthen the management and monitoring of groundwater basins. These laws, known collectively as the Sustainable Groundwater Management Act (SGMA), established a timeline and process for forming local

GSAs in designated groundwater basins. GSAs are responsible for developing and implementing GSPs to achieve basin sustainability within a 20-year implementation horizon. DWR is the agency responsible for reviewing and approving individual GSPs, while the SWRCB serves as the regulatory backstop for groundwater basins found to be out of compliance with SGMA. Since 2014, the Department's Groundwater Program has developed multiple documents to assist GSAs in developing and implementing effective GSPs, including a groundwater consideration planning document and a habitat-specific document for wetlands (CDFW 2019). These documents highlight scientific, management, legal, regulatory, and policy considerations that should be accounted for during GSP development. DWR is currently in the process of reviewing GSP plans for critically overdrafted and medium-to-high priority basins. Within the range of Southern SH/RT, there are over fifteen GSPs that are currently being reviewed by DWR. SGMA requires GSAs to submit annual reports to DWR each April 1 following the adoption of a GSP. Annual reports provide information on groundwater conditions and the implementation of the GSP for the prior water year (see https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Groundwater-Sustainability-Plans for more information).

7.1.9 State Water Resources Control Board Water Rights Administration

Water rights are a legal entitlement authorizing water to be diverted from a specified source and put to a beneficial, non-wasteful use. Riparian water rights are based on ownership of land bordering a waterway, while appropriative water rights are issued without regard to the relationship of land to water but rather the priority in which the water was first put to beneficial use. The exercise of most water rights (i.e., appropriative water rights) requires a permit or license from the SWRCB. The goal of the SWRCB in making water rights-related decisions is to develop water resources in an orderly manner, prevent waste and unreasonable use of water, and protect the environment. The SWRCB has several other major water rights - related duties, including but not limited to: participating in water rights adjudications; enhancing instream uses for fish and wildlife beneficial uses; approving temporary water transfers; investigating possible illegal, wasteful, or unreasonable uses of water; and revoking or terminating water rights. SWRCB-issued water right permits contain public trust provisions for the protection of instream aquatic resources. While these provisions (i.e., maximum diversion amounts and diversion seasons) are meant to protect aquatic resources, they do not have an explicit regulatory mechanism to implement protections required in other state statutes, such as Fish and Game Code 5937 (see Section 7.1.10 below). Furthermore, prior to recent advancements in groundwater management, the SWRCB generally lacked the authority to regulate groundwater diversions and development. Overlying landowners may extract percolating groundwater without approval from the SWRCB as long as the extracted water is put to beneficial uses and the region in which the groundwater diversion occurs has not been formally adjudicated.

7.1.10 Fish and Game Code Section 5937

Fish and Game Code Section 5937 states "the owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around, or through the dam, to keep in good condition any fish that may be planted or exist below the dam."

7.2 Species Recovery Plans and Regional Management Plans

7.2.1 Southern California Steelhead Recovery Plan

The Southern California Steelhead Recovery Plan (Recovery Plan) was adopted in 2012 following the listing of the Southern California Steelhead DPS in 1997. The goal of the Recovery Plan is to prevent the extinction of the species in the wild; ensure the long-term persistence of viable, self-sustaining populations of steelhead distributed across the DPS; and establish a sustainable sport fishery (NMFS 2012a). Generally, recovery of the DPS, which consists of naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Santa Maria River to the U.S.-Mexico Border, entails the protection, restoration, and maintenance of a range of habitats in the DPS to allow all life-history forms of the species to be fully expressed (e.g., anadromous and resident). The Recovery Plan outlines key objectives that address factors limiting the species' ability to survive and naturally reproduce, including preventing extinction by protecting populations and habitats, maintaining the current distribution of steelhead and restoring distribution to historically occupied areas, increasing abundance, conserving existing genetic diversity, and maintaining and restoring habitat conditions to support all life-history stages of the species. NMFS defines a viable population as a population that has a less than 5% risk of extinction due to threats from demographic variation, non-catastrophic environmental variation, and genetic diversity changes over a 100-year time frame (NMFS 2012a).

The Recovery Plan organizes the recovery plan area into five BPGs: Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast. The BPGs were initially divided based on whether individual watersheds within them are ocean-facing systems subject to marine-based climate inversion and orographic precipitation from ocean weather patterns. Secondarily, population groups were then organized based on similarity in physical geography and hydrology. The rationale for this approach is that steelhead populations utilizing unique individual watersheds have different life histories and genetic adaptations that enable the species to persist in a diversity of different habitat types represented by the BPGs. The Recovery Plan's strategy emphasizes larger watersheds in each BPG that are more capable of sustaining larger and more viable populations than smaller watersheds. Core 1 populations are identified as having the highest priority based on their intrinsic potential for meeting viable salmonid population criteria, the severity of the threats facing the populations, and the capacity of the watershed and population to respond to recovery actions (NMFS 2012a).

Like all federal recovery plans, the Recovery Plan for the Southern California Steelhead DPS contains recovery criteria, recovery actions, and estimates of the time and costs to achieve recovery goals. Recovery criteria are objective, measurable criteria that, when met, would result in a determination that the species be delisted. Recovery criteria for the Southern California Steelhead DPS Recovery are based on both DPS-level and population-level criteria. At the population level, criteria include characteristics such as mean annual run-size, spawner density, and anadromous fraction, while the DPS-level criteria are informed by the minimum number of populations that must be restored in each BPG. Recovery actions are site-specific management actions necessary to achieve species recovery. Actions for the Southern California DPS are organized based on the BPG and core population approaches. High-priority recovery actions include, but are not limited to, physically modifying passage barriers such as dams to allow natural rates of migration to upstream spawning and rearing habitats, enhancing protection of natural in-channel and riparian habitats, reducing water pollutants, and conducting research to better understand the relationship between resident and anadromous forms of the species (NMFS 2012a).

7.2.2. Forest Plans

Land Management, or Forest Plans, were developed by the United States Department of Agriculture for the southern California National Forests (the Angeles, Cleveland, Los Padres, and San Bernadino National Forests) in 2006 to provide a framework for guiding ongoing land and resource management operations. The southern California Forest Plans contain various protections for Southern SH/RT that occur within national forests. These include, but are not limited to, mitigating the effects of visitor use within watersheds occupied by steelhead, working collaboratively with federal and state agencies and water management entities to restore steelhead trout access to upstream habitat, reducing risks from wildland fires to maintain water quality, and eliminating and limiting the further spread of invasive nonnative species (USDA 2005). For example, in 2014, the Cleveland National Forest initiated an effort to restore Southern SH/RT migratory corridors in the San Juan and Santiago watersheds by removing numerous small, outdated, and non-functional dams constructed by Orange County (Donnell et al. 2017). Thus far, up to 81 small check dams on Silverado, Holy Jim, Trabuco, and San Juan creeks have been removed. Forest Plans are required to be updated every 10 to 15 years. In recent years, several amendments to the Southern California National Forest Plans have been adopted in response to monitoring and evaluation, new information, and changes in conditions.

7.2.3 Habitat Conservation Plans and Natural Community Conservation Plans

A Habitat Conservation Plan (HCPs) is a planning document that authorizes the incidental take of a federally listed species when it occurs due to an otherwise lawful activity. HCPs are designed to accommodate both economic development and the permanent protection and management of habitat for species covered under the plan. At minimum, HCPs must include an assessment of the impacts likely to result from the proposed taking of one or more federally listed species, the measures that the permit applicant will undertake to monitor, minimize, and mitigate such impacts, the funding available to implement such measures, procedures to deal with unforeseen or extraordinary circumstances, alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives (USFWS 2021).

The Natural Community Conservation Planning Act authorized the Department to develop Natural Community Conservation Plans (NCCPs). NCCPs identify and provide for the regional protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The development of a NCCP by a local agency requires significant collaboration and coordination with landowners, environmental organizations, and state and federal agencies. Most approved HCP/NCCP documents are joint documents that fulfill the requirements of both Section 10 of the ESA and the Natural Community Conservation Planning Act.

Within the range of the Southern SH/RT, there are at least nine HCP or NCCPs that are either in the implementation phase or the planning phase. The majority of HCP and NCCP plans are for the southern portion of the species range and include multiple plan subareas. For example, the San Diego County Multiple Species Conservation Program contains six subareas, including the City of San Diego, Poway, Santee, La Mesa, Chula Vista, and South San Diego County. Generally, rivers, streams, and riparian vegetation communities in HCP and NCCP plan areas are considered ecologically important areas that are targeted for conservation. HCP/NCCP plans typically contain provisions to conserve fish and wildlife habitat, including fire management, invasive species control, fencing, trash removal, and annual monitoring.

7.2.4 Other Management and Restoration Plans

The Steelhead Restoration and Management Plan for California is a Department-statewide steelhead management plan that provides guidelines for steelhead restoration and management that can be incorporated into stream-specific project planning (McEwan and Jackson 1996).

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3490

7.3 Habitat Restoration and Watershed Management

7.3.1 Fisheries Restoration Grant Program

The goal of the Department's Fisheries Restoration Grant Program (FRGP) is to recover and conserve salmon and steelhead trout populations through restoration activities that reestablish natural ecosystem functions. The FRGP annually funds projects and activities that provide a demonstrable and measurable benefit to anadromous salmonids and their habitat; restoration projects that address factors limiting productivity as specified in approved, interim, or proposed recovery plans; effectiveness monitoring of habitat restoration projects at the watershed or regional scales for anadromous salmonids; and other projects such as outreach, coordination, research, monitoring, and assessment projects that support the goal of the program. Uniquely, the FRGP provides CWA Section 401 certification and CWA Section 404 coverage for all eligible projects funded through the program. In recent years, several FRGP proposals have been funded to support conservation efforts for Southern SH/RT, including the Upper Gaviota Fish Passage Project (2022), Life Cycle Monitoring on Topanga Creek and the Ventura River (2021), Fish Passage Barrier Removal on San Jose Creek, Gaviota Creek, and Maria Ygnacio Creek (2021), and the South Coast Steelhead Coalition (2021) (see https://wildlife.ca.gov/Grants/FRGP for more information.)

7.3.2 Wildlife Conservation Board, Proposition 68 and Proposition 1

The Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) and the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018 (Proposition 68) authorized both the Wildlife Conservation Board and the Department to award significant grant funding to restoration projects that are intended to benefit Southern SH/RT. Both entities distribute Proposition 68 and Proposition 1 funds on a competitive basis to projects that specifically address river and stream restoration (Proposition 68; Proposition 1), Southern SH/RT habitat restoration (Proposition 68), fish and wildlife habitat restoration (Proposition 68; Proposition 1), or stream flow enhancements (Proposition 1). Proposition 68 funded projects that benefit Southern SH/RT and their habitat include the Harvey Diversion Fish Passage Restoration Project on Santa Paula Creek, the Matilija Dam Ecosystem Restoration Project on Matilija Creek, and the Santa Margarita River Fish Passage Project and Bridge Replacement. Proposition 1 funded projects include, but are not limited to, *Arundo donax* removal at the Sespe Cienega on the Santa Clara River, the Santa Clara River Riparian

Improvement, and the Integrated Water Strategies Project for Flow Enhancement in the Ventura River Watershed (WCB 2021).

7.3.3 Other Habitat Restoration Funding Sources

In addition to funding provided by the Department, Wildlife Conservation Board and FRGP, Southern SH/RT conservation projects are also supported by numerous other funding sources. These sources include local, state, and federal sources such as the California Coastal Conservancy, Pacific Coastal Salmon Recovery Fund, the National Fish and Wildlife Foundation, the NOAA Restoration Center, the California Department of Water Resources Integrated Regional Water Management Plan grant program (Proposition 50), the California Natural Resources Agencies Parkways Program (Proposition 40), the CalTrans Environmental Enhancement and Mitigation Program, the Santa Barbara County Coastal Resource Enhancement Fund, and the San Diego Association of County Government TransNet Environmental Mitigation Program (NMFS 2016).

7.3.4 California Steelhead Report and Restoration Card

The California Steelhead Report and Restoration Card program has funded various types of conservation projects since 1993, including instream habitat improvement, species monitoring, outreach and education, and watershed assessment and planning. However, no restoration projects within the Southern SH/RT range were funded between 2015 and 2019, as most funds were granted to projects in more northern watersheds (CDFW 2021c).

7.3.5 Non-Governmental Organization (NGOs) Efforts

Several NGOs contribute funding and staff time to implement restoration projects for the benefit of Southern SH/RT, often with the support of federal, state, or local grants. For example, the South Coast Steelhead Coalition under the guidance of California Trout, has received grant funding from the Department's FRGP to implement several restoration projects that benefit Southern SH/RT, including the Harvey Diversion Fish Passage Project on Santa Paula Creek; the Interstate 5 Trabuco Fish Passage Project on San Juan Creek in Orange County, the Santa Margarita River Fish Passage Project on Sandia Creek in San Diego County; the Rose Valley Restoration Project on Sespe Creek; invasive vegetation removal in the Santa Clara River floodplain; and *O. mykiss* protection in the upper Santa Margarita River, West Fork San Luis Rey River, and upper tributaries to the Santa Clara and Ventura rivers (NMFS 2016). Other NGOs that promote funding and implementation of steelhead recovery actions include the Santa Clara River Steelhead Coalition under the direction of California Trout, the Tri-Counties Fish Team, the Environmental Defense Center, the San Gabriel and Lower Los Angeles Rivers Mountain Conservancy, the West Fork San Gabriel River Conservancy, and the Council for

Watershed Health (San Gabriel and Los Angeles rivers). Additionally, there are many other groups or agencies that are also involved in Southern SH/RT conservation efforts: Concerned Resource and Environmental Workers; Heal the Ocean; Santa Barbara ChannelKeeper; Matilija Coalition; Ojai Valley Land Conservancy; Friends of the Ventura River; Friends of the Santa Clara River; Friends of the Los Angeles River; Friends of the Santa Monica Mountains; Heal the Bay; Friends of the Santa Margarita River; San Dieguito River Valley Conservancy; and the Endangered Habitat League (NMFS 2016).

7.3.6 Other Regional and Local Public Institution Efforts

The Southern California Wetlands Recovery Project (SCWRP) consists of directors and staff from 18 public agencies, which collectively coordinate to protect, restore, and enhance coastal wetlands and watersheds between Point Conception and the Mexican Border. The SCWRP, which was founded in 1997, is chaired by the California Natural Resources Agency with support from the California State Coastal Conservancy. The mission of the SCWRP is to expand, restore, and protect wetlands in southern California. The SCWRP is guided by long-term goals, specific implementation strategies, and quantitative objectives articulated in its 2018 regional strategy report (SCWRP 2018).

The Southern California Coastal Water Research Project (SCCWRP) is a public research and development agency whose mission is to enhance the scientific foundation for management of southern California's ocean and coastal watersheds. Since its creation in 1969, the focus of the SCCWRP has been to develop strategies, tools, and technologies to improve water quality management for the betterment of the ecological health of the region's coastal ocean and watersheds. SCCWRP research projects are guided by comprehensive annual plans for major research areas, including ecohydrology, climate change, eutrophication, microbial water quality, and stormwater best management practices (SCCWRP 2022). Currently, the SCCWRP, in cooperation with other local and state agencies, is leading the Los Angeles River Environmental Flows Project. The project's goals are to quantify the relationship between flow and aquatic life, account for flow reduction allowances to the river from multiple wastewater reclamation plants during the summer months and develop flow criteria for the Los Angeles River using the California Environmental Flows Framework.

The City of Santa Barbara supports a Creeks Restoration and Water Quality Improvement Division (Creeks Division), whose mission is to improve creek and ocean water quality and restore natural creek systems through storm water and urban runoff pollution reduction, creek restoration, and community education programs. The Creeks Division's goal for restoration includes increasing riparian vegetation and wildlife habitat, removing invasive plants, and improving water quality through shading, bank stabilization, and erosion control. The Division has completed several restoration projects in Santa Barbara County, including the Mission Creek Fish Passage project, the Arroyo Burro Estuary and Mesa Creek restoration project, and the upper Las Positas Creek restoration project. The Creeks Division also conducts removal efforts of invasive giant reed from the Arroyo Burro, Mission, and Sycamore Creek watersheds and participates in water quality improvement projects, creek and beach cleanups, and education outreach efforts throughout Santa Barbara County.

The California Conservation Corps Fisheries Program gives U.S. military veterans opportunities to develop skills and work experience by restoring habitat for endangered salmon and steelhead and conducting fisheries research and monitoring. The program, which is a partnership between the California Conservation Corps, NMFS, and the Department, trains participants on a variety of fisheries monitoring techniques, including riparian restoration, dual-frequency identification sonar (DIDSON) techniques, adult and juvenile fish identification, downstream migrant trapping, and instream flow and habitat surveys.

7.4 Commercial and Recreational Fishing

California freshwater sport fishing regulations prohibits fishing in virtually all anadromous coastal rivers and streams in southern California that are accessible to adult steelhead. However, recreational angling for *O. mykiss* above impassable barriers is permitted in many coastal rivers and streams (CDFW 2023a). The Department has expanded its use of sterile “triploid” fish to prevent interbreeding of hatchery fish with native Southern SH/RT (NMFS 2016). The freshwater exploitation rates of Southern SH/RT are likely very low given the Department’s prohibition of angling within the geographic range of the Southern California Steelhead DPS listed under the federal ESA (NMFS 2016). Additionally, sport and commercial harvest of Southern SH/RT greater than 16 inches in length in the Department’s Southern Recreational Fishing Management Zone is prohibited (CDFW 2023b). All incidentally captured steelhead in the ocean must be released unharmed and should not be removed from the water.

7.5 Research and Monitoring Programs

7.5.1 California Coastal Monitoring Program

The purpose of the CMP is to gather statistically sound and biologically meaningful data on the status of California’s coastal salmonid populations to inform salmon and steelhead recovery, conservation, and management activities. The CMP framework is based on four viable salmonid population metrics: abundance, productivity, spatial structure, and diversity (Adams et al. 2011; McElhany et al. 2000). Boughton et al. (2022b) updated the CMP approach for the southern coastal region to address the scientific uncertainty on Southern SH/RT ecology due to lower abundances and a more arid climate compared to more northern populations, for which the original CMP framework was designed.

Currently, the Department leads monitoring efforts in the southern coastal region, with most efforts focused on obtaining abundance estimates for anadromous adults in Core 1 and Core 2 populations (NMFS 2016). As of March 2023, Department CMP staff operate fixed-point counting stations and conduct summer-low flow juvenile surveys, redd surveys, and PIT tagging arrays on the Ventura River, Topanga Creek, and Carpinteria Creek, including the various tributaries to these watersheds. Fixed-point counting stations for anadromous adults are also operated on the Santa Ynez River and its primary tributary, Salsipuedes Creek. Redd surveys and juvenile low-flow surveys also occur in coastal watersheds of the Santa Monica Mountains, such as Big Sycamore Creek, Malibu Creek, Arroyo Sequit Creek, and Solstice Creek. Additionally, the Department conducts spawning surveys in the many watersheds of the Conception Coast, including Jalama, Gaviota, Glenn Annie, San Pedro, Maria Ygnacio, and Mission creeks. Department CMP staff anticipate expanding the number of southern coastal watersheds monitored as landowner agreements and available funding increase (K. Evans, CDFW, personal communication).

7.5.2 Other Monitoring Programs

Several special districts or local governments monitor Southern SH/RT on an annual basis in watersheds that contain federally owned or operated infrastructure. Such monitoring is often required for compliance with monitoring and reporting measures set forth in federal ESA Section 7 Biological Opinions. Although the level of monitoring effort and protocol methods vary between monitoring programs, the data produced by these special districts or local governments are often the longest time-series data available for Southern SH/RT.

COMB has conducted monitoring within the Lower Santa Ynez River and its tributaries since 1994 as part of the assessment and compliance measures required in the Cachuma Project Biological Opinion. Redd and adult spawner surveys typically occur throughout the winter months, while juvenile snorkel surveys are conducted in the spring, summer, and fall months. Estuary monitoring is also periodically conducted to complement upstream trapping during the migration seasons.

Since 2005, the CMWD has monitored fish migration at the Robles Fish Passage facility (14 miles upstream from the ocean) on the Ventura River using a VAKI Riverwatcher remote fish monitoring system. CMWD also conducts reach-specific spawner and redd surveys and snorkel surveys at index sites throughout the Ventura River watershed from the winter through late spring (Dagit et al. 2020).

UWCD monitors both upstream and downstream migration at the Vern Freeman Diversion Dam (approximately 10 miles upstream from the ocean) using both video-based and motion detection surveillance systems. Monitoring occurs from January to June when streamflow in the Santa Clara River is high enough to maintain water levels at the passage facility (Booth 2016).

The RCDSMM has monitored Arroyo Sequit, Malibu, and Topanga creeks since the early 2000s. Monitoring typically occurs from January through May and includes snorkel surveys, spawning and rearing surveys, instream habitat surveys, and periodic lagoon surveys (Dagit et al. 2019). Since 2016, the South Coast Steelhead Coalition, under the direction of California Trout, has conducted post-rain reconnaissance surveys in San Juan Creek, San Mateo Creek, the Santa Margarita River, and the San Luis Rey River (Dagit et al. 2020).

8. SUMMARY OF LISTING FACTORS

The Commission's CESA implementing regulations identify key factors relevant to the Department's analyses and the Commission's decision on whether to list a species as endangered or threatened. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)). This section provides summaries of information from the preceding sections of this Status Review, arranged under each of the factors to be considered by the Commission in determining whether listing is warranted.

8.1 Present or Threatened Modification or Destruction of Habitat

The decline of Southern SH/RT can be attributed to a wide variety of human activities, including, but not limited to, urbanization, agriculture, and water development. These activities have degraded range-wide aquatic habitat conditions, particularly in the lower and middle reaches of individual watersheds (See Section 6.8). Southern California is home to over 20 million people and 1.8 million acres of urban area (DWR 2021). As a result, the majority of watersheds, currently occupied by Southern SH/RT, are highly urbanized and impacted by surface and groundwater diversions and associated agricultural, residential, and industrial uses.

Although some deleterious activities have been eliminated or mitigated, habitat conditions for Southern SH/RT have continued to deteriorate over time due to numerous stressors associated with human population growth and climate change impacts. Water diversions, storage, and conveyance for agriculture, flood control, and domestic uses have significantly reduced much of the species' historical spawning and rearing habitat. Changes to the natural flow regime of southern California rivers and streams have resulted in lower and less variable stream flows, increased water temperatures, shifts in aquatic community composition, and reduced recruitment of gravel and sediments. High road densities and the presence of many in-stream artificial barriers have reduced habitat connectivity by impeding and restricting volitional fish passage in many watersheds, especially in the lower reaches. Development activities associated with agriculture, urbanization, flood control, and recreation have also substantially altered Southern SH/RT habitat quantity and quality by increasing ambient water temperatures, increasing nutrient and pollutant loading, degrading water quality, eliminating riparian habitat, and creating favorable conditions for non-native species. Range-wide and coastal estuarine habitat conditions are highly degraded and are at risk of loss and further degradation. Legal cannabis cultivation is a relatively new yet potentially serious threat to Southern SH/RT watersheds if best management practices, instream flow requirements, and diversion season regulations are not complied with. Our review of habitat conditions in southern California supports the conclusions of other review efforts, which conclude that populations continue to be at risk of extinction unless significant restoration and recovery measures are implemented (Moyle et al. 2017; NMFS 2012a).

The Department considers present or threatened modification or destruction of habitat to be a significant threat to the continued existence of Southern SH/RT.

8.2 Overexploitation

Exploitation rates of Southern SH/RT are relatively low across its range (See Section 6.9). While angling-related mortality may have historically contributed to the decline of some small populations, it is generally not considered a leading cause of the decline of the Southern California Steelhead DPS as a whole (Good et al. 2005; Busby et al. 1996; NMFS 1996b). After southern California steelhead was first listed as endangered under the federal ESA as an ESU in 1997, the Commission closed recreational fisheries for Southern SH/RT in California marine and anadromous waters with few exceptions. The closure continues, and there is currently no recreational fishery for Southern SH/RT (CDFW 2023a; CDFW 2023b).

Marine commercial driftnet fisheries in the past may have contributed slightly to localized declines; however, Southern SH/RT are not targeted in commercial fisheries and reports of incidental catch are rare. Commercial fisheries are not believed to be a leading cause of the widespread declines over the past several decades (NMFS 2012a).

Illegal harvest is likely the leading source of exploitation. Southern SH/RT are especially vulnerable to poaching due to their visibility in shallow streams. Estimates of fishing effort from self-report cards for 1993-2014 suggest extremely low levels of angling effort for Southern SH/RT (NMFS 2016; Jackson 2007). Though illegal harvest rates appear to be very low, because of low adult abundance, the removal of even a few individuals in some years could be a threat to the population (Moyle et al. 2017).

The Department does not consider overexploitation to be a substantial threat to the continued existence of Southern SH/RT, but further directed study is warranted to confirm this threat level.

8.3 Predation

Southern SH/RT experience predation in both the freshwater and marine environments, but specific predation rates, particularly in marine environments, are not well understood (See Section 6.5). While Southern SH/RT have evolved to cope with a variety of natural predators, a suite of non-native predators has also become established within its watersheds (Busby et al. 1996; NMFS 2016; Stillwater Sciences 2019; Dagit et al. 2019; COMB 2022). Established populations of non-native fishes, amphibians, and aquatic invertebrates combined with anthropogenic habitat alterations that provide favorable conditions for the persistence of these non-native species have led to increased predation rates in much of its range (NMFS 1996b). Habitat modification and degradation has also likely increased predation rates from terrestrial and avian predators (Grossman 2016; Osterback et al. 2013).

The Department considers predation to be a moderate threat to the continued existence of Southern SH/RT based on the available data. Further directed study is warranted to confirm the level of impact of these predation threats on Southern SH/RT.

8.4 Competition

Southern SH/RT populations are subject to competitive forces across their range (See Section 6.6). The extent to which competition impacts the distribution, abundance, and productivity of Southern SH/RT populations is not well understood. Southern SH/RT are the only species of salmonid that occur in their range. Therefore, the potential for inter-specific competition with other salmonids is unlikely to occur. Interspecific competition with other non-salmonid fishes occurs to varying degrees across the Southern SH/RT range. In addition to competing with juvenile steelhead for food resources, juvenile non-native fish species can limit the distribution and abundance of juvenile steelhead. Non-native fish species can competitively exclude and confine the spatial distribution of juvenile steelhead to habitats such as shallower, higher velocity riffles, where the energetic cost to forage is higher (Rosenfeld and Boss 2001).

The Department considers competition with nonnative fish species to be a moderate threat to the continued existence of Southern SH/RT. Further directed study is warranted to confirm the level of impact from competition.

8.5 Disease

Southern SH/RT survival is impacted by a variety of factors including infectious disease (See Section 6.3). A myriad of diseases caused by bacterial, protozoan, viral, and parasitic organisms can infect *O. mykiss* in both the juvenile and adult life stages (NMFS 2012a). Degraded water quality and chemistry in much of the Southern SH/RT range is likely to increase infection rates and severity (Belchik et al. 2004; Stocking and Bartholomew 2004; Crozier et al. 2008). There is very little current information available to quantify present infection and mortality rates in Southern SH/RT.

The Department does not consider disease to currently be a significant threat to the continued existence of Southern SH/RT, however further directed study is warranted to confirm the level of current and potential future impact.

8.6 Other Natural Occurrences or Human-related Activities

Southern SH/RT populations have evolved notably plastic and opportunistic survival strategies and are uniquely adapted to wide-ranging natural environmental variability, characterized by challenging and dynamic habitat conditions (Moyle et al. 2017). However, combined anthropogenic and climate change-driven impacts may ultimately outpace Southern SH/RT's capacity to adapt and persist, potentially leading to extirpation within the next 25–50-year time frame (Moyle et al. 2017; See Section 6.2). This prediction is underscored by the fact that Southern SH/RT already encounters water temperatures that approach and may, at times, exceed the upper limit of salmonid thermal tolerances, across portions of its current distribution (Moyle et al. 2017). Southern SH/RT has, therefore, been characterized as having potential for severe climate change impacts (Moyle et al. 2017). With increasing exposure to periods of higher water temperatures and flow variability, along with extended droughts, more frequent and intense wildfires, catastrophic flooding and associated sediment movement, sea level rise, and ever-increasing human demands for natural resources, the combined impacts to Southern SH/RT will be interdependent, synergistic, and are expected to intensify without intensive and timely human intervention (NMFS 2012b; Hall et al. 2018; OEHHA 2022).

Human-related activities are considered by the Department to be significant threats to the continued existence of Southern SH/RT.

9. SUMMARY OF KEY FINDINGS

Southern California steelhead (*Oncorhynchus mykiss*) inhabit coastal streams from the Santa Maria River system south to the U.S.-Mexico border. Non-anadromous resident *O. mykiss*, familiar to most as Rainbow Trout, reside in many of these same streams and interbreed with anadromous adults, contributing to the overall abundance and resilience of the species. Southern California steelhead as defined in the Petition include both anadromous (ocean-going) and resident (stream-dwelling) forms of *O. mykiss* below complete migration barriers in these streams.

Less than half of the watersheds historically occupied by Southern SH/RT remain occupied, most commonly with individuals able to express only a freshwater-resident life-history strategy (NMFS et al. 2012). Adult steelhead runs have declined to precariously low levels, particularly over the past five to seven years, with declines in adult returns of 90% or more on major watersheds that historically supported the largest anadromous populations (e.g., the Santa Maria, Santa Ynez, Ventura, and Santa Clara rivers). Additionally, our analysis of resident populations indicates a sharp decline over this same time period.

While recent genetic findings suggest that the anadromous life-history form can be sustained and reconstituted from resident individuals residing in orographic drought refugia, in southern California, nearly all drought refugia habitats are currently above impassable barriers. Therefore, the anadromous phenotype is at an increasingly high risk of being entirely lost from the species within its southern California range, in large part due to the lack of migration corridors between drought refugia and the ocean, and the inability of resident progeny to successfully migrate downstream in years with sufficient rainfall and streamflow.

Southern SH/RT continues to be most at risk from habitat degradation, fragmentation, and destruction resulting from human-related activities. Specifically, dams, surface water diversions, and groundwater extraction activities restrict access to most historical spawning and rearing habitats and alter the natural flow regime of rivers and streams that sustain ecological, geomorphic, and biogeochemical functions and support the specific life history and habitat needs of Southern SH/RT. Agricultural and urban development negatively affect nearby rivers and streams through increased pollution and surface runoff, which degrade water quality and habitat conditions. Furthermore, the rapid rate of climate change and the increasing presence of non-native species present another challenge to the persistence of Southern SH/RT.

Based on the best scientific information available at the time of the preparation of this review, the Department concludes that the Southern SH/RT is in danger of extinction throughout all of its range. Intensive and timely human intervention, such as ecological restoration, dam removal, fish passage improvement projects, invasive species removal, and groundwater management, are required to prevent the further decline of the species. The extinction of Southern SH/RT would represent an insurmountable loss to the *O. mykiss* diversity component in California due to their unique adaptations, life histories, and genetics, which have allowed them to persist at the extreme southern end of the species' West Coast range.

10. RECOMMENDATION FOR THE COMMISSION

CESA requires the Department to prepare this report regarding the status of Southern SH/RT in California based upon the best scientific information available to the Department (Fish & G. Code, § 2074.6). CESA also requires the Department to indicate in this Status Review whether the petitioned action (i.e., listing as endangered) is warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

Under CESA, an endangered species is defined as “a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease” (Fish & G. Code, § 2062). A threatened species is defined as “a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]” (Fish and G. Code, § 2067).

Based on the criteria described above, the best scientific information available to the Department indicates that Southern SH/RT is in serious danger of becoming extinct in all or a significant portion of its range due to one or more causes including: 1. present or threatened modification or destruction of habitat; and 2. other natural occurrences or human-related activities. The Department recommends that the Commission find the petitioned action to list Southern SH/RT as an endangered species to be warranted.

11. PROTECTION AFFORDED BY LISTING

It is the policy of the State to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). The conservation, protection, and enhancement of listed species and their habitat is of statewide concern (Fish & G. Code, § 2051, subd. (c)). If listed, unauthorized take of Southern SH/RT would be prohibited under state law. CESA defines “take” as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86). Any person violating the take prohibition would be punishable under state law. The Fish and Game Code provides the Department with related authority to authorize “take” of species listed as threatened or endangered under certain circumstances (see, e.g., Fish & G. Code, §§ 2081, 2081.1, 2086, & 2835). If Southern SH/RT is listed under CESA, take resulting from activities authorized through incidental take permits must be minimized and fully mitigated according to state standards (Fish & G. Code, § 2081, subd. (b)). Take of Southern SH/RT for scientific, educational, or management purposes could be authorized through permits or memorandums of understanding pursuant to Fish and Game Code Section 2081(a).

Additional protection of Southern SH/RT following listing would also occur during required state and local agency environmental review under CEQA. CEQA requires affected public agencies to analyze and disclose project-related environmental effects, including potentially significant impacts on endangered, threatened, and rare special status species. Under CEQA's "substantive mandate," state and local agencies in California must avoid or substantially lessen significant environmental effects to the extent feasible. With that mandate, and the Department's regulatory jurisdiction generally, the Department expects related CEQA review will likely result in increased information regarding the status of Southern SH/RT in California as a result of pre-project biological surveys. Where significant impacts are identified under CEQA, the Department expects project-specific required avoidance, minimization, and mitigation measures will also benefit the species. While CEQA may require analysis of potential impacts to Southern SH/RT regardless of its listing status under CESA, the act contains specific requirements for analyzing and mitigating impacts to listed species. In common practice, potential impacts to listed species are scrutinized more in CEQA documents than are potential impacts to unlisted species. State listing, in this respect, and required consultation with the Department during state and local agency environmental review under CEQA, is expected to benefit the species by reducing impacts from individual projects to a greater degree than may occur absent listing.

CESA listing may prompt increased interagency coordination specific to Southern SH/RT conservation and protection. Listing may also increase the likelihood that state and federal land and resource management agencies will allocate additional funds toward protection and recovery actions.

12. MANAGEMENT RECOMMENDATIONS AND RECOVERY MEASURES

CESA directs the Department to include in its Status Review recommended management activities and other recommendations for recovery of Southern SH/RT (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f).). Department staff generated the following list of recommended management actions and recovery measures.

1. Implement comprehensive monitoring in all streams with extant Southern SH/RT populations and produce statistically robust population estimates. Fully implement the CMP and integrate the updated south coastal region monitoring strategy (Boughton et al. 2022b) to resolve the various ecological and methodological factors that currently impede monitoring. The main features of this updated strategy are:

- Estimates of average density for each BPG;
- Research on the location and extent of drought refugia in each BPG;

- Adult steelhead abundance estimates in selected populations that are robust enough to evaluate species' resilience to catastrophic events and the ability to adapt over time to long-term environmental changes;
- Adult *O. mykiss* abundance estimates that are sufficient to develop an estimate for total abundance in the region;
- Routine genetic monitoring to track the *Omy 5* A haplotype and AA genotype as indicators for viability; and
- Greater emphasis on monitoring methods that are unbiased or can be corrected for bias (NMFS 2016).

2. Support and participate in the development of watershed-specific plans to effectively maintain and restore Southern SH/RT habitat by focusing on the combination of factors currently limiting their distribution and abundance, such as dams, agriculture, and water extraction. This includes continuing to coordinate and collaborate with NMFS, NGOs, state and local governments, landowners, and other interested entities to implement recovery actions identified in the 2012 Recovery Plan for the southern California Steelhead DPS and other management and conservation strategies. High priority actions include (NMFS 2012a):

- Remove manmade passage barriers in all population watersheds and re-establish access to upper watersheds in both small coastal streams and the larger interior rivers within each BPG identified in the Recovery Plan;
- Complete planning and removal of Matilija Dam on Matilija Creek and Rindge Dam on Malibu Creek;
- Provide ecologically meaningful flows below major dams and diversions in all population watersheds by re-establishing adequate flow regimes in both small coastal streams and large interior rivers;
- Reevaluate the efficacy of existing fish passage structures at instream surface water diversions, dams, culverts, weirs, canals, and other infrastructure in all watersheds historically and currently occupied by Southern SH/RT; and
- Minimize the adverse effects of exotic and non-native plant and animal species on aquatic ecosystems occupied by Southern SH/RT through direct removal and control efforts.

3. Improve and expand suitable and preferred habitat used by Southern SH/RT for summer holding, spawning, and juvenile rearing. Prioritize habitat restoration, protection, and enhancement in Southern SH/RT holding, spawning, and rearing areas. Habitat projects should focus on improving habitat complexity, riparian cover, fish passage, and sediment transport, as well as enhancing essential deep, cold-water habitats for holding adults. Restoration should also be considered in potential habitats not currently occupied by Southern SH/RT.

4. Continue research on *Omy5* haplotypes and other relevant genomic regions to better understand: the mechanism for anadromy in Southern SH/RT, the impact of migration barriers on the frequency of the “A” haplotype in individuals, and the risk of progressively losing the genetic basis for anadromy over time in above-barrier populations despite the current presence of the “A” haplotype.

5. Continue to investigate the population structure and ancestry of Southern SH/RT at the extreme southern end of the species distribution in southern California, including further research on identifying genetically introgressed populations and the potential benefit of these populations for maintaining the persistence of viable networks of Southern SH/RT, given recent findings of limited native ancestry in the region and the importance of variation in adaptation.

6. Initiate research into Southern SH/RT ecology identified in the Southern California Steelhead Recovery Plan (NMFS 2012a). Important research topics include:

- Environmental factors that influence anadromy;
- The relationship between migration corridor reliability and anadromous fraction;
- Identification of nursery habitat types that promote juvenile growth and survival;
- The role of seasonal lagoons and estuaries in the life history of Southern SH/RT and the extent to which these areas are used by juveniles prior to emigration;
- Investigation on the role that mainstem habitats play in the life history of steelhead, including identification of the ecological factors that contribute to mainstem habitat quality;
- The role of naturally intermittent creeks and stream reaches;
- Determining whether spawner density is a reliable indicator of a viable population;
- Determining the frequency of return adult spawners;
- Recolonization rates of extirpated watersheds by source populations;
- Dispersal rates between watersheds, including interactions among and between populations through straying;
- Intra-and interannual variation in diet composition and growth rate; and
- Partial migration and life-history crossovers.

7. Formalize minimization and avoidance measures on a Department-wide basis to minimize incidental take of the CESA-listed species due to otherwise lawful activities resulting from construction, research, management, and enhancement activities. This includes working with federal agencies to coordinate and develop efficient permitting processes for incidental take authorization for actions that contribute to the recovery of Southern SH/RT.

8. Explore other means of conserving individual populations of *O. mykiss* that may face the risk of extirpation due to catastrophic events, such as wildfires, droughts, and oil spills (e.g.,

conservation translocations to other existing facilities at academic institutions or museums, or natural refugia habitats). This includes ensuring that translocations of Southern SH/RT conducted by the Department for conservation purposes significantly contribute to species and ecosystem conservation and are planned, executed, and supported in a manner consistent with best scientific practices and the Department's Policy and Procedures for Conservation Translocations of Animals and Plants (CDFW 2017).

9. Strengthen law enforcement in areas occupied by Southern SH/RT to reduce threats of poaching, illegal water diversions, and instream work used for cannabis cultivation.

10. Evaluate current fishing regulations to determine any potential changes that could be implemented for further protection of Southern SH/RT, and update regulations, using clear and transparent communication, in response to restoration actions, such as dam removal projects, that could change the sport fishing regulation boundary (e.g., inland anadromous waters).

11. Conduct a robust outreach and education program that works to engage with tribes and interested parties, including federal, state, local, NGOs, landowners, underserved communities, and interested individuals, to promote and implement conservation actions. This includes developing outreach and educational materials to increase public awareness and knowledge of the ecological and societal benefits that can be gained by recovering Southern SH/RT.

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Personal Communication

Kyle Evans, CDFW, personal communication, 03/08/2023

John O’Brien, CDFW, personal communication, 12/05/2022

Dane St. George, CDFW, personal communication, 05/24/2023

APPENDIX A: ANNUAL *O. MYKISS* OBSERVATIONS AND DATA SOURCES FOR THREE EXTANT POPULATIONS IN THE CONCEPTION COAST BPG.

Year	Arroyo Sequit Creek[a]	Topanga Creek[b]	Malibu Creek[b]
2001	0	2	NA
2002	0	95	NA
2003	0	59	NA
2004	0	103	230
2005	0	71	87
2006	0	170	80
2007	0	86	12
2008	0	316	2,245
2009	0	209	130
2010	0	253	160
2011	0	114	281
2012	0	96	156
2013	0	56	99
2014	0	57	31
2015	0	59	32
2016	0	34	7
2017	0	98	6
2018	0	55	1
2019	NA	160	0
Total	0	2,093	3240

"NA" indicates no survey conducted or data not yet available.

[a] Source: Dagit et al. (2019)

[b] Source: Dagit et al. (2019). Sum of the average number of *O. mykiss* observed per month.

APPENDIX B: ANNUAL ADULT STEELHEAD OBSERVATIONS AND DATA SOURCES FOR THREE EXTANT POPULATIONS IN THE CONCEPTION COAST BPG.

Year	Arroyo Sequit Creek[a]	Topanga Creek[b]	Malibu Creek[c]
2001	0	2	NA
2002	0	0	NA
2003	0	0	NA
2004	0	0	0
2005	0 [d]	0	0
2006	0 [d]	1	1
2007	0 [d]	2	2
2008	0 [d]	2	4
2009	0 [d]	1	1
2010	0 [d]	1	2
2011	0 [d]	0	2
2012	0 [d]	1	3
2013	0 [d]	0	3
2014	0 [d]	0	5
2015	0 [d]	0	1
2016	0 [d]	0	0
2017	2	2	1
2018	0	0	0
2019	NA	0	0
Total	2	12	25

"NA" indicates no survey conducted or data not yet available.

[a] Source: Dagit et al. 2020

[b] Source: Dagit et al. (2019; 2020)

[c] Source: Dagit et al. (2019;2020)

[d] Passage barriers prevented access to Arroyo Sequit from 2005-2016. Two adult observations occurred after the removal of barriers (Dagit et al. 2019).

APPENDIX C: ANNUAL *O. MYKISS* OBSERVATIONS AND DATA SOURCES FOR FOUR EXTANT POPULATIONS IN THE MONTE ARIDO HIGHLANDS BPG.

Year	Santa Maria River[a]	Santa Ynez River[b]	Ventura River[c]	Santa Clara River[d]	
1994	NA	NA	NA	87	e
1995	NA	NA	NA	115	e
1996	NA	NA	NA	96	e
1997	NA	NA	NA	422	e
1998	NA	NA	NA	6	e
1999	NA	NA	NA	5	e
2000	NA	NA	NA	876	e
2001	NA	266	NA	124	e
2002	NA	116	NA	3	e
2003	NA	196	NA	41	
2004	NA	238	NA	3	
2005	NA	117	0	NA	
2006	NA	653	17	21	
2007	NA	665	63	74	
2008	NA	561	47	157	
2009	NA	610	807	170	
2010	NA	367	147	100	
2011	NA	484	640	23	
2012	NA	199	378	96	
2013	NA	NA	17	1	
2014	NA	137	14	19	
2015	NA	134	65	NA	
2016	NA	103	14	NA	
2017	NA	5	9	NA	
2018	NA	27	1	NA	
2019	NA	39	0	NA	
2020	NA	147	0	NA	
2021	NA	205	0	NA	

"NA" indicates no survey conducted or data not yet available.

[a] Source: Santa Maria River does not appear to be monitored for any viability metrics (NMFS 2016)

[b] Source: COMB (2022)

[c] Source: CMWD (2005-2021). Data are derived from snorkel counts and bankside observations from index reaches of the Ventura River near the Robles Diversion.

[d] Source: Booth (2016)

[e] Inconsistent monitoring from 1994-2002 (Booth 2016)

APPENDIX D: ANNUAL ADULT STEELHEAD OBSERVATIONS AND DATA SOURCES FOR FOUR EXTANT POPULATIONS IN THE MONTE ARIDO HIGHLANDS BPG.

Year	Santa Maria River[a]	Santa Ynez River[b]	Ventura River[c]	Santa Clara River[d]
1994	NA	NA	NA	1[e]
1995	NA	0	NA	1[e]
1996	NA	0	NA	2[e]
1997	NA	2	NA	0[e]
1998	NA	1	NA	0[e]
1999	NA	3	NA	1[e]
2000	NA	0	NA	2[e]
2001	NA	4	NA	2[e]
2002	NA	0	NA	0[e]
2003	NA	1	NA	0
2004	NA	0	NA	0
2005	NA	1	NA	0
2006	NA	1	4	0
2007	NA	0	4	0
2008	NA	16	6	2
2009	NA	1	0	2
2010	NA	1	1	0
2011	NA	9	0	0
2012	NA	0	0	3
2013	NA	NA	0	0
2014	NA	0	0	0
2015	NA	0	0	0
2016	NA	0	0	0
2017	NA	0	0	0
2018	NA	0	0	0
2019	NA	0	1	NA
2020	NA	0	0	NA
2021	NA	0	1	NA

"NA" indicates no survey conducted or data not yet available.

[a] Source: Santa Maria River does not appear to be monitored for any viability metrics (NMFS 2016)

[b] Source: Dagit et al. (2020), COMB (2022)

[c] Source: Dagit et al. (2020), CDFW R5 internal data from DIDSON monitoring (2019, 2021)

[d] Source: Dagit et al. (2020), Booth (2016)

[e] Inconsistent monitoring from 1994-2002 (Booth 2016)

Table 2. Comments from External Peer Reviewers on the Draft Southern California Steelhead Status Review Report

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
1-193	all	Camm Swift	Overall the case for an endangered listing under the CESA is very well jusified and supported by this draft. It has been heartening to see effort to protect this highly impacted fish come closer to fruition and finally have the genetic justifications for protecting the remnant populations. For a long time the decline and its causes were well known, but it was conjectural the degree to which native vs introduced fish were present, and how resident and anadromous populations were related. Conclusions about these issues are now firmly established with detailed genetic informaion much less subject to alternative explanations. Most, if not all. of my comments to follow will mostly address clarity, mistakes and additions that do not seriously affect the very strongly supported conclusions and recommendation put forward. Some of these address the potential audiences for this document. This reviewer had been steeped in this subject for a long time and understands the issues put forward but a more naive reader may have more difficulty with some issues. These are noted below. The Literature cited or references were not all checked against the text but obvious mistakes are noted.	Comment noted.
1	all	David Boughton	Overall this is a thorough and careful status review. Nicely done. Overall, I find the body of available information supports the Department's recommendation to list southern Steelhead and Rainbow Trout as endangered under the California Endangered Species Act. However, this proposed listing omits the Rainbow Trout subpopulations in southern California that are currently isolated above impassable barriers, many of which in my view are at risk due to climate change and its various knock-on effects (increased drought, intensified wildfire regimes, bigger storms driving mudslide potential, warmer temperatures), combined with inability to be recolonized by Steelhead Rainbow Trout due to impassable barriers. I should note that my own agency (NMFS) has never assessed risk for these subpopulations due to lack of jurisdiction.	Additional information about the proposed listing unit was added to Section 3.2.
1-145	all	Alan Byrne	Good luck. This is a unique population of steelhead occupying the southern end of the range of O. mykiss. As such, there will be unique traits and adaptations in this DPS. From an ecological viewpoint it is important to recover this DPS. However, given the effects of climate change and urban development in southern California, policy choices outside the realm of CDFW are needed. If these populations can not regain access to headwater areas the future is not bright. I would focus on key rivers that have a chance to retain anadromy.	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
9	248	Matthew Sloat	I have reviewed the draft status assessment and my view is that the body of available information supports the Department's listing recommendation. The draft assessment is well written and thorough. I really don't have any substantive recommendations. I found the information well presented and agree that the conclusions are well supported by the best available science presented in this draft. My other comments are very nit picky corrections to a few inaccuracies I noticed in the general description of the species.	Comment noted.
9	255-258	Camm Swift	Essential habitat for the continued existence of the "species" but really mean the later identified Southern California SH/RT which is a subdivision of the subspecies *O. m. irideus* as discussed later, p. 12, line 346	The term "species", used in reference to the Petitioner's listing definition, was changed to "Southern SH/RT" throughout the document to reduce confusion.
12	329	Camm Swift	A native species or subspecies under CESA; only much later do you add that it can be a subpopulation like the Southern California SH/RT and as noted below someone used to thinking species and subspecies always have scientific names this might be confusing.	See Department response for page number 9, line number 255-258.
12	329	Camm Swift	"in California species range," technically the Tijuana River goes in and out of California into Baja California so the Southern California SH/RT could be interpreted as living (or having lived!) slightly in Mexico.	Comment noted.
12	338-345	Camm Swift	The unit being discussed is a species again here	See Department response for page number 9, line number 255-258.
12	353	Camm Swift	Here the allowance for subsets of species to be protected is detailed in the law and compared with the long federally listed entity. This explanation should come earlier to avoid confusion to my mind.	Comment noted.
13	357	Devon Pearse	Here and elsewhere, the issue of how to consider the anadromous and resident life-history forms, and all of the additional variation in migratory life-history patterns within those categories, is challenging. While the language used in the Status Review is slightly different from that in the Petition, both focus on protection of all O. mykiss within a given below-barrier habitat unit. This reflects the interconnected relationships among individuals with different life-histories, as well as the greater need of the anadromous ecotype to have intact migratory corridors and sufficient flows to connect upstream habitats with the ocean. Thus, maintaining habitats that supports viable numbers of anadromous adults will also protect resident individuals. See comment on line 620.	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
13	364	Camm Swift	Part of summary of adverse effects might include priorities of DFGW rumored in "the old days" to have concentrated scarce resources towards northern California and tacitly made southern a lower priority.	Comment noted.
14	413-416	David Boughton	This statement is not quite correct, or at least it refers to the version of the ESU policy that was changed by the referenced FR notice (NMFS 2006). You can fix it by changing "ESU" to "DPS" in this sentence. The NMFS DPS policy as applied to steelhead is confusing and even within NMFS many people misinterpret it in my view. ESU is a scientific concept (Waples 1991) but the ESU policy is to equate DPS (a legal concept) to ESU. Scientifically this means southern California resident adults (Rainbow Trout) must be considered in the same ESU as steelhead. NMFS considers the ESU policy (as opposed to the ESU scientific concept) to be an "extension" of the joint NMFS-USFWS DPS policy suitable for the specific life-history of Pacific salmon, but for steelhead fell back to the more general approach of the joint DPS policy, for two reasons: 1) "Use of the ESU policy--originally intended for Pacific salmon--should not continue to be extended to O. mykiss, a type of salmonid with characteristics not typically exhibited by Pacific salmon" (NMFS 2006, page 834, middle column, bottom), and 2) NMFS considered "that within a discrete group of O. mykiss populations, the resident and anadromous life forms of O. mykiss remain 'markedly separated' as a consequence of physical, physiological, ecological, and behavioral factors, and may therefore warrant delineation as separate DPSs" (NMFS 2006, page 835, middle column). That is, the anadromous form is markedly distinct in terms of phenotype even though it interbreeds with rainbow trout. In my view, we can still talk about O. mykiss ESUs as a scientific concept, and the listed steelhead DPS is the anadromous component of the ESU. This is subtly different from the way you all are implementing the DPS policy. Your implementation explicitly includes rainbow trout in anadromous waters, whereas the NMFS version includes those fish only insofar as they are indistinguishable from anadromous O. mykiss (e.g juveniles whose life history is not yet determined). Confused? Join the crowd.	Changed "ESU" to DPS in the referenced sentence. The Department acknowledges and is aware of the different applications of the DPS Policy used here in the Status Review and in other technical documents by NMFS.
14	416	Camm Swift	It could be more explicitly explained that the anadromous jurisdiction lies with NOAA vs the resident one with the USFWS and both populations of fish are included in this proposed state listing.	Comment noted.
14	419	Matthew Sloat	O mykiss doesn't have the largest range. That distinction belongs to chum salmon.	Edited line 419.
14	419-420	Camm Swift	Range of *O. mykiss* extends to the western Pacific into Russia where *mykiss* was described from	Expanded range to include the western Pacific.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
15	444	David Boughton	Table 1 is adapted from a similar table in our monitoring update, but parts have been omitted and it has been changed a bit. As a scientist, I like your definition of "Steelhead Rainbow Trout" as an ESU, but then you should probably include the definition of ESU itself as well. The ESU concept has an aspect of common descent, meaning that the above-barrier O. mykiss would be included in the ESU; but you don't include them in your DPS, even though your interpretation of DPS (unlike the NMFS version), includes adult rainbow trout. This might cause some confusion, particularly since the above-barrier O. mykiss probably have the capacity to express the anadromous life history and are therefore useful for recovery. In addition, they themselves are threatened by the loss of migration connectivity, because disturbances such as droughts and wildfires might extirpate individual above-barrier populations, and they will not get recolonized due to the dams; or, disturbances may cause bottlenecks that reduce genetic diversity, and gene flow via anadromous migrants is also blocked by the dams.	Removed the term ESU from the definition of Steelhead Rainbow Trout in Table 1. Steelhead Rainbow Trout are populations that contain both steelhead and Rainbow Trout individuals.
16	456	David Boughton	I would say "smolting the primary ***physiological*** characteristic that distinguishes…", because migration to the ocean is the primary characteristic	Suggested edit was made to line 456.
16	460	Devon Pearse	Suggest editing to: "Juvenile >O. mykiss< that do not smolt and remain in freshwater generally lose their parr marks as they grow and develop into adult >Rainbow Trout<"	Suggest edit was made to line 460.
16	462	Devon Pearse	Suggest deleting 'Upon reentering freshwater rivers and streams to spawn,", since the timing of maturation relative to freshwater entry is variable and not relevant to the rest of the paragraph.	Suggested edit was made to line 462.
17	501	David Boughton	monophyly means something a little more restrictive than the definition here; it means the whole set of species descended from a common ancestor.	The definition of monophyly in line 509-510 was edited to improve clarity.
17-18	477-518	Camm Swift	This is a nice informative summary but perhaps too extensive for the purposes of this draft?	Comment noted.
18	513-516	Camm Swift	Does historical range count, this wording implies current range which could differ from historical range.	Comment noted. This sentence defines "range" and "distribution" for the purposes of the status review. These definitions apply to both current and historical descriptions.
18	519	Matthew Sloat	The only native O. mykiss populations in Asia are on the Kamchatka Peninsula and Shantar Islands.	Edited line 519.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
18	527	Matthew Sloat	A more recent and accurate phylogeny is available in: Crete-Lafreniere, A., Weir, L.K. and Bernatchez, L., 2012. Framing the Salmonidae family phylogenetic portrait: a more complete picture from increased taxon sampling.	Added Crete-Lafreniere et al. (2012) as a citation to line 530.
21	620	Devon Pearse	The high fecundity of female steelhead relative to female rainbow trout, combined with the female sex-bias in expression of anadromy (Kendall et al. 2015; Pearse et al. 2019), leads to anadromous females providing a disproportionately large contribution to the total egg and juvenile production below barriers in most systems. This is a consequence of their ability to access marine resources, bringing these nutrients and energy back into freshwater systems. This is stated on page 28, but cannot be overemphasized, and highlights the dependence of O. mykiss populations on the maintenance of diverse interrelated life-history forms.	Comment noted.
21	639	David Boughton	At the beginning of the sentence, add "Further north,"	Suggested edit was made to line 639.
23-34	687-991	Camm Swift	Section 2.5, this seems very well written and is central to much of the core argument for listing as scientific substantiation of many of the claims of endangerment. You need a good genetically proficient reviewer to also assess this section.	Comment noted.
23	699-701	Alan Byrne	The sentence about adaptive markers is based on genome wide association studies and most of the time the function of the gene is inferred. The key (and important) word is "putative".	Comment noted.
23	698-706	Alan Byrne	Move to Section 4.7. Focus on fish and their life histories.	Comment noted. Sections were left in place based on other comments received (page 23-34, lines 687-991)
25	721	Devon Pearse	The peer-reviewed publication Garza et al. 2014 TAFS, represents the same study and should replace Garza et al. 2004 throughout	Comment noted. Figures from Garza et al. 2004 are preferred to represent the information.
26	775-780	Alan Byrne	Information that supports the importance of 'straying' in these populations. This is important point to make. If only a handful of rivers have access to the sea in the winter it makes sense that adults in the ocean will go into those rivers regardless of their origin. It also represents a 'safety net' where rivers can be re-populated with anadromous individuals if there was a prolonged drought that caused the river to be disconnected from the ocean.	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
26-29	786 - 852	Alan Byrne	The Omy5 discussion in Section 2.5.5 should be folded into the haplotype discussion in Section 4.7 except I would retain lines 835-852 (it would be a good introduction to Section 2.5.6). I'd rather see a more high level discussion as presented in section 4.7 than all the detail provided in 2.5.5. Although this is an interesting topic, it's the life history variations that are important--genetics may help explain. Some of the info in this section is not necessary (lines 812-813, 823-825, 826-834)	Comment noted.
27	805	Devon Pearse	Rundio et al. 2012 not an appropriate citation here, delete.	Suggest edit was made to line 805.
28	817	Devon Pearse	The cited papers (Leitwein et al. 2016; Pearse et al. 2014) did not have data to directly support the statement that 'populations with a high frequency of the 'A' Omy05 variant also had higher proportions of individuals phenotypically expressing anadromy', although the data in those papers is consistent with this and statements in the rest of the paragraph. Suggest reversing the sentence and editing to Populations with higher potential to support anadromous or migratory individuals typically have a higher population-wide frequency of the anadromous variant of Omy5 than populations that have a higher frequency of the resident rainbow trout, such as those above waterfall barriers.	Suggest edit was made to line 817.
28	835	Devon Pearse	While accurate regarding the population genetic and evolutionary relationships among populations within versus among watersheds, this paragraph should more strongly enough state that resident and anadromous individuals within a given population or watershed are not just closely related in a population genetic sense, but interbreed, and that close relatives including full siblings may express these alternative phenotypes (or other life-history variation, e.g. adfluvial or lagoon migration).	More information as added to line 854.
28-29	835-852	Alan Byrne	Important point--retain this PP, see comment above.	Comment noted.
29	859	David Boughton	I'm not sure "monophyletic clade" is the right term here, it's usually used for species relationships. Safer to say "more closely related"	Suggested edit was made to line 859.
31	895	David Boughton	Insert "in the downstream direction" after "over barriers"	Suggested edit as made to line 895
31	904	Devon Pearse	Data in Pearse et al. 2014 is also very relevant to this statement, including for So Cal steelhead the Santa Clara and Santa Ynez Rivers.	Added suggested reference to line 904.
31	907	David Boughton	Add sentence: "However, a reservoir environment imposes different selective pressures than migration to the northern Pacific Ocean and therefore we would expect the anadromous genotype to be changed over time and eventually lose its ability to express a successful anadromous phenotype."	Suggested edit was made to line 907.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
31	893-907	Alan Byrne	Most of the points in this PP are made in lines 877-892 except for the last sentence.	Comment noted.
32	945-947	David Boughton	There is an important distinction to be made here between continual vs past or occasional stocking. Past stocking introduced many new genes, many of which were selected against (outbreeding depression), but a few of which may have been selected for, increasing fitness as noted. But for the erosion of native lineage in a way that reduces fitness, you would likely need ongoing stocking so that natural selection is swamped by geneflow from the hatchery stock	Redundant language was removed. See Department response for line 33, page 956.
33	956	Devon Pearse	The CDFW report, Jacobson et al. 2014, presents the same samples and data as Abadia-Cardoso et al. 2016, which was published following additional analyses and peer review. Given that, this paragraph is somewhat redundant with much of the preceding paragraph. Suggest reworking.	Redundant language was removed from Section 2.5 of the report.
33	962	David Boughton	Suggest changing to "Many more southerly populations…" since all the populations are southern.	Suggested edit was made to line 962.
36	1076	Devon Pearse	The statement "The anadromous life history of Southern SH/RT is not markedly separate from the non-anadromous life history of Southern SH/RT" seems incongruous with the rest of this paragraph, but it's meaning becomes clear when reading the next section. Suggest deleting or moving this sentence.	Comment noted.
36	1075-1077	David Boughton	This is the opposite of the NMFS DPS policy, which states that the anadromous form is markedly separate from the non-anadromous form (in terms of physical, physiological, ecological, and behavioral factors), even though the two forms interbreed. So you are applying the DPS policy in a way that is different from the way NMFS applied it. Of course the State of California is free to do what they want, but this may cause confusion. But also, if you are going to apply the DPS policy this way, it seems strange to exclude the above-barrier populations, which are also threatened by the loss of migration access due to the dams (commented on above), and also provide a genetic resource that could aid in the recovery of the below-barrier populations.	Additional information about the proposed listing unit was added to Section 3.2.
36	1077-1081	David Boughton	See above comment	Comment noted.
37	1086-1094	David Boughton	See above comment	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
37	1096-1107	David Boughton	See above comment. There are three kinds of "markedly separate" being lumped here: the geographic separation (which both NMFS and CDFW treat identically), the "marked" separation of anadromous vs resident forms below barriers but within the same geographic area (which NMFS recognizes but CDFW doesn't), and the separation of above-barrier and below-barrier rainbow trout (CDFW treats as one being threatened, the other not; neither are considered threatened by USFWS (who has Federal jurisdiction), and NMFS does not have an approach because the adult rainbow trout are outside their Federal jurisdiction).	Comment noted. The Department acknowledges and is aware of the similarities and differences in the application of the DPS Policy metrics (i.e., markedly separate) used here in the Status Review and in other technical documents by NMFS.
37-38	1116, 1146, 1150	Alan Byrne	I don't know what this is or why its included. If it is referring to ESU criteria on pages 35-36 please be specific.	Comment noted. See section 3.1 (DPS and ESU criteria) for more information.
37	1106	Camm Swift	Southern California SH/RT are distinct from the rest of the species	Comment noted. See Department response for page number 9, line number 255-258.
37	1114	Camm Swift	Southern California SH/RT are distinct from the rest of the populations; it is unclear if these three all mean the same thing [apparently], and the wording needs to be standardized somehow. To me the use of these terms as well as the words species and subspecies outside the zoological taxonomic sense is confusing. Suggest earlier after a concise discussion of the CESA and ESA listings criteria, make some kind of summary statement such as, "The proposed Southern California SH/RT is defined under the CESA as an ecologically, geographically, genetically, and legally distinct (and/or discreet) subdivision of [the subspecies?] *Oncorhynchus mykiss irideus."* And from there on avoid the use of the terms species, subspecies, and taxon in favor of Southern California SH/RT.	Comment noted. See Department response for page number 9, line number 255-258.
37	1118	Camm Swift	The range of Southern California SH/RT is at the southern most of its taxon. True if the taxon is *O. m. irideus* but not if *O. mykiss* that goes into Mexico as *O. m. nelsoni*.	Edited line 1118 to improve clarity of the statement.
38	1130	David Boughton	But what about the Bay Area, which also has steelhead-rainbow trout cohabiting with millions of people?	Edited line 1130 to improve clarity of the statement.
38	1147	Camm Swift	which taxon again	Comment noted.
39	1174-1175	Camm Swift	Southern California SH/RT is a DPS and a subspecies, despite earlier comments about the CESA allowing for designation of species, subspecies, and/or lesser distinct subgroups deemed deserving of protection.	Comment noted. See Department response for page number 9, line number 255-258.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
41	1255	Camm Swift	Becker and Reining (2008) cited here and often later but in list of references has a title restricting it to the Eel River.	Fixed incorrect reference in the Literature Cited section for Becker and Reining (2008).
41-60	1248-1771	Alan Byrne	The loss of habitat depicted in the maps for each BPG is the major reason for the decline of SH in this DPS. Although one can get the sense that a lot of habitat is now inaccessible I recommend that for each BPG you include a table that for each river shown in the BPG maps, list the historical anadromous distribution, the current anadromous distribution, and the percentage of habitat lost and if available the total historical habitat available for the entire BPG, current available for the BPG, and % lost for the BPG. Express habitat/distribution as drainage area or stream length? Make the point that loss of habitat by itself puts SH/RT in serious danger of becoming extinct in this DPS.	Comment noted. Information regarding the extent of current and anadromous habitat for the Ventura and Santa Ynez Rivers can be found in Section 6.8.2. Additional information regarding the range-wide presence and absence of Southern SH/RT in watersheds historically occupied can be found in Chapter 9.
43	1274	Camm Swift	Not sure why San Antonio Creek left out? San Antonio, a short distance north of the Santa Ynez, certainly suspected historically even if on size alone.	Comment noted. *O. mykiss* were determined to be "absent" from the drainage in 2002 based on surveys as part of a steelhead distribution study (Becker and Reining 2008).
44	1290-95	Camm Swift	Newspaper, Lompoc Record, vol. 16, No. 8, May 10, `1890, party of persons to the Sisquoc, creeks alive with mtn trout, No. 9, May 17, 1890, Sisquoc party report 2 persons/2 hrs, 450 fish. Well before stocking up in that area.	Additional information on the historical distribution and abundance of *O. Mykiss* in the Santa Maria River watershed was added to lines 1290-1295.
45	1336-1337	Camm Swift	The earliest years of the Lompoc Record in the Lompoc library from 1875,76 have notes of many one pound trout in San Miguelito creek entering the river from the south in the town of Lompoc, perhaps noted in Algona et al. 2012.	See line 1325-1326.
46	1383	David Boughton	Robles is not impassable, or at least, it depends on how they operate it.	Edited line 1435.
48	1435	David Boughton	I think you mean Santa Clara River, not Santa Maria River	Fixed incorrect river.
49	1470	David Boughton	I'm not sure where you got "eight" from. There are a much larger number of small creeks along this stretch of coast that have had O. mykiss.	Edited line 1470.
50-51	1502-1508	Camm Swift	Jalama Creek had juveniles in May of 1970, specimens at LACM (Natural History Museum of Los Angeles County, Section of Fishes)	Added reference to Jalama Creek in section 4.3.2.3.
51	1509	Camm Swift	Some explanation as to why Calleguas Creek not in Monte Arido or Santa Monica Mtns, another that size alone would predict expectation of steelhead in the past	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
53	1556	Camm Swift	Accessible mileage for Topanga should be much less than Malibu or explain that the upstream barrier is natural in Topanga and artificial in Malibu, the latter at least has more mileage if barrier removal takes place	Suggested edit was made to line 1556.
54	1594-1595	Camm Swift	Figure could include other significant dams? San Gabriel and Cogswell dams on the San Gabriel, Seven Oaks dam on the Santa Ana, and two on Santiago Creek, trib to the Santa Ana, and in text that follows. Some of these are noted much later.	Comment noted.
55	1606	Camm Swift	LACM has records from Fish Canyon for rainbow trout being abundant on 02 July 1986, 15 February 1998 and 16 June 2000. Fish were said to be common or abundant each time below and up into Forest service property. Camm Swift field notes and/or specimens.	Comment noted.
55	1617	Camm Swift	Boughton et al. (2006, Technical Memorandum 394, NMFS-SWFC) noted late 1850s historical accounts of abundant trout in the upper Santa Ana river, City Creek, and Cucamonga Creek of the Santa Ana drainage.	Added information in Boughton et al. 2006.
56	1634	Camm Swift	Should consider Big Tujunga Wash, trib to L. A. River, only place in current L. A. River drainage where native sucker, chub, and dace still occur and supported trout fishery in 1940s with controlled release from Big Tujunga dam.	Added Big Tujunga Creek as a tributary to the Los Angeles River.
56	1654	David Boughton	intermittency also results from groundwater depletion caused by pumping for water extraction. I suspect many dry creeks and rivers stem from groundwater depletion, and it would be good to highlight this problem more throughout this status review. Dams of course are a big part of the problem but so is lowered water tables because aquifers are used as another summertime water storage facility.	Noted groundwater depletion as a cause for stream intermittency.
57	1666	Camm Swift	San Mateo creek, map shows Cristianitos creek, a major northern tributary that is largely ephemeral but does not show upper Devils Canyon where steelhead actually spawned 1998-2000 (Hovey 2004).	Comment noted.
57	1670	David Boughton	If there's an impassable barrier, then shouldn't the sentence say rainbow trout rather than steelhead?	Edited line 1670.
58	1687	David Boughton	This is a bit confusing because Hovey used genetic data to argue that the creek had been colonized by steelhead after the Nehlsen et al paper; suggest rewrite to reflect that the San Mateo/Devil Canyon fish are believed to be descendants of this steelhead colonization event	Restructured lines 1675-1680.
60	1773	Camm Swift	As per earlier comments instead of "…of the candidate species…" use "...of Southern California SH/RT…"	See Department response for page number 9, line number 225-258.
60	1777-1778	Camm Swift	as above, reword to avoid using the word species	See Department response for page number 9, line number 255-258.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
61	1790-1792	David Boughton	The definition of core populations was those receiving highest priority for recovery actions, which is not quite the same as the definition here. For example, a well-protected and healthy population might not be core because it is already protected and thus not a priority.	Edited line 1790-1792 to improve clarity of the sentences.
61-71	1803-2003	Alan Byrne	Section 4.4.1. This is depressing and is all you need to have in the report to arrive at the conclusion that SH in this DPS are in serious danger of becoming extinct	Comment noted.
63	1848	David Boughton	How do redd surveys produce O. mykiss estimates?	Corrected mistake in line 1848.
65	1872	David Boughton	Thus, the observed steelhead were entering sink habitat? Might want to point this out--this situation creates an ecological trap.	Comment noted.
67	1920	David Boughton	According to the equation in line 1896, if any entry is zero, the geometric mean will be zero. How did you get these numbers, which are mostly not zero, even though the three Tables 2 indicate they should be zero? Something seems wrong here.	Added more information to Section 4.4.2.
66-68	1899 - 1946	Alan Byrne	You presented some estimates of steelhead run sizes in Section 4.3.1 for the Santa Ynez, Ventura, and Santa Clara rivers. Can you also show those estimates in this section in Table 3?	Comment noted.
71 - 74	2005 - 2073	Alan Byrne	You are probably required to do a trend analysis but with such low abundance's it does not add much. A population of 2 that goes to 4 is still in a world of hurt. Make that point.	Comment noted.
74	2068-2073	David Boughton	Clarify that you're talking about steelhead specifically here, not O. mykiss, since there are often extant O. mykiss populations in the headwaters	Comment noted.
74 - 77	2075 - 2122	Alan Byrne	You are probably required to do a productivity analysis but with such low abundances it does not add much. You need fish. Same point I made for trend applies here.	Comment noted.
75	2089	David Boughton	Apparently some typos in this equation. The "t+t4" should be "t+4" I think, and should be subscripted, as should the second "t". Also, this CRR estimator completely disregards age structure (not all adult steelhead return at age 4, and there is probably an important role for kelts). These simplifications should be noted. Also, productivity is defined differently in Fish Bulletin 182.	Fixed typo and edited the definition of productivity to align with Fish Bulletin 182.
71-77	2005-2122	Alan Byrne	The most important VSP parameter is abundance. You can not have meaningful positive trend, productivity, diversity metrics at population sizes (especially the anadromous component) as low as those presented in the abundance section	Comment noted.
78	2162-2163	David Boughton	Not necessarily - see Moore, M. R. (1980). Factors influencing the survival of juvenile steelhead rainbow trout (Salmo gairdneri gairdneri) in the Ventura River, California. M.S., Humboldt State University. Also, for the Carmel River a little bit to the north, but very similar in a lot of ways: Arriaza, J. L., D. A. Boughton, K.	Edited line 2162-2163 based on Moore (1980). Reference and citation added.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
			Urquhart and M. Mangel (2017). "Size-conditional smolting and the response of Carmel River steelhead to two decades of conservation efforts." Plos One 12(11). There could be a lot of improvement to these habitats to help spawning and rearing, in my view	
78	2144-2161	Camm Swift	Dams were also built often where the larger downstream reaches began to level out and probably provided considerable spawning sites in larger flows than in the higher tributaries with more bedrock and boulders with much lower flows. Thus they may well have been more than just corridors for migration.	See Department response for page number 78, line 2162-2163.
78	2145	David Boughton	Here is another place where it would be good to include groundwater depletion among the many ills impacting southern steelhead-rainbow trout	Added groundwater extraction to line 2145.
78	2171	David Boughton	This last sentence makes no sense. I think you mean the reverse?	Removed confusing sentence.
79	2186	David Boughton	But there were drought refugia in the mountains, where resident trout could regenerate anadromous fish when conditions were suitable	Added information on drought refugia to line 2186.
79	2188	David Boughton	Diversity - the extended phenotype - includes life-history diversity but potentially other phenotypic traits as well.	Edited line 2188.
79	2203	David Boughton	Comma after "range"	Added comma.
80	2217	David Boughton	Invasive species are also a big problem in many southern lagoons	Added invasive species to line 2217.
80	2220-2223	Camm Swift	While lagoon anadromous are rare or absent in the south, angling for "sundowners," in coastal lagoons like San Mateo creek was common in the 1930s and the Department had specific angling regulations for them (Swift et al. 1993). Given the epemeral nature of some southern California streams, the integrity of the lagoons may have been more important in the south relative to streams (Swift, Mulder et al. 2018; Swift, Holland et al. 2018,).	Comment noted. Added Swift et al. (1993) citation to line 3540.
80	2233	David Boughton	Hyphenate "above-barrier"	Added hyphen.
80	2234	David Boughton	"restricted fish passage to" can be read in two contradictory ways	Revised line 2234 to improve clarity of the sentence.
80-81	2224-2255	Alan Byrne	This is where I would move the Omy5 discussion (at a very high level) that is now in Section 2.5.5.	Comment noted.
81	2225-2227	Alan Byrne	Statement is true for females but "AR" males expressed more resident life history.	Comment noted.
81	2249-2251	Alan Byrne	...."it is unclear whether the resident component can reliably sustain the anadromous component in the long term...." -- I rather think of the resident component as having the ability to produce anadromous fish after prolonged unfavorable conditions (not needing to sustain the "A" life history). The returning anadromous fish can then sustain the "A" life history.	Revised lines 2249-2251 based on suggested revision.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
81	2278	Alan Byrne	another instance of "believe"--please re-write	Revised line 2278.
82	2299	David Boughton	Add "to" after "prior" and commas after "2012"	Suggested edits were made to line 2299.
82	2303	David Boughton	Poor sentence structure	Fixed poor sentence structure in line 2303.
82	2302-2307	Alan Byrne	This is worth repeating in the ES. Also, I find that not listing population's upstream of dams/artificial barriers problematic as, in my view, the only possible way for this DPS to persist is to gain access to their historical range. It's worth explaining the logic of excluding upstream areas somewhere in the report.	Added lines 2302-2307 to the Executive Summary.
83	2323	David Boughton	Change "necessary" to "necessarily"	Changed to neccesarily.
83-91	2346-2606	Alan Byrne	All this info is factual however it could be shortened if it was focused on the Southern SH/RT habitat requirements. Since you cite Bjornn and Reiser, Moyle, and NMFS a lot, I don't think its necessary to cite other studies that confirm what they stated (for example lines 2513 - 2522). As most of these rivers become de-watered all the habitat requirements listed are a moot point. I would make the lack of water the major habitat problem in this section. Fish need water. And it should be cool and clean.	Comment noted.
84	2361-2363	Camm Swift	For surmouning vertical barriers, the 25% pool depth figure applies to relatively low barriers and must be much more for the fish to clear higher barriers.	Comment noted.
86	2426-2430	Camm Swift	While Arroyo Chub may provide food for Southern California SH/RT they also can compete with small individuals in streams (Richards and Soltz 1986, cited in Swift et al. 1993) and are considered introduced in Topanga Creek and many other streams north of Malibu Creek (Swift et al. 1993). Through much of the range non-native species both compete with and prey upon Southern California SH/RT.	Added that Arroyo Chub are considered introduced in Topanga Creek.
87	2479	Devon Pearse	Another reference relevant to adaptation of Southern SH/RT to cite here and elsewhere in the Status Report: Dressler et al. 2023. Thermal tolerance and vulnerability to warming differ between populations of wild Oncorhynchus mykiss near the species' southern range limit. Scientific Reports 13:145338. https://doi.org/10.1038/s41598-023-41173-7	Added Dressler et al. (2023) as a citation to line 2479 and elswhere in the report where appropriate.
89-90	2555-2571	Camm Swift	Text implies lagoons that do not open to the ocean are in poor condition but lagoons otherwise not impacted can remain in good condition through the fall or even for multiple years during extremely dry years. Even if surface flows do not exist upstream, lagoon are also often fed by groundwater.	Comment noted. Text revised to remove implication that closed lagoons are in poor condition.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
91-92	2609-2658	Alan Byrne	I'm not opposed to keeping this section however it is not focused on the Southern SH. And it has no effect/little on the resident forms. The CCE indicators are close to shore but steelhead don't spend much time there (compared to chinook) as they head to sea after entering the ocean. I would delete line 2632 beginning with ....For the CCE region to 2658 and Figure 15.	Suggested edit was made.
93-102	2659-2940	Alan Byrne	This is a very important Section. I didn't get the sense of its importance when I read the full document. The points in Section 6.2 should be forcefully repeated in a concluding section and the ES. Climate effects should be elevated so that the reader understands that expected changes in climate is a serious threat to the species survival and could ultimately drive it to extinction.	Comment noted.
97	2788	Devon Pearse	Also appropriate to cite new (2023) NMFS status review?	Added NMFS (2023) citation.
100	2866-2875	Camm Swift	In southern California among estuarine types, only lagoons serve as salmonid nursery areas and the much more tidal and saline "created" estuaries apparently do not function as such. The brackish estuaries noted are a phenomenon of systems farther north where larger volume of freshwater inputs much of the year sustain brackish estuarine conditions.	Comment noted.
103	2989	David Boughton	Would be good to write a comment on the above-barrier populations' conservation value, which has been talked about elsewhere.	Comment noted. Conservation value of above-barrier populations discussed in Section 2.5.7.
103	2995	David Boughton	Could cite Clemento et al paper for populations retaining high degree of native ancestry	Added Clemento et al. (2008) citation.
103-105	3000-3048	Camm Swift	Include striped bass, both freshwater estuarine, and marine (Boughton, 2020, Calif. Fish and Wildlife, 106(3):226-257). Also Redeye bass (*Micropterus coosae*) in the prime Southern California SH/RT habitat in the Santa Margarita River gorge	Added information about Redeye bass. Reference provided concludes striped bass are rare in southern California.
104	3024-3033	Alan Byrne	delete everything after …....Bonar, et al.2005).	Suggested edit was made to lines 3024-3033.
104	3040	Alan Byrne	are crayfish native to these streams?? If yes, so what. It's a stretch to conclude that crayfish pose a threat to the survival of juvenile steelhead from 1 study. Predation effects should be assessed at the population scale not individuals.	Red Swamp Crayfish are non-native to southern California waters.
105-106	3074-3083	Camm Swift	Arroyo chub competition noted above, originally very little competition/predation outside L. A. basin since north and south only two or three other species in freshwater like stickleback, prickly sculpin and lampreys.	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
106	3104-3108	Alan Byrne	highlight this.	Comment noted.
107	3134	Devon Pearse	Delete "…in above-barrier populations…", since the statement applies to a comparative analysis among many populations below and above partial and complete barriers to migration.	Suggested edit was made to line 3134.
107	3119-3136	Alan Byrne	not a surprising result given the low population size.	Comment noted.
107	3136	David Boughton	Add a sentence that the above-barrier diversity is an important repository of genetic material, serving a similar function as conservation hatcheries do in other parts of the species range.	Added suggested sentence after line 3136.
107	3137-3139	Alan Byrne	A strong statement. See my earlier comments about Omy5. I don't think this sentence is needed. The previous PP covers the points about A/R haplotypes.	Comment noted.
107	3147	David Boughton	Although the very wet years may select for the anadromous form!	Comment noted.
106-110 or 11		Camm Swift	This seems to repeat much of what was described earlier but is perhaps necessary to expand on it with more detail.	Comment noted.
111	3277	Camm Swift	Mention Big Tujunga dam, which as noted above supported a trout fishery in the 1940s and the stream is the only habitat in the Los Angeles River basin to still support three native Los Angeles basin fishes noted above.	Added Big Tunjunga dam.
112	3297	David Boughton	In my view there should be an expanded section - perhaps a couple paragraphs - on aquifer draw-down, groundwater depletion, and its links to dewatering of surface flows, especially in summer. This tends to get lumped in with dam effects on flows, but it deserves more attention as an important factor in its own right. Many of the dewatered stream channels in southern California may have one been perennial or mostly perennial but are very sensitive to groundwater depletion	Added more information regarding impacts of groundwater depletion.
112	3303	David Boughton	Most groundwater sustainability plans focus on water storage not the restoration of surface flows. See, for example, Ulibarri, N., N. E. Garcia, R. L. Nelson, A. E. Cravens and R. J. McCarty (2021). "Assessing the Feasibility of Managed Aquifer Recharge in California." Water Resources Research 57(3). They found that the goal of protecting surface water was only 1/8th as common as the goal of increasing groundwater storage, and 1/10th as common as the goal of raising the water table, even though all three are explicit intents of the act	Added more information based on Ulibarri et al. (2021) to line 3303.
112	3306	David Boughton	Again, GSPs don't necessarily address surface water - see above comment. One important CESA goal for southern steelhead-rainbow trout might be to get water agencies to include surface water restoration into their GSPs	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
112	3313	Camm Swift	Not sure what deep means in Bond's paper but under natural conditions many coastal lagoons were broad and flat and relatively shallow in relation to their depth. Restriction and channelization has caused deepening of many.	Comment noted.
113	3329	David Boughton	Other risks are poor water quality, stratification (which can cause low DO and fish kills) and episodic breaching by beachgoing humans, etc.	Added these other risks to line 3329.
115	3413-3414	Camm Swift	Habitat was converted "by" livestock rather than for livestock with the well-known loosing of cattle and horses onto the open ranges of southern California by the early Spanish colonists beginning in the late 1700s and subsequently land owners were allowed to own additional land holdings reclaimed from margins of estuaries and wetlands.	Suggested edit was made to line 3413-3414.
116	3446	Camm Swift	Most of the Los Angeles Basin was known as an artesian area with widespread springs and marshes that would have supported salmonids (Mendenhall, W. C. 1907. Ground waters and irrigation enterprises in the foothill belt, Southern California. USGS Water supply Paper 219.	Comment noted. Added information to lines 1591-1592.
116	3462	David Boughton	fix typo for "Trout"	Fixed typo.
117	3486-87	Camm Swift	Clawed frogs originated in the Santa Clara system upstream in Agua Dulce canyon above Santa Clarita in the earliest 1970s.	Comment noted.
117-118	3492-3538.	Alan Byrne	Why does cannabis have more lines than agriculture?? I would retain lines 3492 - 3501 but move it into the Agriculture section. You can delete 3502 - 3538.	Suggested edits were made to the Cannabis Cultivation section.
119	3539-3541	Camm Swift	Southern California SH/RT known as sundowners in coastal lagoons etc. as noted above and quoting retired DFG biologist Richard Croker in Swift, et al. 1993, p. 113.	Added Swift et al. (1993) citation to line 3540.
119-136	3560-4139	Alan Byrne	An exhaustive list of regulations, plans, and programs without any discussion on whether any of these actions are having an effect to prevent the Southern SH/RT from going extinct. Is all this detail needed?? Or can you just list each with short sentence of its intent? Can all these programs be implemented? is there funding to continue them? Programs already in place did not prevent the Southern SH/RT populations from an "endangered" listing.	Comment noted.
126	3802-3815	David Boughton	it’s a little odd that this dam is described in detail, but other important dams aren't.	Comment noted.
129	3810	Camm Swift	Add integration with USFWS recovery plans for federally endangered Unarmored threespine stickleback (Los Angeles Basin and Santa Clara River), (now) northern and southern tidewater goby (many coastal lagoons), and federally threatened Santa Ana sucker (Los Angeles Basin). DFGW now reviewing status of Santa Ana speckled dace as well. And Arroyo chub is California species of special concern.	Comment noted.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
129	3924-25	Camm Swift	Many of these check dams originated as concrete barriers buried in stream sediments to force ground water to the surface and subsequent high flows scoured out the downstream sides making them appear as dams and creating barriers where none were present intitially.	Added reviewer information to lines 3924-3925
135	4119	David Boughton	Spell out COMB in parentheses or something, for the uninitiated	Suggested edit was made to line 4119.
135	4125	David Boughton	Likewise for CMWD	Suggested edit was made to line 4125.
136	4130	David Boughton	Likewise for UWCD	Suggested edit was made to line 4130.
136	4134	David Boughton	Likewise for RCDSMM	Suggested edit was made to line 4134.
136-137	4163-4164	Camm Swift	I thought urbanization made streams more flashy and variable in extremes of flow rather than less variable? Namely from high, rapid runoff from increasing amounts of impervious surfaces.	Revised lines 4163-4164.
137-138	4195-4200	Camm Swift	"Locals" often know fish can be found below impassable barriers like Rindge Dam on Malibu Creek just after large rain events which, as noted, can allow a few anglers to have strong effects.	Comment noted.
138	4204-4218	Alan Byrne	With the SH/RT populations at such low abundances I don't see a compelling argument for whether Predation or Competition are or are not a threat so I would re-assess you're conclusion of "moderate threat". I'd be more comfortable stating something like…adequate data/studies specific to the Southern SH/RT DPS is lacking.	Re-assessed and revised the Department's conclusion for predation and competition.
138	4204-4217	Camm Swift	My opinion is that the effects of predation are usually (or probably) under estimated, partially because little hard data is available for local fish. Its hard to imagine the channel catfish, largemouth bass, striped bass and other do not significantly impact the younger stages of Southern California SH/RT in streams and lagoons. Thus, I would grade them as more than a moderate threat. Particularly since west coast salmonids evolved free of many of these predators and thus would be expected to have have few avoidance behaviors related to them. It may also be unrealistic to expect to rid streams of these popular sport fishes or somehow keep them separated from Southern California SH/RT habitats in many cases, but perhaps not all.	Comment noted. See Department response for page number 138, line number 4204-4218.
138	4221-4222	Camm Swift	Brown trout Is a salmonid with self-sustaining populations within these areas, namely Bear Creek, trib to Santa Ana river and Ice Houses Canyon, trib to San	Comment noted. Brown trout are covered by the non-native category.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
			Antonio Creek, trib to Santa Ana River. Perhaps Brown trout are covered by the non-native category.	
140	4266	David Boughton	To match what you have said elsewhere, you should call them "southern California steelhead-rainbow trout", not southern California steelhead	Suggested edit was made to line 4266.
140	4268	David Boughton	As said elsewhere, this is different from how the Feds define the DPS. I myself have no quibbles with this from a scientific perspective, but it will likely cause even more confusion then there is presently. Also, it seems odd to include rainbow trout below the barriers, but not above the barriers, since they share common descent and could provide important genetic materials for the recovery of the below-barrier steelhead-rainbow-trout. Arguably, the loss of connectivity to the above-barrier rainbow trout endangers them as well, since they can no longer get gene flow (via steelhead) from other stream systems, and also cannot get recolonized if a fire or something extirpates a given population. Why don't you include them in the DPS as well?	Additional information about the proposed listing unit was added to Section 3.2.
140	4269	David Boughton	I think you should clarify this statement that it does not include the above-barrier rainbow trout, which are still present in many systems that have lost O. mykiss from below-barrier parts of the system	Added clarification to line 4269.
140	4292-4299	Camm Swift	given the recommendations above the wording here is excellent sticking with Southern California SH/RT rather than species, subspecies, taxon, etc.	Comment noted.
141	4318	Camm Swift	Thus change this line to "….to list Southern California SH/RT as endangered to be warranted." since this unit was defined earlier and avoiding calling it a species or subspecies. In the explanation leading up to this last sentence it might be optional to add the additional wording from the law about species, subspecies, or subdivisions of these as discussed before.	Suggested edit was made to line 4318. See Department response for page 9, line 255-258.
142-145	4356-4465	Alan Byrne	No major disagreement, however it is likely that many will be difficult and very costly to implement given the current population abundances in most of these rivers. I would recommend selecting priority streams that could serve to retain anadromy and provide "strays" into other rivers when conditions are favorable. Other streams could be assessed on an alternating basis.	Comment noted.
143	4373	Devon Pearse	Genetic monitoring of *Omy 5* variation would not necessarily be informative with respect to viability. Suggest deleting this bullet point, since evaluation of Omy5 is described under action 4.	Suggested edit was made to line 4373.
143	4386	David Boughton	Do you mean the Federal Recovery Plan? If so, you should probably say "Federal," since if this listing goes through there will presumably be a state recovery plan. I would also encourage you to explicitly say that fishways or assisted migration should be established at passage barriers that cannot be removed, at least in the near term.	Added clarification to line 4386.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
143	4391	David Boughton	and also restore aquifers in dewatered areas to sustain surface flows during the dry season whenever possible.	Added suggested recovery measure to line 4391.
143	4392	David Boughton	and establish fish passage at barriers that currently lack it, or where it exists but is ineffective!!! Don't just re-evaluate it! Create it! Create fish passage, especially for above-barrier populations that still have a lot of native ancestry.	Added suggested recovery measure to line 4392.
144	4404-4413	David Boughton	Although the genetic work is very interesting, for recovery it is not nearly as important in my view as establishing passage, improving habitat and streamflows, and the items in paragraph 6.	Comment noted.
144	4437	Camm Swift	Implies a broadening of an effort to the whole species from Russia to Baja California buy using *O. mykiss?*	Revised language in line 4437 to remove the implication.
145	4462	Camm Swift	Literature Cited: citations were not checked against their appearance in the text and in this list. Not being sure of the style for this draft some inconsistencies are pointed out in the following entries. Particularly the multi-authored papers seem to be alphabetized by first author and then chronologically by date regardless of subsequently listed co-authors. Most books and journals alphabetize these by second, or even third or more authors if present and then by date (year). Possibly you have a style manual to standardize citations/references.	Comment noted. Citations were organized chronologically by date of publication, not by second author, consistent with citation styles used in previous status reviews.
145	4464-5644	David Boughton	Some of the references are NOT in alphabetical order, so check them.	See Department response for page number 145, line 4462.
146	4492-4493	Camm Swift	No title to item	Fixed.
147	4516	Camm Swift	No journal indicated	Fixed.
149	4586-4591	Camm Swift	Boughton papers rearranged if alphabetized by second and other authors including additional paper noted above	See Department response for page number 145, line 4462.
153	4695, 4698	Camm Swift	Chapman, B. B. should precede Chapman, D. W.	Fixed
156	4790-4802	Camm Swift	rearrange by 2nd author	Comment noted.
157	4828-4830	Camm Swift	add California Department of Fish and Game, Fish Bulletin 178 (this was before change to Fish and Wildlife)	Comment noted. Citation written as recommended in the article.
161-162	4954-4962	Camm Swift	re-alphabetize	See Department response for page number 145, line 4462.
162	4978-4983	Camm Swift	re-alphabetize, elaborate what G3-2 and G3.5 indicate	Fixed.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
162	4992	Camm Swift	change 903: to 90(3):	Fixed.
164	5041-5047	Camm Swift	re-alphabetize	Comment noted.
165	5070	Camm Swift	give issue number like for Hovey, 2004? Minor issue but consistency is desirable	Comment noted.
166	5086	Devon Pearse	Change to 2017; although first published online in Aug 2016, this paper was in the January 2017 issue.	Fixed.
166	5092-5093	Camm Swift	along, causes misspelled	Fixed.
166	5105	Camm Swift	remove words "Invasive species"?	Comment noted.
168	5161-5162	Camm Swift	need title?	Fixed.
169	5178	Camm Swift	what is Npj?	Comment noted.
169	5184-5192	Camm Swift	re-alphabetize, these three journal titles vary from very completely written out to very abbreviated such as PNAS (Proceedings of the [U. S.] National Academy of Sciences) probably unknown to many outside the scientific community. Should have some standard or consistency	Fixed.
170	5217-5224	Camm Swift	re-alphabetize	Fixed.
170-172	532-5280; 5290-5292	Camm Swift	move up to below Myrick	Fixed.
172	5296	Camm Swift	O'Neal to down below Olsen et al.?	Fixed.
174	5343	Camm Swift	Pearse, Barson, et al. goes above Pearse, Donohoe etc	See Department response for page number 145, line 4462.
174	5354	Camm Swift	Pacific reference should move up unless you are going to alphabetize by the acronym PFMC	Fixed.
176	5398-5404	Camm Swift	re-arrange	See Department response for page number 145, line 4462.
176	5411-5418	Camm Swift	re-arrange	See Department response for page number 145, line 4462.
177	5432-5436	Camm Swift	move down in alphabetical order	Fixed.
177	5444-5451	Camm Swift	reverse order	See Department response for page number 145, line 4462.

Page Number	Line Number	Reviewer	Reviewer Comment	Department Response
179	5505	Camm Swift	Take out Conception Coast from authorship since also listed later on as publisher	Fixed.
180	5523-5524	Camm Swift	to above Stearly and Smith	Fixed.
180	5537-5538	Camm Swift	move up alphabetically or lead with SYRTAC	Fixed.
181	5563	Camm Swift	Masters or Ph.D thesis, which department at Michigan	Fixed.
183	5625-5627	Camm Swift	Move up to above Williams, Seager, et al.	See Department response for page number 145, line 4462.
183	5641	Camm Swift	pages?	Comment noted.
191	5704	Camm Swift	my affiliation should be "Emeritus, Section of Fishes, Natural History Museum of Los Angeles County"	Fixed.

Status Review for Southern California Steelhead

Oncorhynchus mykiss

Presentation to the California Fish and Game Commission

April18 | Robin Shin

Fisheries Branch

Presentation Overview

- Listing Description
- Species Overview
- Information Received
- Abundance and Population Trends
- Threats
- Department Recommendation
- Management and Recovery Measures

Listing Description

- Southern California steelhead means all *O. mykiss*, including <u>anadromous</u> and <u>resident</u> life histories, below manmade and natural complete barriers to anadromy from and including the Santa Maria River to the U.S.-Mexico Border.

- Federal listing includes only naturally spawned anadromous adults

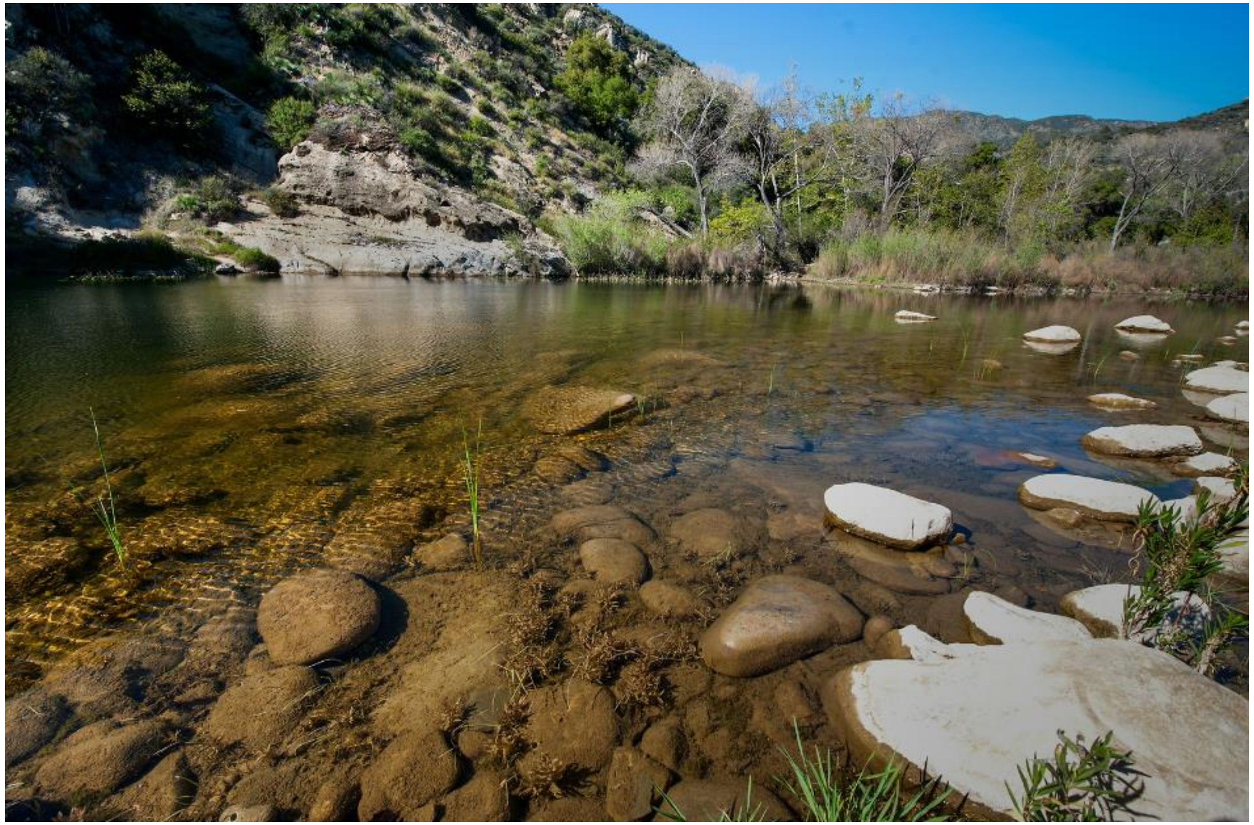
- Department determination that Southern California steelhead is a Distinct Population Segment (DPS) and hence a subspecies for CESA listing purposes.

Species Overview: Life History

- Exhibit an anadromous life-history
- Born and reared in freshwater and mature in saltwater before returning to their natal waters to reproduce
- Variation in the time and location spent at each life-history:
  - Anadromous (freshwater to saltwater migration)
  - Freshwater Resident (remain in freshwater)
  - Lagoon-anadromous (migration to and from brackish lagoons)

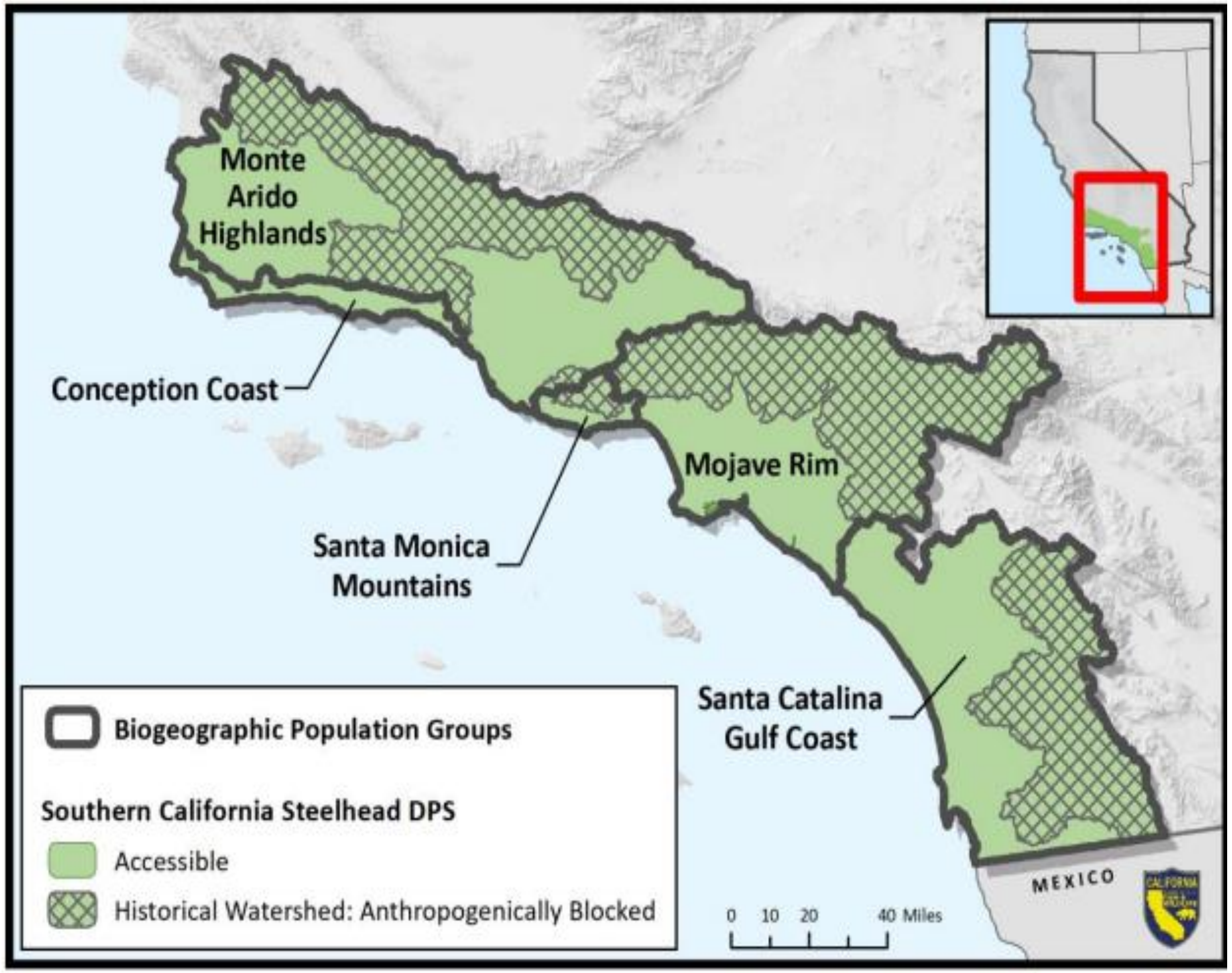
Species Overview: Habitat

- Spawning
  - Clean loose gravel
  - Adequate depth and velocity
- Freshwater Residency
  - Sufficient flow
  - Cool water temperatures
  - Cover habitat
  - Availability of prey items
- Estuarine Rearing
  - Sand berm formation
  - Low degradation



Species Overview: Range and Distribution

- Santa Maria River (San Luis Obispo and Santa Barbara counties)to the U.S.-Mexico Border
- Encompasses 5 biogeographic population groups of *O. mykiss*
- Less than half of 46 watersheds known to support historical populations are still occupied



Map by Janet Brewster, CDFW

Information Received

- During data solicitation period [April 2022 to January 2023]:
  - 17 comments from Tribes
  - 480 emails received
  - 12 submissions of information
- After Status Review delivered to Commission [January 2024]:
  - 39 references
  - Draft technical memo for southern California steelhead life cycle model and graphic user interface

Abundance/Population Trends

Anadromous Adults

- Critically low range-wide abundances
- Counts have not been greater than ten for any watershed examined
- Most streams have observed no adult returns in past 10 years

Population	Years	Trend (%/year)	Minimum Abundance (12-year)	Maximum Abundance (12-year)
Santa Ynez River	1995-2021	-2.24	0	9
Ventura River	2006-2021	**-7.54**	0	1
Santa Clara River	1994-2018	-2.29	0	3
Topanga Creek	2001-2019	-1.7	0	5
Malibu Creek	2004-2019	-1.41	0	2

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

Abundance/Population Trends

Resident *O.mykiss*

- Measurable declines in population trend and abundances for all populations examined.

Population	Years	Trend (%/year)	Minimum Abundance (12-year)	Maximum Abundance (12-year)
Santa Ynez River	1995-2021	**-8.81**	5	484
Ventura River	2006-2021	**-19.39**	0	640
Santa Clara River	1994-2018	-6.09	1	170
Malibu Creek	2004-2019	**-25.56**	0	2,245
Topanga Creek	2001-2019	-1.41	34	316

Major Threats

- Dams, Diversions, and Artificial Barriers
- Urbanization
- Estuarine Habitat Loss
- Invasive Species
- Wildfires
- Drought
- Climate change

Rindge Dam, Malibu Creek

Department Recommendation

The Department recommends that the Commission find the petitioned action to list Southern California steelhead as an endangered species to be warranted.

Management and Recovery Measures

- Implement comprehensive monitoring

- Remove manmade passage barriers and re-establish access to upper watersheds

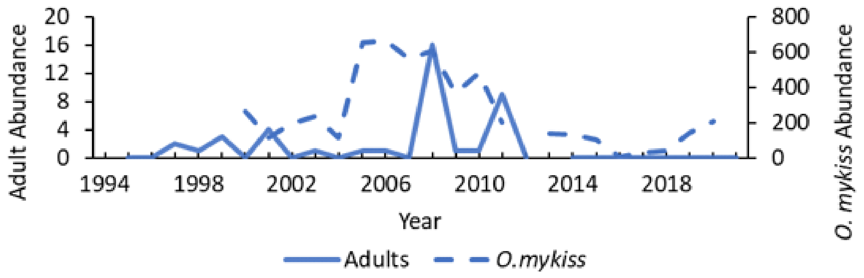
- Habitat and streamflow restoration

Questions ◈ Thank You

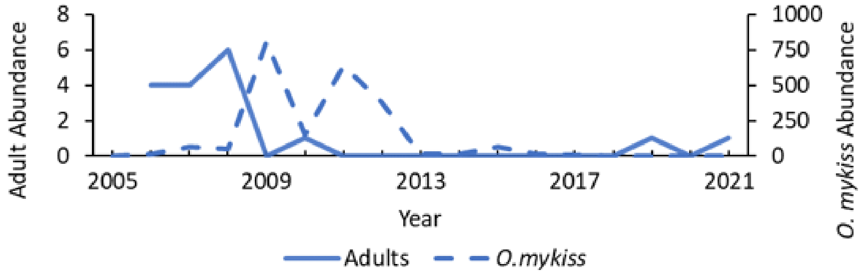
Robin Shin
Senior Environmental Scientist (Specialist)
fisheries@wildlife.ca.gov

Summary

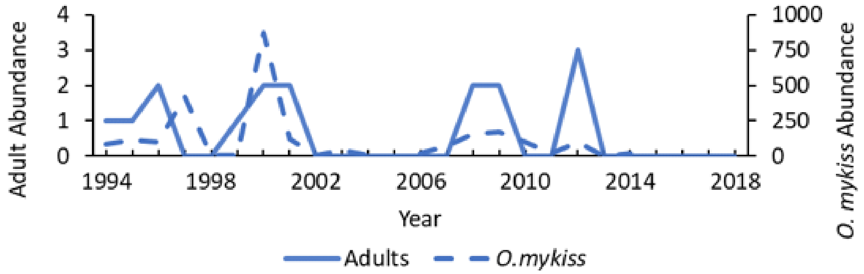
A. Santa Ynez River



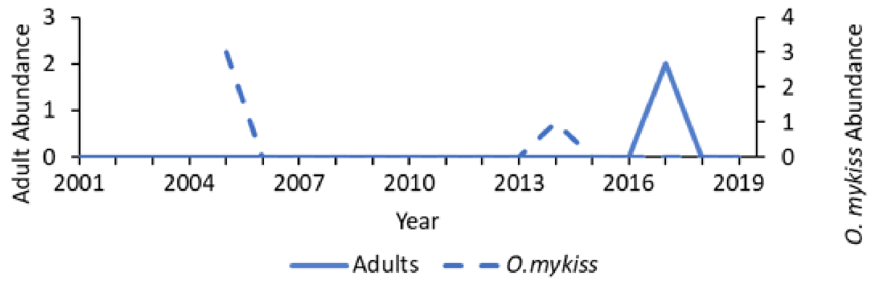
B. Ventura River



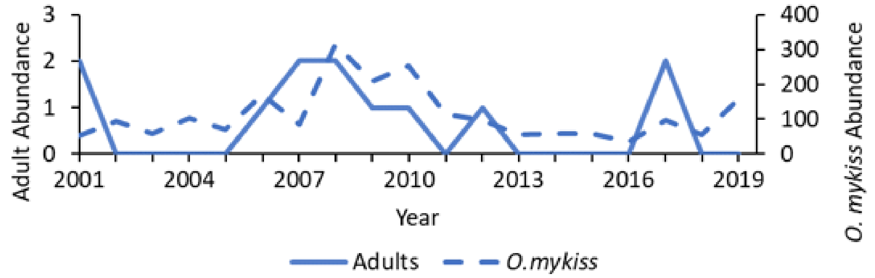
C. Santa Clara River



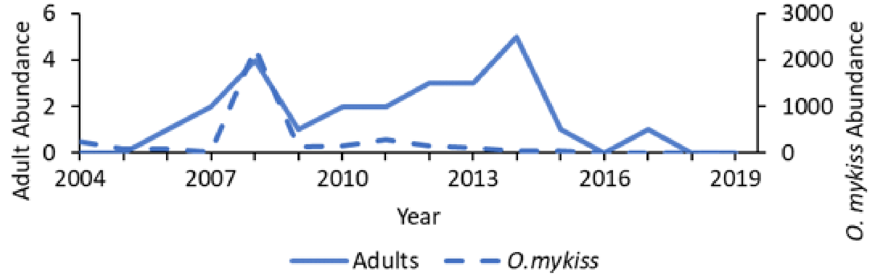
A. Arroyo Sequit Creek



B. Topanga Creek



C. Malibu Creek



EHL

March 18, 2024

Samantha Murray, Chair
California Fish and Game Commission
P.O. Box 944209
Sacramento, California 94244-2090

RE: California Trout, Inc.'s Petition to list Southern California Steelhead (*Oncorhynchus mykiss*) as Endangered Office - Administrative Law's Notice ID #Z2021-0702-02 and Z2022-0426-01—*Support*

President Murray and Commissioners:

Endangered Habitats League (EHL) fully supports designating the Southern California steelhead as endangered under California's Endangered Species Act. For your reference, EHL is Southern California regional conservation group dedicated to ecosystem protection and sustainable land use.

Returning Southern steelhead to our coastal streams is a longstanding goal of conservationists. Yet, the species is at the brink of extinction. Your Commission should act immediately to prevent the total and irreversible loss of this species.

Recent research tells us that Southern steelhead populations are in danger of extinction within the next 25 to 50 years if current trends persist. Since their listing as endangered under the federal Endangered Species Act in 1997, Southern steelhead numbers have *continued to decline* to dangerously low levels. This is the result of continued urbanization, agriculture, and water development. These activities have compromised and drastically reduced their essential required habitat. The legacy of degradation will only be exacerbated by climate crisis projections of intensified floods, droughts, and extreme heat.

The rivers and streams in Southern California once saw Southern steelhead adults return in the tens of thousands. In the past 25 years, only 177 adult Southern steelhead were documented in their native range. Allowing this species to disappear is not acceptable.

CalTrout's petition, reaffirmed in State Courts as containing sufficient information to warrant a decision, and California Department of Fish and Wildlife's (CDFW) peer-reviewed species status report present you with the best available science and a clear mandate to make the decision to fully list this species immediately.

These fish play a key role in our ecosystems on which we all depend. They are a crucial part of the integrity of watersheds in which they swim. Their continued survival and recovery will reflect the resilience of our communities in the face of growing climate crisis challenges. We can look to them for clues on how California must work to address bigger problems in our Southern California rivers, streams, watersheds, and coastlines. These aquatic ecosystems, extending from summits to the seabed, provide countless environmental, social, and economic benefits for the entire state. We believe that we prosper, now and in the future, when Southern steelhead are thriving in our rivers.

For all these reasons, EHL strongly support listing Southern steelhead as endangered in all waters within historic range below natural or man-made barriers.[1]

Yours truly,

Dan Silver
Executive Director

---

[1] Please note that, consistent with section 10.5(c) of the Tejon Agreement, EHL is not advocating that state listing of Southern steelhead requires changes to any Tejon Ranch project or project approval. In addition, we wish to confirm that in light of the benefits to important biological resources realized through the Agreement, EHL does not oppose the developments currently proposed on Tejon Ranch.

CALIFORNIA FISH AND GAME COMMISSION
RECEIVED 03/20/2024

To: California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

From: Stephen L. Kanne

President Silva and Commissioners:

As a concerned California resident, I write to you today to express my full support for designating the Southern California steelhead as endangered under California's Endangered Species Act.

Southern steelhead are an iconic native species, but without further protections we risk losing them forever. That's not a California I want to live in. Do you? You must act immediately to put in place all precautions to prevent this species from total loss.

Recent research tells us that Southern steelhead populations are in danger of extinction within the next 25 to 50 years, if current trends persist. Since their listing as an endangered species in 1997 under the federal Endangered Species Act, Southern steelhead numbers have continued to decline to precariously low levels. In the past 25 years, only 177 adult Southern steelhead were documented in their native range! Allowing this species to disappear is not acceptable, and more protections are essential.

These fish play a key role in our ecosystems, and they can give us crucial information about the greater health of the watersheds they swim in (and that our communities rely upon). We can look to them for clues on how California must work to address bigger problems in our southern rivers and streams, watersheds that provide countless societal and economic benefits for the entire state. I believe that we prosper when rivers and waterways in key locations are thriving, and in many of these places there is work to be done.

These fish may also play a role in providing resiliency for ecosystems further north along the coast. Southern steelhead are uniquely adapted to Southern California's warmer Mediterranean climate. As climate change continues to increase water temperatures and alter flow regimes along the entire West Coast, Southern steelhead could be critical to the long-term resiliency of their northern relatives.

For all these reasons, I wholeheartedly support California Trout's recommendation that Southern California steelhead be listed as endangered in all waterways within historic range below natural or man-made barriers. CalTrout chose this delineation thoughtfully, so that fishing and continued management for rainbow trout, the freshwater form of this amazing species, would still be possible above these barriers.

It's not too late to save the Southern California steelhead species from blinking out – but if you don't act urgently, we may very well miss our chance. Please make protection of these amazing and important fish a conservation priority by listing them as endangered under the state's Endangered Species Act.

Sincerely,

Stephen J. Hanna

A Concerned California Resident

3/12/24

Stephen & Claudia Kanne
2708 Wilshire Blvd., #322
Santa Monica, CA 90403

LOS ANGELES CA 90
13 MAR 2024 PM 9

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

94244-2090

CACHUMA CONSERVATION RELEASE BOARD

March 21, 2024

Submitted via Email

Melissa Miller-Henson
Executive Director
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, California 95814

Request for a Southern California Location for the Commission's Hearing to Consider Listing Southern California Steelhead as an Endangered Species

Dear Ms. Miller-Henson:

On behalf of the Cachuma Conservation Release Board (CCRB), I am writing to respectfully request that the California Fish and Game Commission's hearing on final consideration of listing Southern California steelhead as an endangered species be held in Southern California, rather than in San Jose.

CCRB is a joint powers agency consisting of the City of Santa Barbara, the Goleta Water District and the Montecito Water District. We have a long history of effective efforts on behalf of steelhead in the Lower Santa Ynez River watershed in Santa Barbara County. In response to the petition, we have submitted timely comments on the proposed listing.

We appreciate that internet access is available for the Commission's hearings. However, we hope the Commission will consider holding this hearing closer to the habitat and natural range of Southern California steelhead and closer to the local and regional agencies working for steelhead, such as CCRB, which would be most affected by such a listing.

Thank you for your kind attention to our request.

Sincerely yours,

Lauren Hanson
Board President

cc: Samantha Murray, Commission President
Erika Zavaleta, Commission Vice President
Jacque Hostler-Carmesin, Commission Member
Eric Sklar, Commission Member
Darius W. Anderson, Commission Member
CCRB Board of Directors
Peter Cantle, CCRB Executive Director

P.O. Box 3767, Santa Barbara, CA 93105
www.ccrb-board.org

CACHUMA OPERATION AND MAINTENANCE BOARD
3301 Laurel Canyon Road
Santa Barbara, California 93105-2017
Telephone (805) 687-4011 FAX (805)569-5825

Ms. Melissa Miller-Henson
Executive Director
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
E-mail: fgc@fgc.ca.gov

Ms. Jennifer Bacon
CESA Analyst
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
E-mail: jennifer.bacon@fgc.ca.gov

March 26, 2024

Re: Comments on CDFW's Use of COMB data related to Fish Abundance - Status Review Report (January 2024) for Listing of the Southern California Steelhead Under the California Endangered Species Act

Dear Ms. Miller-Hensen and Ms. Bacon,

On behalf of the Cachuma Operation and Maintenance Board (COMB), we appreciate the opportunity to provide comments on the Status Review report (Report) for listing of the Southern California Steelhead (Southern SH/RT) under the California Endangered Species Act (CESA). We applaud the efforts of the California Department of Fish and Wildlife (CDFW) in compiling this extensive and comprehensive Report related to the listing of the Southern SH/RT as endangered under CESA. We respectfully submit the following comments regarding your use of COMB's data.

The Fisheries Division (FD) staff at COMB has been monitoring Southern SH/RT within the Santa Ynez River watershed since the mid-1990s. Considering the importance of the CDFW Report and our contribution of data to a portion of its content, we respectfully submit the following comments and recommended changes based on our scientific observations of the data.

COMB's Senior Resources Scientist, Timothy Robinson, PhD, has been managing the FD staff and all related 2000 Biological Opinion requirements and activities for the Cachuma Project and Lower Santa Ynez River system since 2005. Dr. Robinson and our team of Senior Biologists have been deeply involved with data gathering, data analyses and all levels of reporting including those COMB-FD materials which were used in the CDFW Report's analyses. After careful review of the Report, COMB would like to provide the following observations and recommended changes:

- Appendix C (Page 189) provides the base data used in many of the analyses in the Report. For the Ventura River, snorkel survey data were used whereas for the Santa Ynez and Santa Clara rivers, migrant trapping data were used. Based on our scientific expertise, using two separate types of data for the same analysis leads to inaccurate comparison and analysis because migrant trapping data represents a subset of abundance results, where snorkel survey data are more representative of actual abundance.

- The upstream/downstream migrant trapping data for the Lower Santa Ynez River (LSYR, downstream of Bradbury Dam) basin provides a view of the Southern SH/RT abundance which is limited in several ways. First, it only captures movement of fish within the basin and does not represent in any way the total abundance within the basin, which was the objective of the Report's trend analysis and supporting dataset. We recommend using snorkel data that would be more representative of the LSYR basin-wide Southern SH/RT abundance, as was used for the Ventura River over a limited area. Second, the enforcement by the National Marine Fisheries Service (NMFS) of the 2000 Cachuma Project Biological Opinion Incidental Take Statement (ITS) numbers for juveniles and adults started in 2014 and greatly skewed the capture numbers, particularly in 2021 and onward, when the trapping season ended early due to reaching the take limit. This regulatory monitoring limitation for the Santa Ynez River can easily be seen in Appendix C (Page 189) in the presented data from 2014 to 2021 compared to 2001 to 2012. Third, box fyke traps used for monitoring fish migration must be removed during moderate to high flow events to safeguard the fishery, equipment, and staff, resulting in a capture number most likely less than what migrated through that location. Even deployment of a Dual-Frequency Identification Sonar (DIDSON) camera struggles with this limitation. Standardization of the data in the form of catch per unit effort or catch per day would address some of these limitations. These types of metrics are provided in COMB's Annual Monitoring Summaries.

- We highly recommend using snorkel survey data (spring surveys which generally had the highest observations) to represent Southern SH/RT abundance within the LSYR basin and the standing crop of the fishery. By using these data for trend analyses, the result from the beginning of the data record through the prolonged drought period (2001-2016) out to 2021 and beyond exhibit an even stronger recovery from the drought, particularly when adding two more years of data for 2022 and 2023 (Table 1 and Figure 1). Adding a simple linear trendline to the snorkel data results in a flat trajectory through 2021 and a slightly positive sloped line when including 2022 and 2023 data. Our provided analysis indicates that the LSYR basin is sustaining a population and does not follow the same downward trend as other populations within the geographic range of Southern SH/RT. Also, snorkel survey data can underestimate the actual number of fish per habitat. We will be addressing this issue this summer by conducting calibration surveys for our routine snorkel surveys.

Table 1: Migrant trapping and snorkel survey data from 2001 to 2023 for the LSYR basin.

Year	Santa Ynez River	
	Migrant Trapping	Snorkel Surveys (Spring)
2001	266	1595
2002	116	1016
2003	196	647
2004	238	532
2005	117	1719
2006	653	3262
2007	665	1879
2008	561	3407
2009	610	982
2010	367	2373
2011	484	1803
2012	199	3152
2013		1416
2014	137	429
2015	134	141
2016	103	58
2017	5	42
2018	27	29
2019	39	2479
2020	147	1556
2021	205	4064
2022	182	2110
2023	52	2190

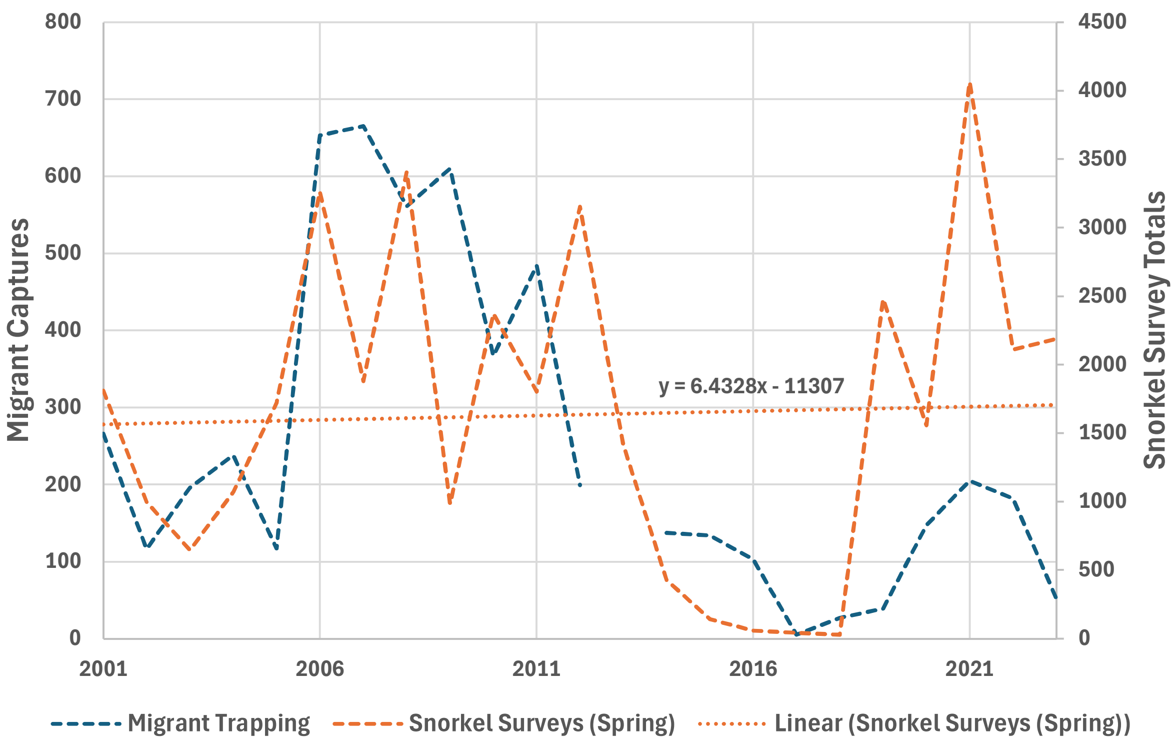


Figure 1: Migrant trapping and snorkel survey data from 2001 to 2023 for the LSYR basin showing a trendline for the snorkel survey data.

- Although no anadromous LSYR fish have been observed during migrant trapping in the LSYR basin since 2011 (partly due to the prolonged drought when the sandbar at the LSYR Lagoon was closed to the ocean), we have documented anadromous redds (identified by size) in 2021 (LSYR mainstem downstream of a beaver dam near the Salsipuedes Creek confluence) and 2023 in El Jaro Creek. Redds were not used in the analyses, but spawner surveys are a means of identifying the presence of anadromous fish and could be used as a surrogate.

- There was no mention of beaver dams possibly inhibiting migration within the LSYR basin. During high flow years, beaver dams are not an issue for fish passage. However, during moderate to low years, they can limit migration considering there can be well over 50 dams (range from 2010 to 2023 is 45 to 132 dams) within the LSYR mainstem of varying sizes to navigate, and often double-digit dams in the tributaries.

- Section 4.3.1.2: Santa Cota Creek, the correct name is Zanja de Cota Creek.

- 4.3.1.2 Page 46: We request the paragraph discussing recent modification in the operation of Bradbury Dam for increased releases be modified for accuracy. For example, the 2000 Biological Opinion contains provisions for dam releases to benefit the downstream fishery both in the LSYR mainstem and Hilton Creek during dry and wet years. The recent Water Rights Order 2019-0148 tiered off those provisions and required higher releases during wet years (determined by inflow to the lake) to benefit the downstream fishery during the year of and year after that determined wet year. The higher releases are referred to as Table 2 flows that have the purpose of supporting migration, spawning, and rearing in the LSYR.

Thank you for considering our observations, comments, and suggestions. Please contact our General Manager, Janet Gingras, at 805 / 687-4011 ext. 201 if you have questions or need additional information.

Sincerely,

Polly Holcombe
Polly Holcombe (Mar 25, 2024 16:54 PDT)

Polly Holcombe
Board President
Cachuma Operation and Maintenance Board

cc: Brian Hennes, CDFW (Brian.Hennes@wildlife.ca.gov)
Claire Ingel, CDFW (Claire.Ingel@wildlife.ca.gov)
SCSH@wildlife.ca.gov

CESA-Status-Review-Report-comment-letter

Final Audit Report 2024-03-25

Created:	2024-03-25
By:	Dorothy Turner (dturner@cachuma-board.org)
Status:	Signed
Transaction ID:	CBJCHBCAABAAriVSicejV9j36slRbpCpBWrHzm_Oq08D

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Pasadena Casting Club
P.O. Box 711
Pasadena, CA 91102

28 Mar 2024

To: California Fish and Game Commission

Via Email: fgc@fgc.ca.gov

From: Pasadena Casting Club

Subject: CESA listing for Southern Steelhead

Dear President Murray and Commissioners:

Pasadena Casting Club is a group of fly fishing enthusiasts dedicated to the art of angling and casting, conservation, and education. The club was founded in 1947 and has over 350 members. We participate in conservation activities to maintain healthy streams and fisheries, run programs to introduce veterans, women, and young people to fly fishing, and serve our community by raising awareness of California's fisheries and the habitat that supports them. I am writing on behalf of our Board of Directors and our club to support designating Southern California steelhead as endangered under California's Endangered Species Act.

We appreciate the extensive research performed by California Trout and the work completed to submit the petition for listing in 2021. And we applaud the unanimous decision that the California Fish and Game Commission made in April 2022 that stated listing under CESA "may be warranted". Now that the species status review has been completed by the California Department of Fish and Wildlife, and supports the findings of the petition, we request that the Commission act quickly to save this amazing fish.

Southern steelhead are an iconic native species in our region, and our members have witnessed first-hand the loss of habitat and decline of the species in Southern California. These fish are not just valued for their beauty and incredible toughness, but as an indicator of the state of our watersheds. Although remarkably resilient, continued impacts on our stream systems could result in the complete loss of this species unless they are protected. We believe that protection for the fish will also provide water quality, watershed health, recreation, and other benefits to all Californians.

For these reasons, Pasadena Casting Club supports California Trout's recommendation that Southern steelhead be listed as endangered in all waterways within their historic range below natural or man-made barriers. California Trout chose this delineation thoughtfully, so that fishing and continued management for rainbow trout, the freshwater form of this species, will still be possible above these barriers.

Please act now to make protection of these amazing fish a conservation priority by listing them as endangered under the state's Endangered Species Act.

Sincerely,
Pasadena Casting Club

Edward E. Wallace

Edward E. Wallace
Conservation Chair

Cc: PCC Board of Directors

United Water CONSERVATION DISTRICT

April 1, 2024

California Fish and Game Commission
PO Box 944209
Sacramento, CA 94244-2090
Sent via email: fgc@fgc.ca.gov

California Department of Fish and Wildlife
Fisheries Branch
Attn: Southern California Steelhead
P.O. Box 944209
Sacramento, CA 94244-2090
Sent via email: SCSH@wildlife.ca.gov

Subject: United Water Conservation District Comments on the California Department of Fish and Wildlife California Endangered Species Act Status Review of Southern California Steelhead (*Oncorhynchus mykiss*)

Dear Commissioners and Fisheries Branch Staff:

United Water Conservation District (United) submits the following comments to the California Fish and Game Commission (Commission) and California Department of Fish and Wildlife (CDFW) in response to the Status Review of southern California steelhead (*Oncorhynchus mykiss*) (Status Review) prepared by CDFW (2024). In their Status Review, and pursuant to Fish and Game Code (FGC) § 2074.3 and 2074.6, CDFW is required to evaluate the breadth of available scientific literature and develop a summary of the status of southern California steelhead as well as a recommendation to the Commission for listing under the California Endangered Species Act (CESA). United has completed a thorough review of the Status Review and it is clear that CDFW has based key findings on partial sets of data, which in large part is only relevant to the anadromous component of the proposed listing unit of southern California steelhead rainbow trout ("Southern SH/RT"). The comments from United include relevant context regarding the analysis and findings of the Status Review and should inform the Commission's decision at this stage in the listing process. Past comments from United to the Commission and CDFW are included as an attachment to this submittal as they remain applicable and provide useful background regarding the information relied upon through the previous stage of the listing process. Ultimately, the Status Review does not provide an analysis of the status of the species based on the best available science and the recommendation from CDFW to list Southern SH/RT under CESA is premature. The Commission should find that the listing is not warranted at this time and should rather delay the listing decision until after additional data collection to accurately characterize the resident and anadromous life-history variants in the proposed listing unit.

Population Abundance and Trend

The population trend analysis in the Status Review is flawed

Regarding the methods to monitor fish in a given study, CDFW's steelhead monitoring protocol (Fish Bulletin 182) states "The methods likely involve different inherent biases in their estimates; and thus, once a deployment decision is made, a given method should be used consistently for a given population, to support valid trend estimation." In short, the sources of information that CDFW utilized in their analysis of population abundance and trend do not provide consistent and comparable results as these monitoring programs are not designed to support such an assessment. The results included in the Status Review do not meet CDFW's own standards and are, therefore, invalid.

In the Status Review, CDFW completed an analysis of abundance and trends with "annual abundance data compiled from a variety of sources." The sources used include monitoring programs in the Santa Ynez River (COMB 2022), Santa Clara River (Booth 2016), and Ventura River (CMWD 2005-2021 and Dagit et al. 2020) and was limited to data from trapping efforts associated with past and ongoing monitoring in these three watersheds, the populations within which are designated as Core 1 under the federal ESA listing (NMFS 2012). This is problematic for multiple reasons:

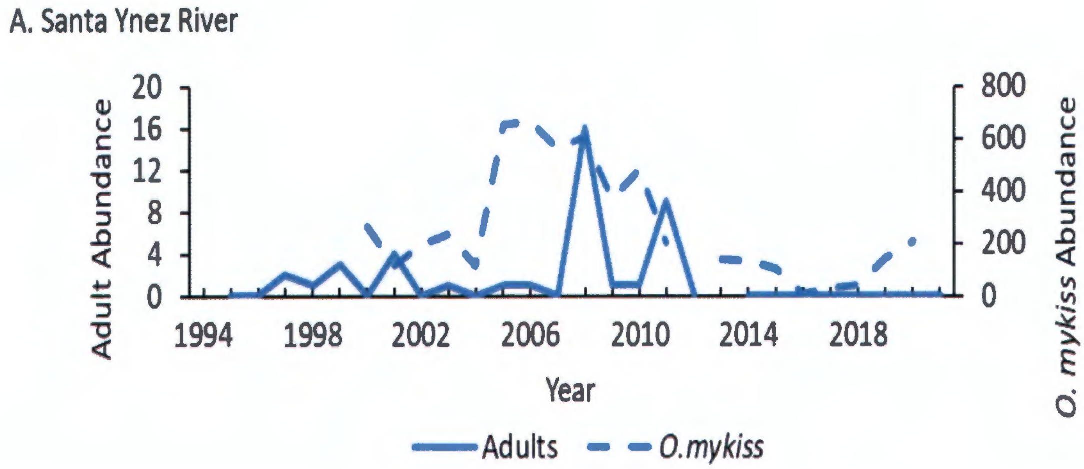
1) Monitoring data accounts for those individuals that are biologically motivated to move within the watershed (e.g., based on resource availability) or to migrate, but does not account for *O. mykiss* residents within the watershed. A detailed example of this shortcoming is provided in the 'Proper accounting for resident *O. mykiss* yields different conclusions' section below.
2) Monitoring efforts have changed within the period of analysis, so these results are not directly comparable. Monitoring of adult migration conducted by United at the Freeman Diversion fish ladder has consisted of trapping from 1994-1997 (prior to the federal ESA listing), incidental observation during facility dewatering from 1998-2002, false weir and passive video-based surveillance system (video cameras/ infrared scanner) from 2002-2010, updated computer-based surveillance system (network cameras) in 2010 with additional cameras added between 2011-2014, and further upgrades to the camera systems in 2016 and 2023 to current generation equipment. The current system is triggered to record video footage by an infrared scanning beam and camera–based motion detection. This system is thought to potentially undercount adult steelhead based on collection of several downstream migrating kelts observed in the facility's downstream migrant trap through 2014 that did not match observed upstream migrants. The 2016 upgrades are thought to have addressed these shortcomings, though only one (possibly a second, though not confirmed) adult upstream migrating steelhead has been detected by the surveillance system since 2012 (in 2020). Monitoring efforts at the Freeman Diversion were not consistent over the range of years evaluated by CDFW. Due to permitting restrictions, the downstream migrant trap at the Freeman Diversion was not operated after 2015, a fact the Status Review fails to acknowledge (4.4.1.1, Figure 12.C.) and downstream migrant trapping efficiency has never been assessed. Overall, monitoring data from the Freeman Diversion on the Santa Clara River does not provide the level of detail and consistency necessary to support the analysis completed in the Status Review.

In another example, regarding monitoring data from the Santa Ynez River, the Status Review notes that no data was collected in 2013 and that "Biological Opinion Incidental Take provisions have been required since 2014" (4.4.1.1, Figure 12.A.). However, the Status Review fails to acknowledge that the Biological Opinion Incidental Take provision required a reduced trapping effort (i.e., fewer trapping days) after 2014 compared to previous years, even though the COMB (2022) reference clearly states the reduced trapping efforts from 2014 through 2022. Therefore, monitoring results are not comparable across years. Overall, the data utilized by CDFW in the Status Review to evaluate the abundance and trends of the proposed listing unit does not provide the level of rigor necessary for this analysis and does not meet CDFW's own standards outlined in Fish Bulletin 182.

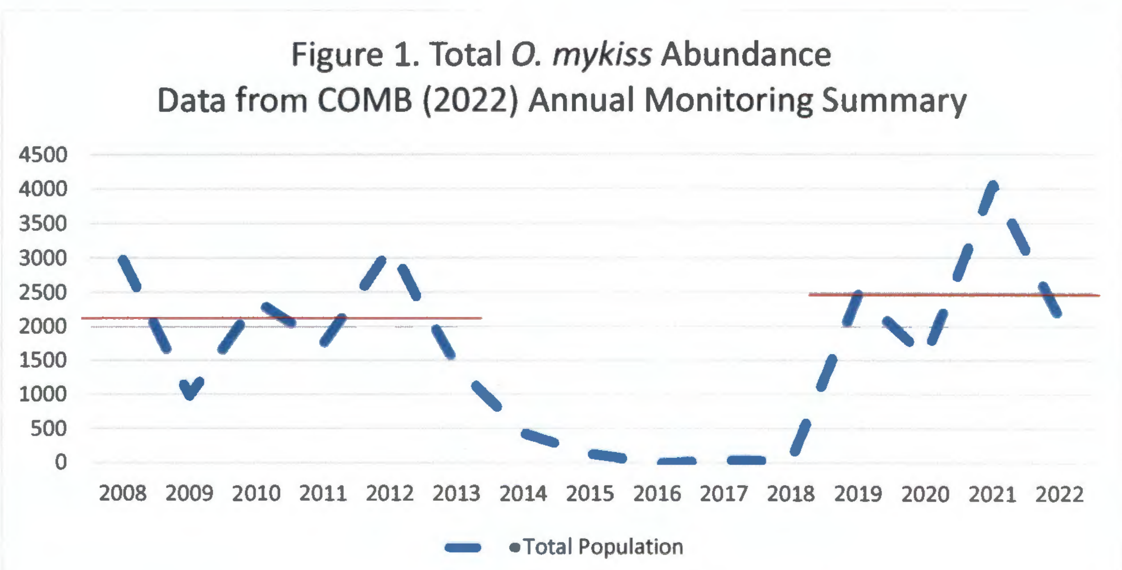
3) Trapping is limited to periods when flows allow for installation and operation of fish traps (i.e., high flows may preclude trap operation) and/ or based on other facility or flow conditions. As an example, the downstream migrant trap at the Freeman Diversion only operated when United was actively diverting water and only as a conservation tool to rescue fish (and subsequently relocate them to suitable habitat) that would otherwise be discharged downstream to poor river conditions. During high flows, the trap was not operating because United was not diverting water or downstream river conditions were suitable for fish and trapping/ relocating fish was not necessary. Also, notably the downstream migrant trap only sampled a small proportion of the total river discharge at high flows (i.e., the proportion being diverted), the remainder of which was flowing downstream past the diversion facility.
4) Trap data alone is not representative of even the migrating portion of *O. mykiss* without a trap efficiency study. Further, the Status Review failed to include available information from other monitoring studies (e.g., snorkel surveys) conducted as part of these same monitoring efforts, which more accurately characterizes the overall *O. mykiss* population. CDFW failed to use the best available science in their analysis, and therefore, the conclusions drawn are not sufficiently supported. Please see the detailed example of this issue in the 'Proper accounting for resident *O. mykiss* yields different conclusions' section below.

Proper accounting for resident *O. mykiss* yields different conclusions

In the Status Review, CDFW omits survey data for resident *O. mykiss,* which in one example below, contradicts the stated conclusions regarding the abundance and trends of the proposed listing unit. The information presented in the Status Review for the Santa Ynez River regarding the abundance of *O. mykiss* is displayed on Figure 12 (A. Santa Ynez River), and is reproduced here for ease of reference:



The Status Review figure above indicates that *O. mykiss* abundance never increased above approximately 700 individuals during the period of analysis. However, a review of the monitoring reports referenced by CDFW (COMB 2022) found a total *O. mykiss* abundance within the surveyed reaches varying with the antecedent conditions (i.e., wet/ dry water year cycles), from a low of <100 individuals at the height of the recent drought to a maximum of over 4,000 individuals following drought. It should be noted that these totals represent only the numbers within the surveyed portions of the river, which cover only a small fraction of the overall Santa Ynez River watershed. The totals, therefore, do not represent a characterization of the total population within the watershed. Clearly, the abundance numbers in the Status Review do not account for the full reported values and it is unclear why CDFW omitted a portion of the available data. These totals include all *O. mykiss* surveys (i.e., trapping and snorkel surveys), which more appropriately represents the petitioned listing unit. A closer review of this data finds that the "pre-drought" population from roughly 2008-2013 averaged 2,100 individuals while the "post-drought" population from roughly 2018-2022 averaged 2,500 individuals (Figure 1).



In the Status Review, CDFW does not properly account for resident *O. mykiss*, and the resulting interpretation of the species status mischaracterizes the overall abundance and trends, as demonstrated by the example on the Santa Ynez River detailed above. The monitoring results on the Santa Ynez do illustrate the species response to drought conditions, with an observed reduction in observations during the historic 2012-2017 drought experienced in the region, presumably due to limitations in available suitable habitat, food resources, etc., which may provide an indication of the overall trends within the watershed. However, the data also shows the expected response post-drought, with a significant population increase following the onset of average to above average precipitation in ensuing water years. This example was selected since the Santa Ynez River has the most complete dataset of the overall *O. mykiss* population within the watersheds analyzed in the Status Review. Further, data from United's Freeman Diversion used in the Status Review is not comparable to data collected in the Santa Ynez River as the Freeman Diversion is located in the lower Santa Calara River, approximately 10 miles from the river mouth, in a reach that has been considered a migration corridor, and not spawning or rearing habitat for *O. mykiss*. More broadly within the region, the available data does not provide a consistent and accurate representation of the *O. mykiss* population, and therefore, the abundance and trends cannot be reliably calculated. Taken together, the abundance and trends analysis in the Status Review is a foundational component of the listing recommendation upon which the Commission is likely to base their decision. However, CDFW's analysis is flawed and not supported by the best available science.

Information relevant to resident *O. mykiss* is lacking or omitted

As United has commented on in the past, the original petition submitted by CalTrout did not address resident *O. mykiss* sufficiently. CDFW's previous petition evaluation report similarly failed to address resident *O. mykiss* sufficiently to accurately characterize the petitioned listing unit, which was defined in CDFW's evaluation report as:

> "All *Oncorhynchus mykiss,* including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border with the understanding that anadromous (adult southern steelhead) arise from anadromous and resident naturally spawning adults."

The definition of the proposed listing unit in the Status Review is largely similar to the previous definition, with the primary exception being the removal of the language regarding "anadromous (adult southern steelhead) arise from anadromous and resident naturally spawning adults":

> "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories, from and including the Santa Maria River (San Luis Obispo and Santa Barbara counties) to the U.S.-Mexico Border."

To account for the life history variability, CDFW used the term "southern California steelhead rainbow trout (Southern SH/RT)" to define the proposed listing unit. However, in multiple instances, the Status Review fails to account for resident *O. mykiss* both in the presentation of data as well as in the development of conclusions. For example, in the Historical and Current Distribution Section (4.3), the Status Review states:

> "In general, estimates of historical population abundance are based on sparse data and assumptions that are plausible but have yet to be adequately verified or tested. While the following

historical estimates are likely biased either upward or downward, the examination of historical records of adult run size in southern California show consistent patterns of abundance that are at least two or three orders of magnitude greater in size than in recent years."

The quoted language above mentions the "adult run size," presumably referring to the anadromous portion of the proposed listing unit. However, the resident component is not mentioned, which is concerning given CDFW's ongoing Heritage and Wild Trout Program and/or the Coastal Salmonid Monitoring Program. These Department programs complete surveys on *O. mykiss* in multiple watersheds within the region A separate example of omission of resident *O. mykiss* is in the Trends Analysis section (4.4.3.3) of the Status Review, which states "many populations occurring south of the Santa Monica Mountains are considered severely reduced and, in many instances, extirpated." However, David Boughton, an *O. mykiss* researcher with the National Oceanic and Atmospheric Administration Southwest Fisheries Science Center (NOAA SWFSC) selected by CDFW to peer review the draft Status Review commented that CDFW "clarify that you're talking about steelhead specifically here, not *O. mykiss*, since there are often extant *O. mykiss* populations in the headwaters." CDFW failed to add clarification in the final Status Review, but rather changed the preceding language from "steelhead" to "Southern SH/RT," which contradicts the peer reviewer's comment.

In the original listing of southern California steelhead Environmentally Sensitive Unit (ESU) under the federal ESA and reiterated in the designation of the southern California steelhead Distinct Population Segment (DPS), the U.S. Fish and Wildlife Service (USFWS) disagreed with NMFS' proposal to include resident *O. mykiss* in the listing unit. The 2006 DPS listing (71 FR 833) states that "FWS, the agency with ESA jurisdiction over resident *O. mykiss*, disagreed that resident fish should be included in the steelhead ESUs and advised that the resident fish not be listed". The position of the USFWS was based on the absence of evidence that resident *O. mykiss* needed protection under the federal ESA (62 FR 43937). The information provided in the Status Review is focused on the anadromous component of the proposed listing unit and the lack of evidence regarding the status of residents persists. As United has commented on in the past[1], the available evidence shows that a resilient population of resident *O. mykiss* persist in many watersheds both above and below barriers, and these systems are capable of supporting robust populations that provide a substantial and well documented contribution to the overall species.

NMFS population viability model does not include the resident component

The CalTrout petition included multiple references to National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA-NMFS) assessments of the anadromous component of the overall *O. mykiss* population. In the evaluation of the petition completed by CDFW in November 2021, CDFW referred to the NMFS population viability threshold of 4,150 anadromous spawners per year on average within an individual watershed, which was developed by the NMFS Southwest Fisheries Science Center (Boughton et al. 2007) and included in the NMFS Recovery Plan (NMFS 2012). The Status Review similarly refers to the NMFS viability threshold in the conclusions under the Abundance and Trends section (4.8.1), stating that "the results of our analyses demonstrate that no population is near the criteria necessary to provide resilience from extinction."

Again, the Status Review fails to account for the resident component of *O. mykiss* in key findings and conclusions. The viability criteria developed by NMFS accounts for only the anadromous component of

[1] See attached comment letters and information submittals from United to the Commission and CDFW dated August 17, 2021, December 2, 2021, February 1, 2022, and September 20, 2022

O. mykiss. In Boughton et al. (2007), the authors state the importance of the interchange between resident and anadromous *O. mykiss*; however, the conclusions of their assessment are limited to the anadromous component, stating that "100% of the spawners must be anadromous". In 2023, NMFS released a 5-year review of southern California steelhead (NMFS 2023), which further examines the interchange between resident and anadromous *O. mykiss* and suggests a new population density criterion of 0.3 fish/m^2 to account of residents as an "appropriate provisional population density viability criterion". Ultimately, the NMFS 5-year review does not change the population viability criteria under the federal listing but CDFW does not refer to this information in their Status Review. The statement in the Status Review that "no population is near the criteria necessary to provide resilience from extinction" is therefore, misleading as it is based on information relevant solely to the anadromous component of the listing unit.

New southern California steelhead life-cycle model includes resident life-history

United and other agencies have commented in the earlier stages of the CESA listing process that information presented in the CalTrout petition and evaluated by CDFW in the petition evaluation regarding the population trend of southern California steelhead presented only the anadromous component of the proposed listing unit – not the resident component – including numbers of returning anadromous adults and declines in numbers compared to historic population estimates. In the petition evaluation report, CDFW noted that information on population abundance and trends of resident *O. mykiss* is limited. United disagrees, as information that contributes to the best available science is readily available and would allow for reasonable inference regarding the status of residents as it relates to the proposed listing. United provided information to CDFW at the outset of the Status Review process relevant to the abundance of resident *O. mykiss* in several watersheds within the proposed listing unit boundaries. However, this information was largely ignored and information presented by CDFW in the Status Review regarding resident *O. mykiss* was not utilized in the development of key findings, including the status of the species abundance and population trends over time.

A group of agencies led by the Association of California Water Agencies (ACWA) anticipated that this key information gap would persist through the development of the Status Review. In an effort to fill this gap and demonstrate the complex life-history dynamics contributing to the persistence of *O. mykiss* and inform the listing process ACWA contracted Cramer Fish Sciences (Cramer) to develop a life-cycle model that incorporates the resident and anadromous life-history types. During the petition process through the start of CDFW's status review, the water agencies, including United, provided substantial comments and background references highlighting the available science on the interplay of the resident and anadromous life-history types on the persistence of the species. Notably, the June 2021 CalTrout petition agrees with this, stating in their assessment that "[f]ish that express the resident freshwater life-history strategy play a central role to the continued existence of southern steelhead." This statement is well supported by the available literature; however, a thorough evaluation incorporating the multiple *O. mykiss* life-history strategies and viability metric was not available, and therefore, the development of a life-cycle model is seen as providing new information for consideration by CDFW and the Commission. The Status Review supports the development of such a tool to consider existing information related to the interplay of resident and anadromous *O. mykiss,* stating in section 2.5.5 that "the close genetic relationships between sympatric populations of steelhead and Rainbow Trout suggest that the populations interbreed and that close relatives, including full siblings, may express alternative ecotypes (or other life-history variation, e.g., adfluvial or lagoon migration). Therefore, managing individual fish with different life histories separately is biologically unjustified, and the two life history variants should be considered a single population when found coexisting in streams."

The life-cycle model in its current iteration is intended to inform CDFW and the Commission of the overall trajectory of the proposed listing unit with appropriate consideration of the life-history types, including resident and anadromous O. mykiss. The scope of the life-cycle model is appropriately broad at this stage, encompassing general assumptions based on the available literature about the species within the proposed listing unit, applying local information and reasonable assumptions to parameterize the model and allow for the evaluation of a wide range of scenarios to test those assumptions. As described by Cramer (2023), the life-cycle model parameters are based on the known life-history variability of *O. mykiss* in the proposed listing unit. The model uses empirical data, when available, from the scientific literature to set parameter values, with flexibility to change parameter values as additional data becomes available as well as based on professional judgement. As commented on above, population trends are a key component of the Status Review, and the findings and conclusions are based on incomplete data. The life-cycle model provides a valuable tool, with incorporation of all available information on anadromous and resident *O. mykiss* within the proposed listing unit, to examine the long-term responses to a range of scenarios and reevaluate the conclusions in the Status Review. Integration of the model in the Status Review would allow for the exploration of population dynamics, and the extent to which these dynamics are affected by individual parameters and their values. Cramer (2023) highlights a key advancement provided by the model, noting that "the core dynamics demonstrate that concepts like connectivity and life history variants can have large impacts on a population's trajectories, and that omitting them may not fully capture the population's capabilities." This is one example of the utility of the model, but there are others, including the assessment of other biological variables (e.g., anadromous fraction) and environmental variables (e.g., future climate scenarios) as they contribute to the status of the species.

The life-cycle model was presented to CDFW prior to the submission of the Status Review. On December 12, 2023, a meeting was held to introduce the life-cycle model to CDFW staff, including those working on the Status Review, with an overview on the model development background, methodology used, literature reviewed as the basis for the model parameterization, and initial model outputs. The meeting was also intended to initiate a dialogue between the biologists working for the regulated stakeholders, third-party technical experts (Cramer), and CDFW regarding the information needed to make sound management decisions in the proposed listing unit. ACWA members were represented by biologists Randall McInvale (United), Sarah Mulder (Ventura Water), and Scott Lewis (Casitas Municipal Water District), Environmental Services Manager Marissa Caringella (United), Executive Director of Planning and Natural Resources Lisa Haney (Orange County Water District), and State Relations Advocate Stephen Pang (ACWA). CDFW was represented by Kyle Evans, Chenchen Shen, and Robyn Bilski. Cramer was represented by Kai Ross, PhD and Joe Merz, PhD.

Following the submission of the Status Review, ACWA United and independent scientists have continued to bring the life-cycle model to the attention of CDFW and the Commission. On January 22, 2024, ACWA sent CDFW a link to the life-cycle model giving CDFW full access to use the model. On February 7, 2024, ACWA sent CDFW a copy of Cramer's draft memorandum detailing the model's background and function. And, on February 13, 2024, United and its legal representative met with the Commission's attorney—Supervising Deputy Attorney General Eric Katz. During that meeting, United presented the life-cycle model, demonstrated how the model worked and explained how the model represented an advancement in the scientific tools available to evaluate the long-term survival of *O. mykiss.*

Considering the lack of data in the Status Review to properly characterize the proposed listing unit, and without incorporation of the life-cycle model in the evaluation, CDFW has not demonstrated that they have utilized the best scientific information currently available in developing their conclusions and recommendations. The listing decision should not move forward until there is a more thorough evaluation of the available scientific information, including the life-cycle model, to ensure that the management decisions appropriately characterize the population proposed for listing.

Recommendations for management of the proposed listing unit

United appreciates the opportunity to provide comments on the Status Review. The information summarized herein demonstrates the need for a more transparent analysis of the data available on *O. mykiss* in the proposed listing unit, as well as the need for future data collection using standardized methods to accurately characterize the proposed listing unit population. The decision by the Commission at this stage must be scientifically sound and, as noted in our comments, the analysis completed in the Status Review, and the data used to complete these analyses, raises fundamental questions regarding the validity of the conclusions upon which the recommendations are based. We understand that the Commission must make a decision based on the available information, but as demonstrated in our comments, key questions have yet to be sufficiently addressed. With availability of the new life-cycle model developed for southern California steelhead and provided to CDFW, the conclusions in the Status Review should be reevaluated. As of now, fundamental questions regarding the status of the species remain unanswered and it is evident that the data currently available does not begin to fill the information gap needed to properly evaluate the proposed listing unit. United implores the Commission to find that the listing is not warranted at this time.

Respectfully,

Mauricio E. Guardado, Jr.
General Manager

Enclosures

Attachment 1 – United Water Conservation District letters to the Fish & Game Commission and CDFW dated August 17, 2021, December 2, 2021, February 1, 2022, and September 20, 2022

United Water
CONSERVATION DISTRICT

August 17, 2021

Vanessa Gusman
California Department of Fish and Wildlife
Fisheries Branch
PO Box 944209
Sacramento, CA 94244-2090

Subject: CalTrout petition to list Southern California Steelhead as endangered under the California Endangered Species Act (CESA)

Dear Ms. Gusman:

United Water Conservation District (United) submits the following information in response to the CalTrout petition to list southern California Steelhead as an endangered species under the California Endangered Species Act (CESA) (CalTrout petition). As a California Special District with a vested interest in the conservation of southern California steelhead (*Oncorhynchus mykiss irideus*) (steelhead; *O. mykiss*), United has a well-documented history of monitoring southern California steelhead in the Santa Clara River watershed. The work of United, along with a handful of others in the region, comprises the majority of the monitoring conducted on the species in southern California. Through this monitoring and data analysis, United has developed an understanding of *O. mykiss* in the watershed that has been leveraged in extensive consultations with the regulatory agencies over the years. An information gap regarding *O. mykiss* ecology exists in the region and key research questions remain unanswered, as the information presented below demonstrates. That history and knowledge gap compels the conclusion that the California Department of Fish and Wildlife (CDFW) should study this species – not list it based on the limited information provided in the CalTrout petition.

To aid CDFW's review, United provides additional information and references, formatted to primarily address inaccuracies, or in some cases correct information, presented in the CalTrout petition, followed by a discussion and references to specific documents for consideration in the evaluation of the petition. Specific references included in this submittal are largely focused on steelhead in the Santa Clara River watershed, though reference to the greater geographic region and steelhead population is included as appropriate.

1701 Lombard Street, Suite 200, Oxnard CA 93030 Tel: (805)525-4431 www.unitedwater.org

The CalTrout Petition Misrepresents United's Freeman Diversion.[1]

The CalTrout petition states that United's Freeman Diversion facility has not been remediated. This statement fails to recognize that (1) the existing facility[2] continues to provide passage for steelhead, with two confirmed upstream migrating steelhead observations as recently as 2020, (2) United is continuing to prepare a Habitat Conservation Plan (HCP) pursuant to Section 10 of the federal Endangered Species Act (ESA) associated with the rehabilitation of the fish passage facility at the Freeman Diversion and an updated bypass flow program intended to balance the needs of species and water resources in the region, (3) physical modeling of alternative fish passage designs by the United States Bureau of Reclamation (BOR) is currently underway, and (4) United continues to consult with National Marine Fisheries Service (NMFS) and CDFW on all of the above. The rehabilitated fish passage facility will represent a significant improvement over the existing condition and will provide improved fish passage conditions for steelhead as well as Pacific lamprey (*Entosphenus tridentatus*), design criteria for which is a primary component in the 10+ year alternative fish passage design process underway with NMFS and CDFW's involvement.

The adult steelhead run size estimates[3] are unsubstantiated by quantitative data. Establishment of achievable management and recovery objectives is hampered by the lack of reliable historic and current population data.

The historic run size estimate in the Southern California Steelhead Recovery Plan[4], which is cited by the CalTrout petition, comes from "The Updated Status of Federally listed ESUs of West Coast Salmon and Steelhead" (Good et al. 2005) and includes steelhead estimates for each

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[1] CalTrout Petition. See pg. 13, paragraph 1.

[2] United operates the Freeman Diversion to conserve, maintain, and put to beneficial use the waters of the Santa Clara River watershed, with one of the primary goals being to combat seawater intrusion in the Oxnard Plain. United has diverted water from the Santa Clara River at the Freeman Diversion to provide for surface water deliveries and groundwater recharge in accordance with water right license 10173 and permit 18908. CDFW protested the original application to the water rights permit in 1980, citing a remnant steelhead resource in the river. Through much coordination and consultation between United, CDFW, the State Water Resources Control Board (SWRCB), and the Department of Water Resources (DWR), a steelhead study was completed in the river in the early 1980s, which resulted in the installation of a Denil fish ladder and implementation of bypass flows for fish passage at the request of and based on specifications provided by CDFW. SWRCB issued water right permit 18908 to United in 1987 and subsequently amended it in 1992. The permit incorporated CDFW's recommended fish ladder and bypass flow provisions, which were notably protested by DWR due to the importance of combating the severe seawater intrusion experienced in the Oxnard Plain. Nevertheless, United accepted the fish passage provisions and began implementation when the Freeman Diversion became operational in 1991. Over the years, United has modified bypass flows several times for the benefit of steelhead, each time decreasing diversion yield compared to its water rights license and permit. As a result, the seawater intrusion conditions have been magnified by the ongoing drought conditions and limited diversion yield.

[3] CalTrout Petition. See pg. 2, paragraph 5, pg. pg. 6 paragraph 5, and pg. 7 paragraph 1.

[4] NMFS. 2012. Southern California Steelhead Recovery Plan. See pg. xiii, paragraph 3.

of the major watersheds. Within the Ventura River watershed, the estimate traces back to a 1946 CDFW letter commenting on the future Matilija Dam.[5] Within the Santa Clara River watershed, the 1980 estimate by Moore[6] of the average population traces back to the same 1946 CDFW letter from which Moore extrapolated an estimate in the Santa Clara River by comparing the potential habitat of the two watersheds. This fact is echoed in CDFW's 1996 Steelhead Restoration and Management Plan for California[7] and again by NMFS (2005)[8], which also includes a review of the historical run sizes in the major southern California watersheds. Moore's knowledge of the Santa Clara Watershed comes from the late 1970s and early 1980s, one of the wettest periods on record, causing an overestimation of river miles of suitable steelhead habitat. In the same 1980 report, Moore notes that projecting the average run size can be misleading, particularly in systems subject to extreme flow fluctuations from year-to-year.

In a review of the history of steelhead in the Santa Ynez River, Alagona et al. (2012)[9] acknowledges the natural variation in steelhead run sizes, particularly in the southern California ecosystems, noting that "[a]ll of these perturbations and processes affect steelhead populations, which may have varied by two orders of magnitude annually owing to natural changes alone." The original source of the Santa Ynez River estimate came from a report generated by Shapovalov[10], a CDFW employee, which relied upon the opinion of another CDFW employee (Carl Tegen) who was working as a trapper in the Santa Ynez River watershed. Tegen compared the number of steelhead in the Santa Ynez River to counts in the Eel River and deduced that the Santa Ynez steelhead run during the year in question (1944) was "at least as large" as the Eel River. While it is apparent that there were many adult steelhead in the Santa Ynez in 1944, it would be inaccurate to assume that his estimate was a running average of a natural run of steelhead for the same reason that Moore notes in his 1980 report regarding year-to-year fluctuations in flows within these river systems.

CDFW acknowledges this subjectivity in quoting the U.S. Fish and Wildlife Service (USFWS) in the Fish Species of Special Concern in California.[11] CDFW notes that the estimates of historical run sizes "are highly subjective and probably correct only within an order of magnitude". In Good et al. (2005), NMFS concurs with the earlier CDFW statement and goes a

[5] Clanton D.A. and Jarvis J.W. 1946. Field inspection trip to the Matilija-Ventura watershed in relation to the construction of the proposed Matilija Dam. California Division of Fish and Game, Field Correspondence.
[6] Moore M. 1980. An Assessment of the Impacts of the Proposed Improvements to the Vern Freeman Diversion on Anadromous Fishes of the Santa Clara River System, Ventura County, California. See pg. 14, paragraph 2.
[7] CDFW. 1996. Steelhead Restoration and Management Plan for California. See pg. 55, paragraph 4.
[8] Good T.P., Waples R.S., Adams P. 2005. The Updated Status of Federally listed ESUs of West Coast Salmon and Steelhead. See pg. 282, paragraph 4.
[9] Alagona P.S., Cooper S.D., Capelli M., Stoecker M., Beedle P. H. A History of Steelhead and Rainbow Trout (*Oncorhynchus mykiss*) in the Santa Ynez River Watershed, Santa Barbara County, California. See pg. 169, paragraph 4.
[10] Shapovalov L. 1944. Preliminary Report on the Fisheries of the Santa Ynez River System, Santa Barbara County, California. See pg. 12, paragraph 2.
[11] CDFW. 1995. Fish Species of Special Concern in California. See pg. 81, paragraph 4.

step further to adjust down the historical run size estimate for the Santa Ynez based on a logical inference regarding Tegen's experience in the Santa Ynez and Eel Rivers. Good et al. (2005) summarizes their review of historical run sizes by stating that "the estimates of historical run sizes for the Southern California steelhead ESU are based on very sparse data and long chains of assumptions that are plausible but have not been adequately tested." Therefore, to properly evaluate southern California steelhead, CDFW must first develop an accurate estimate of adult run size necessary to establish the status of the species and appropriate recovery goals in southern California watersheds.

Furthermore, another concern is that the estimates were based on an artificially stocked population supported during the extensive steelhead planting program implemented by CDFW beginning in the 1890s and continuing up to the 1930s (Bowers 2008). In the 1910s, southern California rivers, including the Santa Clara and Ventura, along with their tributaries, were receiving up to 3 million trout from northern hatcheries per year. The fish planted were predominantly steelhead and a mix of resident with the anadromous form. This topic is discussed further below.

The focus on human induced population decline in steelhead[12] in southern California ignores the influence of artificial steelhead planting by CDFW.

In southern California, the rise and fall of the steelhead population directly correlates with CDFW's planting of northern steelhead in southern California waters. Prior to the planting from northern hatcheries, records of steelhead in the southern California rivers are minimal. For example, records from the missionary period never mention trout or steelhead, which contrasts with the rivers further north, and scarce records from the pre-colonial period. As noted in the review of steelhead in the Santa Ynez River by Alagona et al. (2012)[13], "we found relatively few explicit records of Chumash exploitation of riverine fish, such as steelhead in the Santa Ynez River, from Spanish, Mexican, and early American explorers and settlers," indicating that steelhead were possibly not as prevalent and abundant as previously asserted. Alagona et al. (2012) continues: "At present, the only archaeological evidence for steelhead presence comes from several theses and a museum contribution describing excavations of sites in former inland Chumash villages with associated information on the identity of fish elements… [s]teelhead remains were found at three of four excavated sites… 6 salmonid bone elements found at Xonxon'ata [located on Zaca Creek 6 miles above its confluence with the Santa Ynez River] constituted only 0.2% of the identifiable fish bones recovered at this site, with the rest assignable to marine species, and these bones appeared to come from immature steelhead or rainbow trout." Alagona et al. (2012) acknowledges that more research is necessary to draw conclusions

[12] CalTrout Petition. See pg. 3, paragraph 3

[13] Alagona P.S., Cooper S.D., Capelli M., Stoecker M., Beedle P. H. A History of Steelhead and Rainbow Trout (*Oncorhynchus mykiss*) in the Santa Ynez River Watershed, Santa Barbara County, California

regarding the presence of salmonid bones at the Santa Ynez River archaeological sites; however, the findings provide an indication of limited steelhead presence during the pre-colonial period.

As noted above, large numbers of trout from northern hatcheries were planted in southern California rivers in the 1890s up to the 1930s. The planted fish were predominantly steelhead and a mix of resident with the anadromous form. The history of the steelhead fisheries during this time is well documented.[14,15] By the early 1930s, there was a trend towards planting larger "catchable-sized" trout. In the late 1930s, the focus of the hatcheries had changed to producing and planting "catchables" that were mostly from a resident form of *O. mykiss.*[16] The decline in steelhead in southern California rivers coincided with the change in hatchery practices.

The population decline following the cessation of planting from northern hatcheries is evident in correspondence generated by CDFW officials and numerous newspaper articles at the time (McEachron 2007 and Bowers 2008). Alagona et al. (2012) also cited Spanne (1975), which "noted that runs of anadromous fish in the Santa Ynez River occurred right up to the construction of Bradbury Dam, but that they were much more predictable and frequent in the late nineteenth and early twentieth centuries based on the memories of elderly residents." The late nineteenth and early twentieth century time period is coincident with the steelhead planting program that was underway in southern California at that time. By 1951, the mention of a steelhead fishery in the newspapers had almost ceased to exist. During that year (1951), CDFW biologist Willis Evans stated: "The fisheries value of these drainages lies primarily in the existence of a resident population of rainbow trout in the head waters areas. Their range throughout most of the subject drainages is curtailed by the lack of sustained year long stream flows. High summer water temperatures above the tolerance of trout also prevent trout development in otherwise suitable streams such as lower Piru Creek."[17] "These drainages" referred to the Ventura and Santa Clara River watersheds. The following year (1952), the Santa Paula Chronicle reported that "Steelhead fishing season ended this year without a single catch being made." In 1954, a few steelhead were reported in the Ventura River but no catches were reported. Notably, these statements from CDFW were made prior to any major dams being constructed in the Santa Clara River watershed. Santa Felicia Dam, constructed on Piru Creek in 1955, was the first such dam. More

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[14] McEachron M. 2009. A Review of Historical Information Regarding Steelhead Trout in the Piru Creek Watershed, Ventura County, California.

[15] Bowers K. 2008. History of Steelhead and Rainbow Trout in Ventura County: Newsprint Accounts from 1870 to 1955. Vol I.

[16] CDFW. 1970. Fish Bulletin 150 A History of California Fish Hatcheries. See pgs. 50-52.

[17] Evans W.A. 1951. U.S. Department of Agriculture "Report of Survey Santa Clara-Ventura Rivers and Calleguas Creek Watersheds, California" (January 1951). See pg. 1, paragraph 4.

recent records of steelhead in the Santa Clara River, primarily made by fisherman, CDFW, and by United were reported and are also well-documented.[18,19,20]

The CalTrout petition refers to steelhead monitoring at the Freeman Diversion fish ladder, stating that it, in part, "supports the finding that little to no change has been observed in total abundance or spatial structure of Southern steelhead since the initial federal listing." United does not refute this statement. However, it should be noted that it is consistent with previous CDFW surveys in the Santa Clara River watershed, which found low numbers of steelhead going back to the 1950s. Later, CDFW conducted a two year study in coordination with United in 1982-1983 and 1983-1984.[21] It resulted in the trapping and identification of a total of 3 steelhead over the two-year study period. As noted above, monitoring at the Freeman Diversion fish ladder has identified low numbers of adult steelhead, typically 0 to 2 individuals per year, since beginning operation in 1991 up to 2021. Combined with earlier observations, monitoring at the Freeman Diversion indicates that the total abundance of steelhead has remained relatively stable since well before the federal listing.

Further research into the relationship between resident and anadromous life-histories must be included in the analysis[22] of the status of steelhead, species stability, and recovery.

When considering the petition and potential future listing, the contribution of resident rainbow trout must be considered. A document prepared by NOAA-NMFS Southwest Fisheries Science Center supports this approach by stating: "Steelhead and rainbow trout belong to the same species (*O. mykiss*), and steelhead are the ocean-migratory ("anadromous") form and rainbow trout are the freshwater-resident form. There is a growing body of literature showing that steelhead and rainbow trout share freshwater habitat, mate with one another, and their offspring can either undergo physiological changes necessary to migrate to the ocean as a steelhead or undergo freshwater maturation as a rainbow trout."[23] As evidenced by this interplay, the ecology of the species clearly requires close examination by CDFW.

The CalTrout petition states that "[f]ish that express the resident freshwater life-history strategy play a central role to the continued existence of southern steelhead." United agrees with the CalTrout petition regarding this interplay of the freshwater resident and anadromous *O. mykiss* life-histories. NMFS recognizes the importance of the life history plasticity between the resident and the anadromous form of *O. mykiss*. In the recovery plan process, NMFS stated: "It is difficult to envision a successful recovery effort without a better

[18] Stoecker M., Kelley E. 2005. Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities.
[19] Puckett L.K. and Villa N.A. 1985. Lower Santa Clara River Steelhead Study. Final Report.
[20] Entrix. 2000. Results of Fish Passage Monitoring at the Vern Freeman Diversion Facility Santa Clara River 1994-1998
[21] Puckett L.K. and Villa N.A. 1985.
[22] CalTrout Petition. See pg. 8, paragraph 1.
[23] Ohms H.A. and Boughton D.A. 2019. Carmel River Steelhead Fishery Report - 2019.

understanding of the functional relationship between resident and anadromous fish." They go on to explain that "this continuum has a significant implication for viability criteria."[24] The most recent NMFS 5-year review of the species referred to resident *O. mykiss*, their importance to the viability of anadromous steelhead populations, and how viability criteria in the Recovery Plan should be updated to account for the contribution of resident fish, a topic that is discussed in more detail below. Recently, several authors that have worked extensively with the southern California steelhead population published a study[25] that makes a key point: "Resident *O. mykiss* in upper watershed areas outside the designated critical habitat are not protected by either state or federal endangered species acts, despite their documented link in maintaining maximum numbers of [s]teelhead (NMFS 2012)." Dagit et al. (2020) also states that the Southern California Steelhead Recovery Plan (NMFS 2012) and Boughton et al. (2007) proclaim that an important consideration to prevent extinction is "protecting existing populations and all life history expressions."

The current recovery population viability goal of 4,150 spawners per year on average for southern California steelhead comes from Lindley's (2003) "random walk with drift" model using field data from the Central Valley (Boughton et al. 2007; Williams et al. 2016). However, the "random walk" model considers only 100 percent anadromous spawners (thereby disregarding the significant contribution of resident *O. mykiss*). This approach effectively means that in terms of achieving recovery goals, resident trout would not contribute to the anadromous form even though NMFS recognized that the Santa Clara River has maintained a population of smolts emigrating to the ocean while upstream migrant runs were too small to be self-sustaining. The limited consideration of purely anadromous fish for the recovery goal is biologically inappropriate for this species, and contrary to the wide recognition that resident *O. mykiss* play a key role in conservation of native coastal *O. mykiss*, including the steelhead life history strategy – particularly in arid southern California where intermittent flow regimes and prolonged droughts are common (Dagit et al. 2020). The viability studies recognized that the "interchange between resident and anadromous fish groups would almost certainly lower the extinction risk of both groups."[26] They go on to state that during their performance-based criteria analysis the interchange between the resident and anadromous form could have large consequences when determining extinction. Specifically, "we suspect that extinction risk of steelhead fraction is likely to be highly sensitive to the details of this interchange."

In the most recent 5-year review of the species, NMFS states that "the criteria that mean annual spawner abundance 1) be greater than 4,150, and 2) be composed of 100% anadromous individuals, were recommended as a risk-averse approach. It was expected that

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[24] NMFS. 2012. See pg. 14-13, paragraph 7.

[25] Dagit, R., M.T. Booth, M. Gomez, T. Hovey, S. Howard, S.D. Lewis, S. Jacobson, M. Larson, D. Mccanne, and T.H. Robinson. 2020. Occurrences of Steelhead Trout (Oncorhynchus mykiss) in southern California, 1994-2018. California Fish and Wildlife 106(1):39-58.

[26] Boughton. 2007. See pg. 8, paragraph 2.

further scientific work would either support these criteria or allow one or both to be relaxed" depending on the scientific research to fill key knowledge gaps including "uncertainty about the magnitude of normal fluctuations in adult abundance, and… uncertainty about the underlying biological mechanisms for expression of life-history diversity, especially factors triggering anadromous versus resident life-histories within populations."[27] Thus, there is clear acknowledgment that additional research is needed to gain a more complete understanding of steelhead ecology and, among other things, refine the viability goal under the federal ESA. These findings and research questions would also need to be closely considered by CDFW in the evaluation of the petition.

Dagit et al. (2020) also notes that, "[a]s reported by Williams et al. (2016) and confirmed by our observations, at no point since [southern California] steelhead were listed as endangered in 1997 was the preliminary provisional viable population goal of 4,150 annual anadromous spawners observed in any individual watershed, nor through the DPS as a whole."

Finally, Dagit et al. (2020) states that "[b]uilding quantitative models that consider both anadromous and resident fish in the production of smolts, in addition to watershed-specific carrying capacities would be a valuable effort towards refining population goals." United strongly agrees, and points to the last southern California steelhead 5-year review that also stated: "Overall, these results show that resident and anadromous forms are tightly integrated at the population level, suggesting a revision of the viability criterion for 100 [percent] anadromous fraction" (NMFS 2016). Moyle (2017) acknowledges that the life-history trait of "partial anadromy is an active area of research to gain insight into underlying environmental and genetic influences. This multigenic trait has important implications for endangered steelhead recovery and fisheries management strategies."

The CalTrout petition states that "[t]he resident component of the ESU covers a large number of native rainbow trout that are geographically dispersed, but are genetically demonstrable remnant populations of Southern steelhead;" however, the information presented above demonstrates that the interplay between the anadromous and resident life-histories is an open and ongoing area of research with direct implications on the status of the species. A review of the best available scientific information results in numerous findings and conclusions regarding the need for additional research on this topic. Researchers and regulatory agencies acknowledge that further study is necessary to ascertain key data required to make informed management decisions. Therefore, United urges CDFW to evaluate the entire breeding population, including resident fish as well as south-central coast steelhead (discussed below) in their review of the CalTrout petition. Should southern California steelhead become a candidate species, CDFW must again evaluate the entire breeding population in the status review to achieve a more realistic recovery goal that is true

[27] NMFS. 2016. 5-Year Review: Summary and Evaluation of Southern California Coast Steelhead Distinct Population Segment. National Marine Fisheries Service. West Coast Region. California Coastal Office. Long Beach, California. See pg. 20, paragraph 2.

to the biology and genetic structure of the native *O. mykiss* population in southern California. In considering the appropriate population, CDFW can employ a more holistic approach to protecting native *O. mykiss* in southern California, and permit applicants and restoration biologists will be afforded more viable options for project proposals that will lead to meaningful improvements for this population.

The fraction of anadromy must be considered at the sub-watershed level due to highly variable environmental conditions.

Tributaries within the Santa Clara watershed support a healthy population of *O. mykiss*. Stoecker and Kelley (2005) summarized various surveys conducted by CDFW and academic institutions documenting observations of over 100 *O. mykiss* per 100 feet of stream length. Moore, as referenced in Stoecker and Kelley (2005), did an extensive survey of both Santa Paula Creek and Sespe Creek, and their tributaries, reporting "abundant" trout in most of the tributaries. Some of his observations included 15 *O. mykiss* per 100 feet in Lion Creek and 70 *O. mykiss* per 100 ft in Howard Creek. A survey by CDFW, also referenced in Stoecker and Kelley (2005), found *O. mykiss* to be abundant in various tributaries to Sespe Creek in 1994 to 1995. As an example, they observed over 100 *O. mykiss* per 100 feet in Howard Creek. While no estimates were made to calculate the total abundance of *O. mykiss* observed in the Santa Clara River watershed, it would be safe to assume that during these surveys the totals were substantial given that, for example, on Sespe Creek about 47 miles of spawning and rearing habitat *O. mykiss* were reported by CDFW[28]. During this same period, various studies documented the anadromous migration within the watershed. A two-year study conducted by CDFW in 1982-1984 found no smolts migrating out of the Sespe despite trapping, electroshocking, and netting downstream of the Sespe tributary throughout the primary smolt migration period[29]. In the early 1990s, smolts were trapped and counted at the Freeman Diversion. In 1994, for example, United operated a downstream migration trap from February 21 through May 25 and a total of 83 smolts were collected at the trap during this period.[30] It is worth noting that smolts collected at the facility ranged from 0 to approximately 800 during the operation of the downstream migrant trap.

With survey and monitoring results documenting an abundant resident population but relatively few smolts produced from these watersheds, there is a strong indication that *O. mykiss* in the Santa Clara River have a natural low fraction of anadromy. A naturally low fraction of anadromy is expected where the cost to migrate to and from the ocean is high (i.e., low success rate) compared to staying within the watershed as residents. This observed low fraction of anadromy may be explained by the dynamics of many of the rivers in southern California.

As an example, the Santa Clara River is a large watershed (1,625 square miles) dominated by a sandy braided channel in the mainstem. During high flows, suspended sediment levels in the

[28] CDFW. 1996. See pg. 205, paragraph 5
[29] Puckett L.K. and Villa N.A. 1985.
[30] Entrix. 1994. Results of Fish Passage Monitoring at the Vern Freeman Diversion Facility, Santa Clara River, 1994. See pg. 3-10, Table 3-4

Santa Clara River are elevated to a point that is expected to preclude upstream migration opportunity[31]. A key section of the river for emigration to the ocean is well documented by observations dating back to the 1700s to go dry, thus precluding passage. During large portions of the year, portions of the river mainstem remain dry due to percolation to the underlying groundwater basins as surface water is quickly lost in the broad alluvial floodplain.[32]

Kendall et al. (2015) reviewed various studies documenting the factors that may influence the fraction of anadromy. One study found that "migration cost did influence life histories in one model which indicated that emigration survival was one of the critical factors shaping the expression of anadromy."[33] Residency was predicted to increase as emigration survival decreased. Kendall found other studies that concluded that perhaps the southern portions of the species range may be skewed towards residency with the higher cost of anadromy due to seasonally dry stream reaches and lagoon sandbar formations limiting migration opportunities.

Using over 20 years of data collected at the Freeman Diversion from the downstream migrant trap, Booth (2020) concluded that smolt migration timing was correlated with the day length and was less dependent on flow magnitude. Booth found that 95% of all smolts arrived between mid-March and late May with the majority arriving at the collection system in mid-April to mid-May. Most importantly, Booth concluded that "downstream migration in the Santa Clara River often may occur too late in the season to be synchronized with likely opportunities for downstream migration to the estuary and ocean."[34] Upon reviewing the historic hydrology for the system, Booth found that it is a relatively common occurrence for smolts in the Santa Clara River to be unable to successfully migrate to the ocean even with natural hydrology conditions. In summary, *O. mykiss* in the Santa Clara River watershed produce a very small fraction of anadromy, which is expected due to high cost for anadromy and the lack of opportunities for successful emigration and upstream migration. It is likely that the historic planting of steelhead, discussed in more detail above, temporarily modified the fraction of anadromy, thereby increasing the anadromous run size in the system for a short period. Prior surveys have revealed that the resident form of *O. mykiss* are well established within the watershed and are likely to continue to produce the anadromous form. This relationship needs to be studied before a CESA listing determination can be made. As NMFS has stated, the viability of the species would be expected to rise when considering the resident contribution.

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[31] Stillwater Sciences. 2020. Assessment of Suspended Sediment Effects on Adult Steelhead: Implications for Limitations on Steelhead Behavior and Physiology in the Santa Clara River

[32] Beller E.E., R.M. Grossinger, M.N. Salomon, S.J. Dark, E.D. Stein, B.K. Orr, P.W. Downs, T.R. Longcore, G.C. Coffman, A.A. Whipple, R.A. Askevold, B. Stanford, J.R. Beagle. 2011. Historical ecology of the lower Santa Clara River, Ventura River, and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats. See pg. 82

[33] Kendall N.W., McMillan J.R., Sloat M.R., Buerhens T.W., Quinn T.P., Pess G.R., Kuzischin K.V., McClure M.M., Zabel R.W. Anadromy and residency in steelhead and rainbow trout (*Oncorhynchus mykiss*): a review of the processes and patterns. See pg. 335, paragraph 2

[34] Booth M.T. Patterns and Potential Drivers of Steelhead Smolt Migration in Southern California. See pg. 24, paragraph 2.

Genetics on the population structure. The CalTrout petition discusses nuclear DNA with respect to geography, but fails to consider genetic evidence establishing that there is no differentiation between the southern California and the south-central coast populations of steelhead.

The best available scientific information does not support southern California steelhead being distinct from south-central coast steelhead. In 2008, scientists at National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center concluded that "[n]o genetic basis was found for the division of populations [from southern California] into two distinct biological groups, contrary to current classification under the US and California Endangered Species Acts."[35] The Clemento et al. (2008) study analyzed nuclear DNA, representing the best available scientific information and a far superior approach to identifying genetic structure in coastal *O. mykiss* populations compared to the prior studies cited in the original listing that used allozymes (proteins), maternally inherited mitochondrial DNA (Busby et al. 1996), and karyotyping (chromosome sampling). Thus, the more recent – and more reliable – studies from 2008 demonstrate that the two populations should be reclassified as one based on the most updated and most rigorous genetic data.

Other comments on the CalTrout petition:

- The CalTrout petition fails to acknowledge that the language of CESA covers the listing of a "species or subspecies" and not a distinct population segment (DPS).
- While arguing for the listing of the anadromous life-history form, CalTrout recommends not listing the resident life-history form above total barriers even though both forms are genetically identical and comprise a single species, *O. mykiss*. The CalTrout petition stops short of identifying the anadromous life-history form as a species or subspecies, likely owing to the fact that the anadromous and resident life-history forms comprise one species. In the status review of the northern California summer steelhead, CDFW indicated that this ecotype should not be listed under CESA, a recommendation based at least partially on the genetics of the species,[36] which indicated closer relation between localities as opposed to run-timing, and failed to meet the definition of a subspecies, as the petition requested. The same finding should apply to the genetics of anadromous and resident *O. mykiss*.
- The CalTrout petition recommends that catch-and-release fishing with barbless lures only be permitted in waters demonstrated to have steelhead lineage.[37] Catch-and-release

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[35] Clemento A.J, Anderson E.C., Boughton D., Garza J.C. 2008. Population genetic structure and ancestry of *Oncorhynchus mykiss* populations above and below dams in south-central California. See pg. 1321, paragraph 1.

[36] CDFW. 2021. California Endangered Species Act Status Review for Northern California Summer Steelhead (*Oncorhynchus mykiss).* See pg. 149, paragraph 4.

[37] CalTrout Petition. See pg. 17, paragraph 1.

fishing results in a percentage of mortality, so the recommendation runs contrary to the arguments presented in the CalTrout petition.

- The CalTrout petition states that the listing of steelhead under CESA is needed to augment the protections provided by the federal ESA listing[38] but the effective protections for the species would not change significantly. Currently, while NMFS administers protections for steelhead under the federal ESA and CDFW administers protections for steelhead under the Fish and Game Code (F&G Code), "take" is already prohibited under the federal ESA without an incidental take permit and is also effectively prohibited by CDFW's interpretation and application of F&G Code.
- It is important that CDFW use the best available scientific information when describing the species' basic life history. The CalTrout petition states that "the timing of out-migration is influenced by a variety of environmental cues including streamflow, temperature, and breaching of the sand berm at the river's mouth."[39] It is important to add that recent new evidence points to day length (also known as photoperiod) as being a major driver of juvenile outmigration timing[40] and potentially as important, if not more so, than the environmental cues listed by CalTrout's petition.
- The CalTrout petition notes that "[e]xcessive sedimentation and turbidity are critical water quality components in all habitat types and impacts how southern California steelhead utilize each habitat type."[41] United agrees, and would note that as part of the Freeman Diversion MSHCP currently in development, United has completed an analysis of the effects of suspended sediment concentrations and turbidity on the behavior of steelhead. United encourages CDFW to evaluate the effects of sedimentation and turbidity as part of their analysis.
- The CalTrout petition notes that "7 inches is considered the minimal water depth needed for successful migration" for adult steelhead.[42] United agrees that the minimum water depth necessary for adult migration in southern California rivers is something other than the 0.7 feet (8.4 inches) referenced in the CDFW critical riffle analysis standard operating procedure,[43] which was developed based on an analysis completed for the SWRCB Policy for Maintaining Instream Flows in Northern Coastal California Streams.[44] United encourages CDFW to evaluate region specific data on fish size and river flows in their analysis to determine more appropriate flow depth criteria.

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[38] CalTrout Petition. See pg. 15, paragraph 3.
[39] CalTrout Petition. See pg. 9, paragraph 1.
[40] Booth M. 2020. Patterns and Potential Drivers of Steelhead Smolt Migration in Southern California. North American Journal of Fisheries Management, Volume 40, Issue 4: pp 1032-1050.
[41] CalTrout Petition. See pg. 10, paragraph 3
[42] CalTrout Petition. See pg. 10, paragraph 2
[43] CDFW 2017. Standard Operating Procedure for Critical Riffle Analysis for Fish Passage in California
[44] Policy for Maintaining Instream Flows in Northern California Coastal Streams. Division of Water Rights. State Water Resources Control Board. February 4, 2014.

The lack of reliable historic and current population data, compounded by artificial planting, and the lack of proper research into resident and anadromous life histories, fraction of anadromy, and genetic differentiation compels further study of southern California steelhead prior to making a CESA listing decision based on CalTrout's petition. The evaluation must consider all available sources of information to reach the best available scientific information threshold, including the information provided herein, and the attached reference documents, as a starting point for this species.

Respectfully,

Anthony Emmert
Assistant General Manager

December 2, 2021

California Fish and Game Commission
P.O. Box 944209
Sacramento, California 94244-2090

Sent via email to: fgc@fgc.ca.gov

Re: CDFW evaluation report on California Trout petition to list Southern California steelhead as endangered pursuant to the California Endangered Species Act (CESA)

Dear California Fish and Game Commission:

In June 2021, California Trout submitted a petition to the California Fish and Game Commission (Commission) to list Southern California steelhead (Oncorhynchus mykis) as endangered pursuant to the California Endangered Species Act (CESA), Fish and Game Code section 2050 et seq. Thereafter, the Commission referred the petition to the California Department of Fish and Wildlife (CDFW) pursuant to Fish and Game Code section 2073 for preparation of an evaluation report on the petition. Pursuant to Fish and Game Code section 2073.4, on August 17, the United Water Conservation District (United) submitted a 13-page written comment letter and supporting evidence to aid CDFW in its review. United's letter provided additional information and supporting evidence directly relevant to CDFW's mandated evaluation, which included corrections of a number of factual and scientific inaccuracies in the petition. We have enclosed a copy of United's letter and supporting evidence. On November 30, CDFW released its written evaluation report to the public.

We have since reviewed the evaluation report and discovered that it contains no discussion of the substance of United's August 17 letter, or, for that matter, a discussion of the substance of any of the other timely submitted comment letters. CDFW, however, is mandated by Fish and Game Code section 2073.5 and Section 670.1 of Title 14 of the California Code of Regulations to consider all relevant information it receives on the petition and to evaluate the petition in light of that information. The obvious purpose of the mandate is to ensure that the Commission receives an objective evaluation report rather than an advocacy piece favoring the petitioner.

Of specific concern in CDFW's evaluation is its clarification of CalTrout's inclusion of both resident and anadromous DPS in their listing petition. As we stated in our previous comments letter: "When considering the petition and potential future listing, the contribution of resident rainbow trout must be considered. A document prepared by NOAA-NMFS Southwest Fisheries Science Center supports this approach by stating: "Steelhead and rainbow trout belong to the same species (0. *mykiss),* and steelhead are the ocean-migratory ("anadromous") form and rainbow trout are the freshwater-resident form . There is a growing body of literature showing that steelhead and rainbow trout share freshwater habitat, mate with one another, and their offspring can either undergo physiological changes necessary to migrate to the ocean as a steelhead or undergo freshwater maturation as a rainbow trout."[1]

1. Ohms H.A. and Boughton D.A. 2019. Carmel River Steel head Fishery Report - 2019

For this reason, it is critical that the Commission consider the whole O.mykiss population when contemplating the validity of the petition to list. This is just one of the numerous comments cited in United's original comment letter of August 17, 2021.

In light of CDFW's failure to include in its evaluation report any discussion of the relevant public comments it received concerning the petition, United respectfully requests that the Commission remand the evaluation report back to CDFW with the direction that it prepare a revised evaluation report that actually evaluates the scientific information discussed and cited in the petition in relation to the public comments CDFW has received.

Respectfully,

Mauricio E. Guardado, Jr., general manager

Attachment: 2021-08-17 UWCD letter to California Fish and Game Commission

United Water
CONSERVATION DISTRICT

February 1, 2022

California Fish and Game Commission
PO Box 944209
Sacramento, CA 94244-2090

Subject: California Fish and Game Commission proceedings on California Trout's petition to list southern California steelhead as endangered under the California Endangered Species Act (CESA), and California Department of Fish and Game's evaluation of the petition

Dear California Fish and Game Commission:

Before the California Fish and Game Commission (Commission) reaches its decision regarding whether listing of southern California steelhead under the California Endangered Species Act (CESA) may be warranted, it is necessary for the Commission to consider fatal errors in the California Department of Fish and Wildlife's (CDFW) evaluation of California Trout's (CalTrout) petition. Specifically, despite CalTrout's failure to adequately define southern California steelhead, or sufficiently address resident steelhead, CDFW allowed CalTrout to significantly alter its petition with a dramatically expanded definition of southern California steelhead. CDFW also assumes that CalTrout's assertions without specific support are true. This falls woefully short of the Commission and CDFW's statutory and regulatory requirements, thus compelling the Commission to reject CalTrout's petition.

California Fish and Game Code (FGC) section 2072.3 provides: "To be accepted, a petition shall, at a minimum, include sufficient information that a petitioned action may be warranted." FGC section 2073.5(a) requires CDFW to "evaluate the petition on its face and in relation to other relevant information the department possesses or receives," and California Code of Regulations (CCR), Title 14, section 670.1(b) requires the Commission to return incomplete petitions to the petitioner. However, rather than return CalTrout's deficient petition, CDFW states:

> to the extent the Petitioner makes assertions without citing specific support, the Department assumes these statements to be true for purposes of the Petition Evaluation. If the Commission accepts the Petition for further consideration, the Department will need to verify these statements during the status review period. Petition Evaluation Section III, p. 9.

Also, despite identifying another deficiency in CalTrout's petition, CDFW requested CalTrout's intended definition of southern California steelhead. In response, CalTrout broadly defined southern California steelhead as follows:

> All *Oncorhynchus mykiss,* including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border with the understanding that anadromous (adult southern steelhead) arise from anadromous and resident naturally spawning adults.

The inclusion of resident *Oncorhynchus mykiss* (*O. mykiss*), or rainbow trout, below barriers along with anadromous steelhead as part of the listing unit is a significant deviation from the original petition. This clarification also exposes a shortcoming of the petition, specifically, that it does not address resident *O. mykiss* sufficiently, but rather relies on information relevant to anadromous steelhead. As a result, CalTrout's petition and CDFW's evaluation of it are both fundamentally insufficient to substantiate a listing based on CalTrout's definition of southern California steelhead. Notably, FGC section 2074.2(e)(1) and CCR section 670.1(e)(1) provide that "a petition will be rejected by the commission if it fails to include sufficient scientific information" under the statutorily required categories in FGC section 2072.3.

Consideration and evaluation of all readily available information regarding the combined population dynamics and demographics for both resident and anadromous *O. mykiss* is essential to inform the Commission before making a determination on this matter. In fact, readily available data and literature provides evidence that resident *O. mykiss* are significantly more abundant than anadromous *O. mykiss*, have more viable populations than anadromous steelhead in the region (and statewide), and contribute substantially to the persistence of the overall species. Given the larger populations of the resident life history, an evaluation of the combined life histories is more likely to result in a determination that listing is <u>not</u> warranted. Therefore, we strongly urge the Commission to reject the petition pursuant to FGC section 2074.2(e)(1) and CCR section 670.1(e)(1).

General Comments:

United Water Conservation District (United) provided comments on the petition to CDFW on August 17, 2021. In addition to corrections of factual and scientific inaccuracies in the petition, as well as additional references for consideration by CDFW, the comments provided relevant information pertaining to several required components of the petition (see FGC section 2072.3): the population trend, range, abundance, factors affecting the ability to survive and reproduce, the degree and immediacy of threat, impact of existing management, and suggestions for future management.

As indicated in United's December 2, 2021 letter, CDFW's evaluation of the petition did not contain a substantive discussion of United's August 17, 2021 comments. CDFW set a low bar for the petition, disregarding information that is either already available to reviewers or made available through the public review process. This is inconsistent with FGC section 2072.3, FGC section 2073.5 and CCR section 670.1(d).

To determine whether there is sufficient scientific information that a petitioned action may be warranted, the Commission must know whether the information cited in favor of listing is factually true and scientifically accurate and supported, rather than CDFW simply "assuming" that some unsupported statements made by a petitioner about the species are true, even though those statements could, upon further investigation, turn out to be without basis. Knowing the information in the evaluation that is reliable, and that which is not reliable, is critical to the Commission's determination.

Comments on Components of the Evaluation

Population trend

The population trend section of the petition discusses only the anadromous form of *O. mykiss* – not the resident form. And in its evaluation of the petition, CDFW also discusses only the anadromous form of *O. mykiss* when describing the population trend in the region, including providing numbers of returning adults and observed declines in population compared to historic population estimates. CDFW added one reference regarding residents (see the CDFW and Santa Monica Mountains Resource Conservation District (SMMRCD) reference); however, this does not provide any information regarding the population (current or historic), population trend, or a discussion of the status of resident *O. mykiss* in the Santa Monica Mountains specifically or in the overall southern California region. Thus, this component of the petition and CDFW's evaluation is incomplete.

United has compiled readily available survey data and reports from several watersheds within the region; however, it is expected that other data (published or unpublished) is available to CDFW as part of the Heritage and Wild Trout Program and/or the Coastal Salmonid Monitoring Program, which are both led by CDFW.

Regarding the SMMRCD data referenced by CDFW, Moyle et al. (2017)[1] provides a discussion of a portion of the data, indicating a high level of variability in *O. mykiss* numbers from year-to-year. For example, following an observed die-off in Malibu Creek in 2006, the results of subsequent surveys resulted in the observation of five adult steelhead in 2007 and 2,200 *O. mykiss* young of the year (YOY) in 2008. During surveys completed in 2005, 2008, 2011, 2014, and 2015, YOY observations varied from 11 to 590 individuals – the latter surveys completed during the 2012-2016 extreme drought.

Other surveys include those within the Santa Clara River watershed and the CDFW Heritage and Wild Trout Program 2008 report[2] on the Agua Blanca Creek and Fish Creek (tributaries to Piru Creek) yielded estimates of 1,316 and 3,113 *O. mykiss* per mile, with the report noting that "[b]oth Fish and Agua Blanca Creeks contain relatively high densities of coastal rainbow trout, especially given the habitat limitations that salmonids face in this mountainous desert region." Surveys reported in Stoecker and Kelley (2005)[3] within the Sespe Creek drainage found a total of 2,954 *O. mykiss* largely from streambank observations and some snorkel surveys of deeper pools and, of the Santa Clara River sub-watersheds surveyed, the Sespe Creek drainage was found to have the highest relative abundance of *O. mykiss*. It is important to note that the Piru Creek surveys were

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[1] Moyle P.B, Lusardi R.A., Samuel P.J., Katz J.V.E. 2017. State of the Salmonids: Status of California's Emblematic Fishes 2017. August.

[2] CDFG. 2008. Fish Creek and Agua Blanca Creek Summary Report. June 16th-19th, 2008. Heritage and Wild Trout Program. California Department of Fish and Game.

[3] Stoecker M., Kelley E. 2005. Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities.

conducted in tributaries above Lake Piru, a manmade barrier to upstream migration, and the Sespe Creek surveys were conducted in areas above and below natural barriers to upstream migration.

In a study conducted for CDFW in the Ventura River watershed, Allen (2015)[4] reported on extensive *O. mykiss* surveys between 2006 and 2012. In that report, Allen reported that in the lower segment of the river, *O. mykiss* abundance is highly variable with a near zero abundance of fry and juvenile *O. mykiss* observed in 2006 and 2007 but increasing to a maximum of 3,739 juvenile and 2,348 fry *O. mykiss* in 2008 and 2012, respectively. Of the total in the lower river, the vast majority were observed in the study reach near the confluence with San Antonio Creek, known as historically important for *O. mykiss*. In the middle segment of the Ventura River, above the fish ladder on the Robles Diversion, Allen (2015) reported maximum abundance of fry in 2012 totaling 6,637 individuals and maximum abundance of juveniles in 2008 totaling 3,555 individuals. Abundance estimates were higher still in the upper segment, above Matilija Dam, even though total stream length was less than the combined reaches below Matilija Dam (Allen 2015). Overall, *O. mykiss* are generally most abundant in headwater spawning and rearing tributaries across the region and elsewhere.

The results presented above represent only a few examples of the data and findings of relatively recent *O. mykiss* surveys in the region and Attachment A provides a summary of additional *O. mykiss* survey data and reports compiled by United. These references show that there is a resilient and, in favorable years, robust population of resident *O. mykiss* both below and above natural and manmade barriers; however, conclusions regarding population trends and stability are qualitative in nature. For example, Moyle et al. (2017) states that "[o]nly the [resident] coastal rainbow trout (*Oncorhynchus mykiss*) is considered secure in its status" and that "the boundary between [anadromous] steelhead and resident coastal rainbow trout is fuzzy because it is not biologically based, but a distinction of convenience for management." Resident *O. mykiss* are defined by Moyle et al. (2017) as those populations above barriers, though there are populations of residents that are connected to populations below barriers.

When considering whether the listing may be warranted, the Commission should not solely rely upon information contained in the petition and evaluation that is limited to the anadromous life history of *O. mykiss*. The combined population of anadromous and resident *O. mykiss* must be considered to adequately evaluate the petition, which CDFW neglected to incorporate into the evaluation.

Range

As noted in the CDFW evaluation of the petition, Clemento et al. (2008)[5] found that there is no genetic basis for the division of populations (from southern California) into two distinct biological groups (the south-central California coast steelhead and southern California steelhead), contrary to the current classification under the federal Endangered Species Act (ESA). The federal ESA allows for the designation of Distinct Population Segments (DPS) based on metrics other than

[4] Allen M.A. 2015. Steelhead Population and Habitat Assessment in the Ventura River/ Matilija Creek Basin 2006-2012 Final Report. March 31.

[5] Clemento A.J, Anderson E.C., Boughton D., Garza J.C. 2008. Population genetic structure and ancestry of *Oncorhynchus mykiss* populations above and below dams in south-central California.

genetics; however, CESA allows for the listing of a "species or subspecies" and does not include the same DPS policy. It is unclear what basis CDFW or the Commission could use to justify that the petitioned action may be warranted given the lack of a genetic distinction between the federally designated southern California steelhead DPS and the south-central California coast steelhead DPS, as well as the lack of a genetic distinction of the species *O. mykiss* from across the state.

Distribution

Early in the evaluation (see Executive Summary, pg. 1), CDFW notes that the petition defines southern California steelhead as "all *O. mykiss*, including resident and anadromous life histories, below manmade and natural complete barriers…(hereinafter, all references to 'Southern steelhead' are to this definition of Southern California steelhead)." The CDFW evaluation neglects to clearly and consistently present information describing anadromous versus resident *O. mykiss*, as appropriate.

The CDFW evaluation refers to a statement in the petition that the southern California steelhead DPS has been extirpated from approximately 60% of its historical range; however, CDFW does not acknowledge that this is a reference to the NMFS Recovery Plan for southern California steelhead (NMFS 2012)[6] and refers to the anadromous life history. The Southern Steelhead Resources Evaluation (Becker et al. 2010)[7] provides a detailed account of the habitat for *O. mykiss* throughout the region, including both qualitative and quantitative accounts of *O. mykiss* presence in numerous river mainstems and tributaries. This reference, along with the information presented in Attachment A, shows that resident *O. mykiss* are distributed across many of the watersheds in the region.

CDFW neglected to evaluate the available information to determine the accurate distribution of *O. mykiss* within the region. Without reasonable consideration of this readily available information, the evaluation of the petition is incomplete and insufficient to inform the Commission regarding whether the proposed listing is warranted.

Abundance

The petition and CDFW's evaluation both focus on the anadromous life history. As discussed in more detail in the "Population trend" section above and summarized in Attachment A, resident *O. mykiss* are abundant across many of the watersheds in the region and this information, as well as any additional survey data, were not considered by CDFW in their evaluation.

Regarding residents, the CDFW evaluation includes the statement that "the Petition also notes that shrinking populations of freshwater resident *O. mykiss* are vulnerable to loss of genetic diversity and fitness." A reader could interpret this statement to mean that resident populations are in fact shrinking, which may not be CDFW's intent. The petition language reads that "[e]xcessive loss of local freshwater resident populations can lead to lower genetic variability and fitness," which followed a discussion of risks to resident populations from wildfires, drought, climate change, and anthropogenic factors. To clarify, United's understanding is that the petition is referring to

[6] NMFS. 2012. Southern California Steelhead Recovery Plan.

[7] Becker G.S., Smetak K.M., Asbury D.A. Southern Steelhead Resources Evaluation. Identifying Promising Locations for Steelhead Restoration in Watershed South of the Golden Gate. Cartography by D.A. Asbury. Center for Ecosystem Management and Restoration. Oakland, CA.

potential risks and does not state that resident *O. mykiss* populations are shrinking. United requests that CDFW clarify the statement in the evaluation.

Degree and immediacy of threat

Again, the petition and CDFW's evaluation, including their respective references, focus only on the anadromous life history form of *O. mykiss* and do not take resident *O. mykiss* into consideration. Overall, a discussion of resident *O. mykiss* is lacking and, therefore, this component of the CDFW evaluation is incomplete.

The importance of the resident *O. mykiss* life history contribution to the establishment and persistence of the anadromous life history is best stated by Moyle et al. (2017):

> in southern California many, if not most, returning 'steelhead' likely originate as migratory smolts produced from resident headwater trout populations many of which persist *above* man-made and natural barriers to anadromy. The polygenic nature of the anadromy indicates that the trait can persist for a long time in a large resident population. This has been demonstrated in an Argentina river flowing to the Atlantic, where steelhead have developed from resident fish, apparently of California origin, with resident and migratory fish forming one interbreeding population (Pascual et al. 2001) (emphasis from citation).

Elsewhere, Moyle et al. (2017) states:

> If resident rainbow trout populations are considered part of the southern steelhead complex, then the extinction threat of the overall population is somewhat less. Reconnecting the anadromous and resident forms of the native *O. mykiss* populations, however, is essential for maintaining both the anadromous and resident trout populations in the future.

In some watersheds, the connection of resident and anadromous *O. mykiss* remains intact, and in others, there is active progress toward projects that will reestablish this connection. This is essential for consideration by the Commission given that resident *O. mykiss* are secure in their status and contribute to the anadromous life history.

As discussed in more detail in the "Population trend" section above, a resilient population of resident *O. mykiss* persist in many watersheds both above and below barriers and these systems are capable of supporting robust populations that provide a substantial, yet under-evaluated contribution to the species in the region. Many efforts to improve existing fish passage facilities as well as efforts to reconnect isolated populations are currently underway within the existing regulatory framework that would aid in meeting recovery goals under the NMFS recovery plan (NMFS 2012).

Conclusion

The petition and CDFW's evaluation of the petition provide incomplete and insufficient information to inform the Commission's decision regarding whether the proposed listing may be warranted. As CDFW identified, the petitioner did not clearly articulate the intended definition of southern California steelhead. Once clarified, the arguments provided by the petitioner were insufficient to support a finding that the requested listing is warranted. In addition, the near complete reliance on the information presented in the petition (without supporting evidence) results in an evaluation report that lacks key considerations, primarily associated with the resident *O. mykiss* life history. Furthermore, CDFW did not follow statutory requirements in conducting its evaluation of the petition. CDFW did not consider readily available data and scientific literature, much of which was collected under oversight of the agency itself, in evaluating the petition, nor did they consider and address the relevant information provided by stakeholders through the public review and comment period.

The Commission's determination has serious consequences. If the species becomes a candidate species, it will be protected by CESA's take prohibition. As a result of the take prohibition, water supply and wastewater treatment agencies may become subject to civil and criminal liability for incidental, unintended take of the species that may occur in connection with their public health and safety activities. When the regulatory consequence of implementing public health and safety activities may be that an agency becomes liable for criminal and civil penalties, it is incumbent on the Commission to assure that high quality information, and not mere conjecture, supports the determination that the species should be a candidate species.

Overall, CDFW used a deeply flawed approach in preparing the evaluation, and one that is inconsistent with its statutory and regulatory requirements. A determination by the Commission that the listing may be warranted based on the information contained in the petition and CDFW's evaluation would not be legally defensible. Therefore, based on the foregoing, we respectfully request that the Commission reject the petition.

Sincerely,

Mauricio E. Guardado, Jr.
General Manager

Attachment: A - *O. mykiss* Survey Data and Results revised

Attachment A. *O. mykiss* Survey Data and Results

Watershed	Sub-watershed	Year	Study lead	Results	Source
Santa Clara River	Piru Creek (middle)	2008	CDFW	Fish Creek - 288 resident *O. mykiss* (est. 3,113 *O. mykiss* per mile) Agua Blanca - 208 resident *O. mykiss* (est. 1,316 *O. mykiss* per mile)	CDFW 2008a
	Piru Creek (upper)	2008	CDFW	Upper Piru Creek - est. 331 *O. mykiss* per mile Buck Creek - est. 953 *O. mykiss* per mile Alamo Creek - est. 2,648 *O. mykiss* per mile Mutau Creek - est. 334 *O. mykiss* per mile	CDFW 2008b
	Sespe Creek	2004	Stoecker	2,954 *O. mykiss* observed	Stoecker and Kelley 2005
	Sespe Creek	2018	USFS	35 *O. mykiss* in Sespe Creek 373 O. mykiss in Lion Creek	USFS 2018
	Sespe Creek	2017	USFS	215 O. mykiss in Lion Creek 44 *O. mykiss* in Tule Creek	USFS 2017
	Santa Paula Creek	2018	USFS	62 *O. mykiss* observed	USFS 2018
	Rock Creek	2018	USFS	1 *O. mykiss* observed	USFS 2018
	Santa Clara mainstem	1994-2020	United	*O. mykiss* observations between 1994-2014 at the Freeman Diversion: 13 adult steelhead (2 hatchery), 2,128 smolts, 210 YOY, 116 resident, 92 hatchery An additional 2 adult steelhead were identified in the fish passage facility in spring 2020	Booth 2016 United unpublished data
Ventura River	Lower Ventura-San Antonio Creek-Matilija Creek-North Fork Matilija Creek	2005-2020	Casitas Municipal Water District	Peak annual snorkel counts during the monitoring period (2005-2020) generally between 350-400 *O. mykiss*. No *O. mykiss* observed in 2020	CWMD 2020
	Lower Ventura	2006-2012	Allen	Near zero abundance of fry and juvenile O. mykiss observed in 2006 and 2007 but increasing to a maximum of 2,348 fry and 3,739 juvenile O. mykiss in 2012 and 2008, respectively	Allen 2015
	Middle Ventura	2006-2012	Allen	Maximum abundance of fry in 2012 totaling 6,637 individuals and maximum abundance of juvenile in 2008 totaling 3,555 individuals	Allen 2015
	Upper Ventura (including Matilija Creek)	2006-2012	Allen	Higher abundance estimates in the upper segment are largely due to the higher average densities of O. mykiss in the reaches above Matilija Dam, which encompass approximately one-half of the stream miles that are currently available for rearing below the dam (not including dry channels)	Allen 2015
	Matilija Creek	2017	USFS	62 *O. mykiss* in Matilija Creek 301 *O. mykiss* in Upper North Fork Matilija Creek	USFS 2017
	Matilija Creek	2018	USFS	1 *O. mykiss* in Matilija Creek 0 *O. mykiss* in Upper North Fork Matilija Creek	USFS 2018
	Murrieta Creek	2018	USFS	10 *O. mykiss* in Murrieta Creek	USFS 2018
Santa Maria River		2005	Stoecker	4 *O. mykiss* in the lower Sisquoc (0.02 fish/ 100 ft) 190 *O. mykiss* in the upper Sisquoc (3.9 fish/ 100ft) 231 *O. mykiss* in Manzana Creek (2.8 fish/ 100ft) 288 *O. mykiss* in Davy Brown Creek (6.8 fish/ 100ft) 122 *O. mykiss* in South Fork Sisquoc (20.4 fish/ 100ft) 6 *O. mykiss* in Rattlesnake Creek (0.6 fish/ 100ft) Total = 841 *O. mykiss* (2.0 fish/ 100ft)	Stoecker 2005
	Sisquoc River	2018	USFS	514 *O. mykiss* in Davy Brown Creek	USFS 2018
	Munch Creek	2018	USFS	69 *O. mykiss* in Munch Creek	USFS 2018
	Malibu Creek	2005-2014	Santa Monica Mountains Resource Conservation District	5 adult *O. mykiss* observed in 2007 and 2,200 *O. mykiss* young of the year (YOY) in 2008. During surveys completed in 2005, 2008, 2011, 2014, and 2015, YOY observations varied from 11 to 590 individuals	Moyle 2017

Santa Monica Mountains	Topanga Creek	2013-2018	Santa Monica Mountains Resource Conservation District	Observed *O. mykiss* of all life stages ranged from 0 to approximately 170 during the study period. Other streams included in the survey (Big Sycamore, Las Flores, Solstice, Trancas, Zuma) were negative for *O. mykiss* during the study period. Note that the study period was largely during the prolonged 2012-2016 drought	SMMRCD 2018
Santa Ynez River	Santa Ynez	1994-2004	Cachuma Operations and Maintenance Board	Annual snorkel surveys between 1994-2004 resulted in identification of between 0-84 adult *O. mykiss* and 0-346 juvenile *O. mykiss* in the lower Santa Ynez River. Annual snorkel surveys during the same period in the tributaries (Salsipuedes, Hilton, Quiota, El Jaro, Nojoqui) yielded between 0-575 adult *O. mykiss* and between 0-909 juvenile *O. mykiss*. Adult and juvenile status was based on size class	SYRAMC 2009
	Santa Ynez	2017	USFS	92 *O. mykiss* in Alder Creek 292 *O. mykiss* in Fox Creek	USFS 2017
Los Angeles River	Pacoima, Lower Big Tujunga, Haines, Alder, Arroyo Seco, Big Santa Anita Creeks	2018	Southwest Resource Management Association	Presence/ absence surveys. *O. mykiss* identified in Lower and Upper Big Tujunga, Lower Alder, Arroyo Seco, Eaton Canyon, and Big Santa Anita Creeks. Of the native species, coastal rainbow trout were the most abundant.	SRMA 2020
San Gabriel River	Buckhorn, Fish Creek, San Gabriel River, Bear, Cattle Canyon, Lower San Dimas, San Antonio,	2018	Southwest Resource Management Association	Presence/ absence surveys. O. mykiss identified in Lower and Upper Buckhorn, Fish, Cattle Canyon, Lower San Dimas, and San Antonio Creeks, as well as the North, East, and West Forks of the San Gabriel River. Of the native species, coastal rainbow trout were the most abundant.	SRMA 2020

United Water CONSERVATION DISTRICT

September 20, 2022

California Department of Fish and Wildlife
Fisheries Branch
Attn: Southern California Steelhead
P.O. Box 944209
Sacramento, CA 94244-2090
Sent via email: SCSH@wildlife.ca.gov

Subject: United Water Conservation District Comments and Summary of Key Information Regarding the California Department of Fish and Wildlife 12-Month Status Review of Southern California Steelhead (*Oncorhynchus mykiss*)

Dear Fisheries Branch Staff:

United Water Conservation District (United) submits the following comments and attached information for consideration by the California Department of Fish and Wildlife (CDFW) in conducting the 12-month status review associated with the petition to list southern California steelhead (*Oncorhynchus mykiss*) (steelhead; *O. mykiss*) as endangered under the California Endangered Species Act (CESA). On June 14, 2021, California Trout (CalTrout) submitted a petition to the California Fish and Game Commission (Commission) to list southern California steelhead as an endangered species under CESA. On April 21, 2022, the Commission accepted the petition for consideration. On May 13, 2022, the Commission provided public notice that southern California steelhead is now a candidate species under CESA. Pursuant to Fish and Game Code (FGC) § 2074.6, CDFW is in the process of completing a status review of southern California steelhead and has invited the public to submit comments on the petitioned action, including ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, and the adequacy of existing management or recommendations for management of southern California steelhead. In its status review, CDFW is required to evaluate the breadth of available scientific literature and develop a summary of the status of southern California steelhead. The petitioned listing unit, as defined in the CDFW evaluation report and contained in the status review:

> All *Oncorhynchus mykiss,* including anadromous and resident life histories, below manmade and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border with the understanding that anadromous (adult southern steelhead) arise from anadromous and resident naturally spawning adults.

This comment provides a summary of key information contributing to the best available science relevant to the status of resident and anadromous *O. mykiss* and is intended to inform CDFW's status review. Reference documents cited in this comment are available for download via OneDrive: CESA Status Review Comment References. United requests these documents be included in CDFW's administrative file for its review of listing status.

Relationship Between Resident and Anadromous *O. mykiss*

The petition submitted by CalTrout did not address resident *O. mykiss* sufficiently. Rather the petition relied on information relevant to the anadromous form, specifically in presenting population numbers. This resulted in the characterization of only a portion of the total species population; however, in the status review, consideration and evaluation of *all* readily available information regarding the combined population dynamics and demographics for both resident and anadromous *O. myki*ss is essential. Assessment of both resident and anadromous life-history forms will provide a complete account of the prevalence of *O. mykiss* as well as the contributions and interplay across the life-history forms, which is necessary to determine, based on the best available science, the status of the species.

In the status review of southern California steelhead, as well as in the ultimate listing decision, the status and contribution of resident *O. mykiss* must be considered. A document prepared by the National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS) Southwest Fisheries Science Center supports this approach by stating: "Steelhead and rainbow trout belong to the same species (*O. mykiss*), and steelhead are the ocean-migratory ("anadromous") form and rainbow trout are the freshwater-resident form. There is a growing body of literature showing that steelhead and rainbow trout share freshwater habitat, mate with one another, and their offspring can either undergo physiological changes necessary to migrate to the ocean as a steelhead or undergo freshwater maturation as a rainbow trout."[1] As evidenced by this interplay, the status of the species clearly requires close examination of the relationship between resident and anadromous *O. mykiss* in the assessment of their status as well as the viability of the life-history forms.

The CalTrout petition states that "[f]ish that express the resident freshwater life-history strategy play a central role to the continued existence of southern steelhead." United agrees with this statement regarding the interplay of the freshwater resident and anadromous *O. mykiss* life-histories. This submittal offers supporting evidence related to the status of resident *O. mykiss* in the **Population Trend** and **Viability Criteria** sections below, evidence which was absent from the CalTrout petition. Readily available data and literature supports the position that resident *O. mykiss* are significantly more abundant than anadromous *O. mykiss*, have more viable populations than anadromous steelhead in the region (and statewide), and contribute substantially to the persistence and viability of the overall species.

Population Trend

Information presented in the CalTrout petition regarding the population trend of southern California steelhead discussed only the anadromous form of *O. mykiss* – not the resident form – including numbers of returning anadromous adults and declines in numbers compared to historic population estimates (note that historic population estimates are addressed in the **Distribution and Abundance** section below). In the petition evaluation report, CDFW noted that information on population abundance and trends of resident *O. mykiss* is limited. United disagrees, as information that contributes to the best available science is readily available and would allow for reasonable inference regarding the status of residents as it relates to the proposed listing.

In this submittal, we present a compilation of readily available survey data and reports from several watersheds within our region for CDFW's consideration; however, it is expected that other data (published or unpublished) relevant to the status review is available to CDFW as part of the Heritage and Wild Trout Program and/or the Coastal Salmonid Monitoring Program, which are both led by CDFW.

[1] Ohms H.A. and Boughton D.A. 2019. Carmel River Steelhead Fishery Report - 2019.

Regarding the Resource Conservation District of the Santa Monica Mountain (RCDSMM) data referenced by CDFW in the petition evaluation report, Moyle et al. (2017)[2] provides a discussion of a portion of the data, indicating a high level of variability in *O. mykiss* numbers from year-to-year. For example, following low numbers observed in Malibu Creek in 2006, the results of subsequent surveys observed five adult steelhead in 2007 and 2,200 *O. mykiss* young of the year (YOY) in 2008. During surveys completed in 2005, 2008, 2011, 2014, and 2015, YOY observations varied from 11 to 590 individuals – with the latter surveys completed during extreme drought conditions experienced between 2012-2016.

Other surveys include those within the Santa Clara River watershed with the CDFW[3] Heritage and Wild Trout Program 2008 report[4] yielding estimates from Agua Blanca Creek and Fish Creek (tributaries to Piru Creek) of 1,316 and 3,113 *O. mykiss* per mile. The report noted that "[b]oth Fish and Agua Blanca Creeks contain relatively high densities of coastal rainbow trout, especially given the habitat limitations that salmonids face in this mountainous desert region." Surveys reported in Stoecker and Kelley (2005)[5] within the Sespe Creek drainage found a total of 2,954 *O. mykiss* largely from streambank observations and some snorkel surveys of deeper pools and, of the Santa Clara River sub-watersheds surveyed, the Sespe Creek drainage was found to have the highest relative abundance of *O. mykiss*. It is important to note that the Piru Creek surveys were conducted in tributaries above Lake Piru, a manmade barrier to upstream migration, and the Sespe Creek surveys were conducted in areas both above and below natural barriers to upstream migration.

In a study conducted for CDFW in the Ventura River watershed, Allen (2015)[6] reported on extensive *O. mykiss* surveys between 2006 and 2012. In that report, Allen reported that in the lower segment of the river, *O. mykiss* abundance is highly variable, with a near zero abundance of fry and juvenile *O. mykiss* observed in 2006 and 2007 but a document maximum of 3,739 juvenile and 2,348 fry *O. mykiss* in 2008 and 2012, respectively. Of the total in the lower river, the vast majority were observed in the study reach near the confluence with San Antonio Creek, known as historically important habitat for *O. mykiss*. In the middle segment of the Ventura River, above the fish ladder on the Robles Diversion, Allen (2015) reported maximum abundance of fry totaling 6,637 individuals in 2012 with a maximum abundance of juveniles totaling 3,555 individuals in 2008. Abundance estimates were higher still in the upper segment, above Matilija Dam, even though total stream length was less than the combined reaches below Matilija Dam (Allen 2015). Overall, *O. mykiss* are documented to be most abundant in headwater spawning and rearing tributaries across the region and elsewhere.

The information presented above represents only a handful of examples of the data and findings from relatively recent *O. mykiss* surveys in the region. Attachment A provides a summary of additional *O. mykiss* survey data and reports compiled by United for use by CDFW in the status review. These references show that there is a resilient and, in favorable years, robust population of resident *O. mykiss* both below

[2] Moyle P.B, Lusardi R.A., Samuel P.J., Katz J.V.E. 2017. State of the Salmonids: Status of California's Emblematic Fishes 2017. August.

[3] Prior to January 1, 2013, the California Department of Fish and Wildlife (CDFW) was named the California Department of Fish and Game (CDFG) (AB 2402). For simplicity, the name CDFW is utilized throughout this submittal when referring to materials produced prior to 2013.

[4] CDFG. 2008. Fish Creek and Agua Blanca Creek Summary Report. June 16th-19th, 2008. Heritage and Wild Trout Program. California Department of Fish and Game.

[5] Stoecker M., Kelley E. 2005. Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities.

[6] Allen M.A. 2015. Steelhead Population and Habitat Assessment in the Ventura River/ Matilija Creek Basin 2006-2012 Final Report. March 31.

and above natural and manmade barriers; however, conclusions regarding population trends and stability are qualitative in nature. For example, Moyle et al. (2017) states that "[o]nly the [resident] coastal rainbow trout (*Oncorhynchus mykiss*) is considered secure in its status" and that "the boundary between [anadromous] steelhead and resident coastal rainbow trout is fuzzy because it is not biologically based, but a distinction of convenience for management." Resident *O. mykiss* are defined by Moyle et al. (2017) as those populations above barriers; however, populations of residents that are connected to populations below barriers, thus contributing downstream migrants (smolts) to the proposed listing unit, must be factored into the overall population viability. Specific examples of tributaries in the Santa Clara River watershed with a downstream migrant connection above barriers to upstream migration include Sespe Creek and Santa Paula Creek. NMFS recognizes this significant dynamic noting in their 5-year review that persistent returns of anadromous adults "could be maintained either by natural dispersal from some source population located elsewhere and/or from the consistent production of smolts by the local population of freshwater non-anadromous *O. mykiss*, including *O. mykiss* populations currently residing upstream of introduced, long-standing barriers to upstream migration."[7]

The status review should also consider the potential for shifts in the proportion of anadromous and resident *O. mykiss*. Kendall et al. (2017) observed declines in Pacific northwest anadromous steelhead and posited that "declining survival to and from the ocean and in the ocean can lead to an increase in the proportion of resident individuals in *O. mykiss* populations (Kendall et al. 2015). Thus, steelhead population abundance declines may not represent a trend towards the population's extirpation but may instead suggest a change in the dominant life history strategy. Under these conditions it will be important for the resident component to remain viable and capable of producing anadromous offspring."[8]

The Southern Steelhead Resources Evaluation (Becker et al. 2010) includes qualitative and quantitative accounts of *O. mykiss* presence in numerous river mainstems and tributaries including southern California streams located south of the Santa Maria River. And, as noted above, Attachment A provides a summary of *O. mykiss* survey data and reports compiled by United for CDFW's consideration to ensure that its evaluation is based on the best available science.

Viability Criteria

NMFS has documented a recognition of the importance of the life history plasticity between the resident and the anadromous forms of *O. mykiss*. In the Recovery Plan process, NMFS stated: "It is difficult to envision a successful recovery effort without a better understanding of the functional relationship between resident and anadromous fish." They go on to explain that "this continuum has a significant implication for viability criteria."[9] The most recent NMFS 5-year review of the species refers to resident *O. mykiss*, their importance to the viability of anadromous steelhead populations, and how viability criteria in the Recovery Plan should be updated to account for the contribution of resident fish, a key element of the listing evaluation. Recently, several authors that have worked extensively on the southern California steelhead population issue published a study[10] that makes an important point: "Resident *O. mykiss* in upper

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[7] NMFS. 2016. 5-Year Review: Summary and Evaluation of Southern California Coast Steelhead Distinct Population Segment. National Marine Fisheries Service. West Coast Region. California Coastal Office. Long Beach, California.
[8] Kendall N.W., Marston G.W., Klungle M.M. 2017. Declining patterns of Pacific Northwest steelhead trout (*Oncorhynchus mykiss*) adult abundance and smolt survival in the ocean.
[9] NMFS. 2012. See pg. 14-13, paragraph 7.
[10] Dagit, R., M.T. Booth, M. Gomez, T. Hovey, S. Howard, S.D. Lewis, S. Jacobson, M. Larson, D. Mccanne, and T.H. Robinson. 2020. Occurrences of Steelhead Trout (Oncorhynchus mykiss) in southern California, 1994-2018. California Fish and Wildlife 106(1):39-58.

watershed areas outside the designated critical habitat are not protected by either state or federal endangered species acts, despite their documented link in maintaining maximum numbers of [s]teelhead (NMFS 2012)." Dagit et al. (2020) also note that the Southern California Steelhead Recovery Plan (NMFS 2012) and Boughton et al. (2007) proclaim that an important consideration to prevent extinction is "protecting existing populations and all life history expressions."

The current NMFS recovery population viability goal of 4,150 spawners per year on average for southern California steelhead comes from Lindley's (2003) "random walk with drift" model using field data from the Central Valley (Boughton et al. 2007; Williams et al. 2016). However, the "random walk" model considers only 100 percent anadromous spawners (thereby disregarding the significant contribution of resident *O. mykiss*). This flawed model forecasts that in terms of achieving recovery goals, resident *O. mykiss* would not contribute to the anadromous form even though NMFS recognizes that the Santa Clara River has maintained a population of smolts emigrating to the ocean while upstream migrant runs were too small to be self-sustaining. The construct of purely anadromous *O. mykiss* for the recovery goal is biologically inappropriate for this species, and contrary to the common recognition among experts that resident *O. mykiss* play a key role in conservation of native coastal *O. mykiss*, including the steelhead life history strategy – particularly in arid southern California where intermittent flow regimes and prolonged droughts are common (Dagit et al. 2020). The viability studies recognized that the "interchange between resident and anadromous fish groups would almost certainly lower the extinction risk of both groups."[11] The authors state that during their performance-based criteria analysis the interchange between the resident and anadromous form could have large consequences when determining extinction. Specifically, "we suspect that extinction risk of steelhead fraction is likely to be highly sensitive to the details of this interchange." Moyle et al. (2017) provides a more definitive conclusion stating, "[i]f resident rainbow trout populations are considered part of the southern steelhead complex, then the extinction threat of the overall population is somewhat less." Moyle et al. (2017) notes that reconnecting resident and anadromous *O. mykiss* is necessary to maintain the overall population in the future. In some watersheds, the connection of resident and anadromous *O. mykiss* remains intact, and in others, there is active progress toward projects that will reestablish this connection and aid in meeting recovery goals under the NMFS Recovery Plan (NMFS 2012). It is essential that CDFW considers the contribution of resident *O. mykiss* in the viability of the overall population given that residents are secure in their status and contribute to the anadromous life history (Moyle et al. 2017).

Dagit et al. (2020) also notes that, "[a]s reported by Williams et al. (2016) and confirmed by our observations, at no point since [southern California] steelhead were listed as endangered in 1997 was the preliminary provisional viable population goal of 4,150 annual anadromous spawners observed in any individual watershed, nor through the [Distinct Population Segment] DPS as a whole." A cursory comparison between the number of anadromous returns within the Santa Clara River watershed prior to and following the 1997 listing results in largely consistent numbers of individuals[12,13]. Indeed, in their 5-year review, NMFS states that the available data "indicate small (<10 fish) but surprisingly persistent annual runs of anadromous *O. mykiss*" within those watersheds currently being monitored (NMFS 2016). These are important observations which indicate that the anadromous *O. mykiss* population has remained stable in the region, supported by a resilient population of resident *O. mykiss* that persist in many watersheds both above and below barriers. These systems are capable of supporting robust populations that provide a substantial, yet under-evaluated contribution to the species in the region.

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[11] Boughton. 2007. See pg. 8, paragraph 2.

[12] CDFW. 1985. Lower Santa Clara River Steelhead Study. Final Report.

[13] Entrix. 2000. Results of Fish Passage Monitoring at the Vern Freeman Diversion Facility Santa Clara River 1994-1998

Finally, Dagit et al. (2020) states that "[b]uilding quantitative models that consider both anadromous and resident fish in the production of smolts, in addition to watershed-specific carrying capacities would be a valuable effort towards refining population goals." United strongly agrees, and points to the last southern California steelhead 5-year review that also stated: "Overall, these results show that resident and anadromous forms are tightly integrated at the population level, suggesting a revision of the viability criterion for 100 [percent] anadromous fraction" (NMFS 2016). Moyle (2017) acknowledges that the life-history trait of "partial anadromy is an active area of research to gain insight into underlying environmental and genetic influences. This multigenic trait has important implications for endangered steelhead recovery and fisheries management strategies." The best available science indicates that the entire breeding population, including resident *O. mykiss* as well as south-central California coast steelhead DPS (discussed in the **Genetics** section below) be evaluated in the status review. This is also necessary to ascertain a recovery goal that is representative of the biology and genetic structure of the native *O. mykiss* population in southern California.

Ecology, Life History, and Habitat

Anadromous *O. mykiss*, resident O. *mykiss*, and lagoon-anadromous *O. mykiss* may interbreed, and the offspring can result in any life history group (Kendall et al. 2015). As stated before, life history trajectories affect the survivorship of an individual, and there are tradeoffs with various life history strategies. For example, an individual exhibiting the anadromous life history strategy in southern California may result in faster growth, a larger individual, and higher fecundity than a resident *O. mykiss* due to the time it spent in the marine environment. However, a steelhead may not have an opportunity to migrate upstream within southern California due to drought conditions, whereas the resident *O. mykiss* may have better accessibility to spawning areas within the natal watershed.

The CalTrout petition states that "the timing of out-migration is influenced by a variety of environmental cues including streamflow, temperature, and breaching of the sand berm at the river's mouth."[14] It is important to add that recent new evidence points to day length (also known as photoperiod) as being a major driver of juvenile outmigration timing. Using over 20 years of data collected at the Freeman Diversion from the downstream migrant trap, Booth (2020) concluded that smolt migration timing was correlated with the day length and was less dependent on flow magnitude. Booth (2020) found that 95% of all smolts arrived between mid-March and late May with the majority arriving at the collection system in mid-April to mid-May. Most importantly, Booth (2020) concluded that "downstream migration in the Santa Clara River often may occur too late in the season to be synchronized with likely opportunities for downstream migration to the estuary and ocean."[15] Upon reviewing the historic hydrology for the system, Booth (2020) found that it is a relatively common occurrence for smolts in the Santa Clara River to be unable to successfully migrate to the ocean even with natural hydrology conditions.

O. mykiss in the Santa Clara River watershed produce a very small fraction of anadromy, likely related to the high cost for anadromy and the lack of opportunities for successful emigration and upstream migration. Kendall et al. (2015) reviewed various studies documenting the factors that may influence the fraction of anadromy. One study found that "migration cost did influence life histories in one model which indicated

[14] CalTrout Petition. See pg. 9, paragraph 1.

[15] Booth M. 2020. Patterns and Potential Drivers of Steelhead Smolt Migration in Southern California. North American Journal of Fisheries Management, Volume 40, Issue 4: pp 1032-1050. See pg. 24, paragraph 2.

that emigration survival was one of the critical factors shaping the expression of anadromy."[16] Residency was predicted to increase as emigration survival decreased. Kendall et al. (2015) found other studies that indicated the southern portions of the species range may be skewed towards residency with the higher cost of anadromy due to seasonally dry stream reaches and lagoon sandbar formations limiting migration opportunities. For example, the Santa Clara River is a large watershed (1,625 square miles) dominated by a sandy, braided channel in the mainstem. During high flows, suspended sediment levels in the Santa Clara River are elevated to a point that is believed to preclude upstream migration opportunities.[17] A key section of the river for emigration to the ocean is well documented to go dry based on observations dating back to the 1700s, thus precluding passage. During large portions of the year, several reaches of the river mainstem remain dry due to percolation to the underlying groundwater basins as surface water is quickly lost in the broad alluvial floodplain.[18] It is likely that the historic planting of steelhead, discussed in more detail in the **Distribution and Abundance** section below, temporarily modified the fraction of anadromy, thereby increasing the anadromous run size in the system for some period of time. Historic planting is also a cause of genetic mixing among steelhead within the state, a topic discussed in more detail in the **Genetics** section below. As detailed in the **Population Trend** section above, prior surveys have documented that the resident form of *O. mykiss* are well established within the watershed and will continue to produce the anadromous form.

Genetics

In 2008, scientists at the National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center concluded that "[n]o genetic basis was found for the division of populations [from southern California] into two distinct biological groups, contrary to current classification under the US and California Endangered Species Acts."[19] A study by Clemento et al. (2009) analyzed nuclear DNA, representing the best available scientific information and a far superior approach to identifying genetic structure in coastal *O. mykiss* populations compared to the prior studies cited in the original listing that used allozymes (proteins), maternally inherited mitochondrial DNA (Busby et al. 1996),[20] and karyotyping (chromosome sampling). Thus, Clemento et al. (2009) demonstrates that the two population segments should be reclassified as one based on the most updated and most rigorous genetic data. In the status review of the Northern California (NC) summer steelhead, CDFW (2021) indicated that the NC summer steelhead should not be listed under CESA, a recommendation based at least partially on the genetics of the species,[21] which indicated closer relation between localities as opposed to run-timing. In the case of NC summer steelhead, CDFW found that the petitioned listing unit failed to meet the definition of a subspecies, as required under CESA.

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[16] Kendall N.W., McMillan J.R., Sloat M.R., Buerhens T.W., Quinn T.P., Pess G.R., Kuzischin K.V., McClure M.M., Zabel R.W. 2015. Anadromy and residency in steelhead and rainbow trout (*Oncorhynchus mykiss*): a review of the processes and patterns. See pg. 335, paragraph 2

[17] Stillwater Sciences. 2020. Assessment of Suspended Sediment Effects on Adult Steelhead: Implications for Limitations on Steelhead Behavior and Physiology in the Santa Clara River.

[18] Beller E.E., R.M. Grossinger, M.N. Salomon, S.J. Dark, E.D. Stein, B.K. Orr, P.W. Downs, T.R. Longcore, G.C. Coffman, A.A. Whipple, R.A. Askevold, B. Stanford, J.R. Beagle. 2011. Historical ecology of the lower Santa Clara River, Ventura River, and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats. See pg. 82

[19] Clemento A.J, Anderson E.C., Boughton D., Garza J.C. 2009. Population genetic structure and ancestry of *Oncorhynchus mykiss* populations above and below dams in south-central California. See pg. 1321, paragraph 1.

[20] Busby et al. 1996. Status Review: West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS NWFSC-27.

[21] CDFW. 2021. California Endangered Species Act Status Review for Northern California Summer Steelhead (*Oncorhynchus mykiss).* See pg. 149, paragraph 4.

Shifts from the historic composition of *O. mykiss* is another consideration in terms of genetic variation, or lack of variation, across geographies. Pearse et al. (2011) compared *O. mykiss* from historic populations (1897 and 1909 samples obtained from the Smithsonian) with contemporary *O. mykiss* populations to analyze genetic differences across distance. Historic samples showed that genetic differentiation increased based on distance between watersheds. However, contemporary samples led to findings of significant changes from the historic samples but little to no genetic differences as distances between watersheds increased. Pearse et al. states, "[h]ere we show that these steelhead populations had a historically strong correlation between genetic and geographic distance that has been virtually erased in modern populations, suggesting that current relationships among modern steelhead populations are no longer reflective of natural migratory pathways. This demonstrates the critical role of migration in maintaining population relationships of threatened species and highlights the importance of natural history museums in providing historical baseline information." These results add to the findings of Clemento et al. (2009) and indicate that the *O. mykiss* populations across DPSs, in this case the south-central California coast steelhead DPS and southern California steelhead DPS, are not genetically distinct. One reason posed by Pearse et al. is the historic planting of steelhead by CDFW across various watersheds within the state, which is discussed in more detail in the **Distribution and Abundance** section below.

Another consideration is introgression of hatchery stock with native populations. Abadía-Cardoso et al. (2016) conducted a genetic analysis of *O. mykiss* to evaluate the origins and ancestry of the populations from 10 watersheds spanning the southern California steelhead range. The study found that "In the northern part of this region, nearly all populations appeared to be primarily descendants of native coastal steelhead. However, in the southern, more urbanized part of this region, the majority of the sampled populations were derived primarily from hatchery trout, indicating either complete replacement of native fish or a strong signal of introgression overlaying native ancestry." Notably, the study examined the genetics of several contemporary hatchery *O. mykiss* strains obtained from the Fillmore Hatchery, American River Hatchery, and Hot Creek Hatchery to determine introgression of native *O. mykiss* with hatchery *O. mykiss*. As shown in the results of Pearse et al. (2011), historic mixing of populations has an effect on the contemporary genetic variation, which would be a factor in the comparison of contemporary native and hatchery *O. mykiss* populations. While their study does not address the relationship of historic versus contemporary populations, Abadía-Cardoso et al. (2016) does present management elements for *O. mykiss* related to introgressed populations stating,"[n]evertheless, these genetically introgressed populations represent potentially critical genetic resources for the continued persistence of viable networks of *O. mykiss* populations, given the limited native ancestry uncovered in this region and the importance of genetic variation in adaptation."

The **Relationship Between Resident and Anadromous *O. mykiss*** section above addresses the interrelatedness between the various life-histories, which is further supported by genetic information. In a genetic analysis of *O. mykiss* in Hood River, Christie et al. (2011) concluded that "closer to 40% of all steelhead genes come from wild trout each generation." These findings provide a quantified link between the different life-histories as well as a basis for population viability that account for the entire population when concluding that their results "suggest that wild resident fish contribute substantially to endangered steelhead 'populations' and highlight the need for conservation and management efforts to fully account for interconnected *Oncorhynchus mykiss* life histories." The information regarding *O. mykiss* genetics summarized in this submittal provides further support for the assessment of the entire resident and anadromous *O. mykiss* population, including those within the range of the indistinguishable south-central California coast steelhead DPS, when evaluating the status of the species.

Distribution and Abundance

The historic run size estimate in the NMFS Recovery Plan,[22] comes from "The Updated Status of Federally listed [Evolutionarily Significant Units] ESUs of West Coast Salmon and Steelhead" (Good et al. 2005) and includes steelhead estimates for each of the major watersheds. Within the Ventura River watershed, the estimate traces back to a 1946 CDFW letter commenting on the future Matilija Dam, the basis of which included personal observations and interviews with locals, also noting that a stocking program averaging 70,000 to 100,000 hatchery plantings each year had been ongoing for "the past years".[23] Within the Santa Clara River watershed, the 1980 estimate by Moore (1980)[24] of the average population traces back to the same 1946 CDFW letter from which Moore extrapolated an estimate in the Santa Clara River by comparing the potential habitat of the two watersheds. This fact is echoed in CDFW's 1996 Steelhead Restoration and Management Plan for California[25] and again by NMFS in Good et al. (2005),[26] which also includes a review of the historical run sizes in the major southern California watersheds. Moore's knowledge of the Santa Clara Watershed comes from the late 1970s and early 1980s, one of the wettest periods on record – which resulted in wetted reaches that would be dry in average or dry periods – resulting in an overestimation of river miles of suitable steelhead habitat. In the same 1980 report, Moore notes that projecting the average run size can be misleading, particularly in systems subject to extreme flow fluctuations from year-to-year.

In a review of the history of steelhead in the Santa Ynez River, Alagona et al. (2012)[27] acknowledges the natural variation in steelhead run sizes, particularly in the southern California ecosystems, noting that "[a]ll of these perturbations and processes affect steelhead populations, which may have varied by two orders of magnitude annually owing to natural changes alone." The original source of the Santa Ynez River estimate came from a report generated by Shapovalov,[28] a CDFW employee, and relied upon the opinion of another CDFW employee (Carl Tegen) who was working as a trapper in the Santa Ynez River watershed. Tegen compared the number of steelhead in the Santa Ynez River to counts in the Eel River and deduced that the Santa Ynez steelhead run during the year in question (1944) was "at least as large" as the Eel River. While it is apparent that there were many adult steelhead in the Santa Ynez in 1944, a time period following several years of above average rainfall[29], it would be highly inaccurate to assume that his estimate was a running average of a natural run of steelhead for the same reason that Moore notes in his 1980 report regarding year-to-year fluctuations in flows within these river systems.

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[22] NMFS. 2012. Southern California Steelhead Recovery Plan. Southwest Region, Protected Resources Division, Long Beach, California. See pg. xiii, paragraph 3.
[23] Clanton D.A. and Jarvis J.W. 1946. Field inspection trip to the Matilija-Ventura watershed in relation to the construction of the proposed Matilija Dam. California Division of Fish and Game, Field Correspondence.
[24] Moore M. 1980. An Assessment of the Impacts of the Proposed Improvements to the Vern Freeman Diversion on Anadromous Fishes of the Santa Clara River System, Ventura County, California. See pg. 14, paragraph 2.
[25] CDFW. 1996. Steelhead Restoration and Management Plan for California. See pg. 55, paragraph 4.
[26] Good T.P., Waples R.S., Adams P. (editors). 2005. The Updated Status of Federally listed ESUs of West Coast Salmon and Steelhead. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-66, 598 p. See pg. 282, paragraph 4.
[27] Alagona P.S., Cooper S.D., Capelli M., Stoecker M., Beedle P. H. 2012. A History of Steelhead and Rainbow Trout (*Oncorhynchus mykiss*) in the Santa Ynez River Watershed, Santa Barbara County, California. See pg. 169, paragraph 4.
[28] Shapovalov L. 1944. Preliminary Report on the Fisheries of the Santa Ynez River System, Santa Barbara County, California. See pg. 12, paragraph 2.
[29] County of Santa Barbara. 2022. Santa Maria City College Annual Rainfall. Accessed online at: https://content.civicplus.com/api/assets/10547459-92d1-49d4-83b7-b10c4ef54233?cache=1800

CDFW acknowledges this subjectivity in quoting the U.S. Fish and Wildlife Service (USFWS) in the Fish Species of Special Concern in California.[30] CDFW notes that the estimates of historical run sizes "are highly subjective and probably correct only within an order of magnitude." In Good et al. (2005), NMFS concurs with the earlier CDFW statement and goes a step further to adjust down the historical run size estimate for the Santa Ynez River based on a logical inference regarding Tegen's experience in the Santa Ynez and Eel Rivers. Good et al. (2005) summarizes their review of historical run sizes by stating that "the estimates of historical run sizes for the Southern California steelhead ESU are based on very sparse data and long chains of assumptions that are plausible but have not been adequately tested."

Beginning in the 1890s, CDFW implemented an extensive steelhead planting program that continued until the 1930s (Bowers 2008). In the 1910s, southern California rivers (including the Santa Clara and Ventura) along with their tributaries, received up to 3 million trout per year from northern hatcheries. Planted fish were predominantly a mix of resident and anadromous *O. mykiss*. In southern California, the rise and fall of the anadromous *O. mykiss* population directly correlates with CDFW's planting of northern California steelhead in southern California waters. Prior to the planting from northern hatcheries, records of steelhead in the southern California rivers are minimal. For example, records from the missionary period never mention trout or steelhead, which contrasts with the rivers further north. As noted in the review of steelhead in the Santa Ynez River by Alagona et al. (2012), "we found relatively few explicit records of Chumash exploitation of riverine fish, such as steelhead in the Santa Ynez River, from Spanish, Mexican, and early American explorers and settlers," indicating that steelhead were possibly not as prevalent and abundant as previously asserted. Alagona et al. (2012) continues: "At present, the only archaeological evidence for steelhead presence comes from several theses and a museum contribution describing excavations of sites in former inland Chumash villages with associated information on the identity of fish elements… [s]teelhead remains were found at three of four excavated sites… 6 salmonid bone elements found at Xonxon'ata [located on Zaca Creek 6 miles above its confluence with the Santa Ynez River] constituted only 0.2% of the identifiable fish bones recovered at this site, with the rest assignable to marine species, and these bones appeared to come from immature steelhead or rainbow trout." Alagona et al. (2012) acknowledges that more research is necessary to draw conclusions regarding the presence of salmonid bones at the Santa Ynez River archaeological sites; however, the findings provide an indication of limited steelhead presence during the pre-colonial period.

As noted above, large numbers of trout from northern hatcheries were planted in southern California rivers in the 1890s through the 1930s. The history of the steelhead fisheries during this time is well documented.[31,32] By the early 1930s, there was a trend towards planting larger "catchable-sized" trout. In the late 1930s, the focus of the hatcheries had changed to producing and planting "catchables" that were mostly from a resident form of *O. mykiss.*[33] The decline in the anadromous form of *O. mykiss* in southern California rivers coincided with the change in hatchery rearing and planting practices. The population decline following the cessation of planting from northern hatcheries is evident in correspondence generated by CDFW officials and numerous newspaper articles at the time (McEachron 2007, Bowers 2008). Alagona et al. (2012) also cited Spanne (1975), which "noted that runs of anadromous fish in the Santa Ynez River occurred right up to the construction of Bradbury Dam, but that they were much more

[30] CDFW. 1995. Fish Species of Special Concern in California. See pg. 81, paragraph 4.
[31] McEachron M. 2007. A Review of Historical Information Regarding Steelhead Trout in the Piru Creek Watershed, Ventura County, California.
[32] Bowers K. 2008. History of Steelhead and Rainbow Trout in Ventura County: Newsprint Accounts from 1870 to 1955. Vol I.
[33] CDFW. 1970. Fish Bulletin 150 A History of California Fish Hatcheries. See pgs. 50-52.

predictable and frequent in the late nineteenth and early twentieth centuries based on the memories of elderly residents.” The late nineteenth and early twentieth century time period is coincident with the steelhead planting program that was underway in southern California at that time. By 1951, mention of a steelhead fishery in the newspapers had almost ceased to exist. During that same year, CDFW biologist Willis Evans stated: “The fisheries value of these drainages lies primarily in the existence of a resident population of rainbow trout in the head waters areas. Their range throughout most of the subject drainages is curtailed by the lack of sustained year long stream flows. High summer water temperatures above the tolerance of trout also prevent trout development in otherwise suitable streams such as lower Piru Creek.”[34] “These drainages” referred to the Ventura and Santa Clara River watersheds. The following year (1952), the Santa Paula Chronicle reported that “[s]teelhead fishing season ended this year without a single catch being made.” In 1954, observations of a few steelhead were reported in the Ventura River, but no catches were reported. Notably, these statements from CDFW were made prior to any major dams being constructed in the Santa Clara River watershed. Santa Felicia Dam, constructed on Piru Creek in 1955, was the first such dam. Contemporary records of steelhead in the Santa Clara River, primarily made by fisherman, CDFW, and United are also well-documented.[35,36,37]

In 1979, Moore, as referenced in Stoecker and Kelley (2005), performed extensive surveys in both Santa Paula Creek and Sespe Creek. Moore reported “abundant” trout in most of the tributaries, including 15 *O. mykiss* per 100 feet in Lion Creek and 70 *O. mykiss* per 100 feet in Howard Creek. CDFW conducted a two-year study in coordination with United in 1982-1983 and 1983-1984 (Puckett and Villa 1985). It resulted in the trapping and identification of a total of three adult steelhead over the two-year study period. In Sespe Creek, the CDFW study found no smolts despite trapping, electroshocking, and netting downstream of the Sespe tributary during the primary smolt migration period. As noted above, monitoring at the Freeman Diversion fish ladder has identified low numbers of adult steelhead, typically between 0-2 individuals per year, since beginning operation in 1991 through 2022[38]. Consistent with earlier observations, ongoing monitoring at the Freeman Diversion indicates that the total abundance of steelhead has remained relatively stable since well before the federal listing.

In the early 1990s, smolts were trapped and counted at the Freeman Diversion. In 1994, for example, United operated a downstream migration trap from February 21 through May 25 and a total of 83 smolts were collected at the trap during this period.[39] It is worth noting that smolts collected at the facility ranged from 0 to approximately 800 during the operation of the downstream migrant trap; however, the use of the trap was discontinued in 2015 at the direction of NMFS, and a trap efficiency study was not conducted so an estimation of total smolt production based on the proportion of smolts trapped is unknown.

The **Population Trend** section above provides additional information compiled by United regarding the distribution and abundance of *O. mykiss* in the region. The information and summaries provided in this letter contributes to the best available science on the subject; however, as indicated above, additional information available to CDFW and/ or contributed by other stakeholders is anticipated to further inform the status review.

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[34] Evans W.A. 1951. U.S. Department of Agriculture “Report of Survey Santa Clara-Ventura Rivers and Calleguas Creek Watersheds, California” (January 1951). See pg. 1, paragraph 4.

[35] Stoecker M., Kelley E. 2005. Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities.

[36] Puckett L.K. and Villa N.A. 1985. Lower Santa Clara River Steelhead Study. Final Report.

[37] Entrix. 2000. Results of Fish Passage Monitoring at the Vern Freeman Diversion Facility Santa Clara River 1994-1998

[38] Booth M. 2016. Fish Passage Monitoring at the Freeman Diversion 1993-2014

[39] Entrix. 1994. Results of Fish Passage Monitoring at the Vern Freeman Diversion Facility, Santa Clara River, 1994. See pg. 3-10, Table 3-4

Degree and Immediacy of Threat

As noted by Moyle et al. (2017), resident *O. mykiss* are generally considered to be secure in their status. There are many factors contributing to the status of anadromous *O. mykiss* (NMFS 2016) and the interplay between the resident and anadromous life-histories is key in developing a better understanding of the persistence of southern California steelhead. Numerous studies have pointed to the importance of accurately defining this relationship and information provided in the **Population Trend, Viability Criteria**, and **Genetics** sections above contributes to the best available science on the subject. As stated by Moyle et al. (2017), "[i]f resident rainbow trout populations are considered part of the southern steelhead complex, then the extinction threat of the overall population is somewhat less. Reconnecting the anadromous and resident forms of the native *O. mykiss* populations, however, is essential for maintaining both the anadromous and resident trout populations in the future." Resident and anadromous *O. mykiss* occupy the same watersheds in the region and known contributions of residents to the anadromous life history (and vice versa) indicate that the overall species will persist and improve given the restoration efforts currently underway.

A resilient population of resident *O. mykiss* persists in many watersheds both above and below barriers, and these systems are capable of supporting robust populations that provide a substantial and well documented contribution to the overall species[40]. A recent study of a different steelhead population (California Central Valley Steelhead DPS) concluded that the monitoring of all life-histories, including resident and anadromous, is necessary for comprehensive status assessments as well as for the quantification of watershed capacity to support and improve conditions for the overall species[41]. Given the known interrelatedness of the life-history strategies of *O. mykiss*, these findings can readily be applied to southern California steelhead as part of the status review.

Adequacy of Existing Management or Recommendations for Management of the Species

Existing protections for southern California steelhead, typically applied to both resident and anadromous life-history forms, are primarily afforded by the federal Endangered Species Act (ESA). Southern California steelhead were listed as endangered under the federal ESA in 1997 and as such, "take" and modification of critical habitat is prohibited absent consultation with NMFS and execution of a Biological Opinion/ Incidental Take Statement under Section 7 of the ESA, or a Habitat Conservation Plan/ Incidental Take Permit under Section 10 of the ESA. Other existing regulatory mechanisms that provide a level of protection to southern California steelhead include the National Environmental Policy Act (NEPA), Clean Water Act (CWA), Federal Power Act (FPA), California Environmental Quality Act (CEQA), California Fish and Game Code (FGC) (including §1600, 5901, 5937, etc.) California Water Code, Porter-Cologne Act, Forest Practice Act, federal Wild and Scenic Rivers Act, and California Wild and Scenic Rivers Act.

Under the federal ESA, "take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C., §1532). Under CESA, "take" is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (Fish & G. Code, §86). Notably, the federal ESA includes a broader "take" definition (i.e., including "harass" and "harm")

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[40] Kendall N.W., McMillan J.R., Sloat M.R., Buerhens T.W., Quinn T.P., Pess G.R., Kuzischin K.V., McClure M.M., Zabel R.W. 2015. Anadromy and residency in steelhead and rainbow trout (*Oncorhynchus mykiss*): a review of the processes and patterns

[41] Eschenroeder J., Peterson M., Hellmair M., Pilger T.J., Demko D., Fuller A. 2022. Counting the Parts to Understand the Whole: Rethinking Monitoring of Steelhead in California's Central Valley.

as well as "take" prohibitions for habitat for the listed species. CESA does not include a comparable habitat take prohibition; however, CDFW applies the Lake or Streambed Alteration Agreement (LSAA) (FGC §1600-1607) process to effectively protect habitat of listed and non-listed species under the jurisdiction of the state.

A listing under CESA would not effectively increase the protections afforded to southern California steelhead. While NMFS administers protections for southern California steelhead under the federal ESA and CDFW administers protections for steelhead under the FGC, "take" is already prohibited under the federal ESA without an incidental take permit and is also effectively prohibited by CDFW's interpretation and application of FGC. Under the federal ESA, impacts to steelhead must be avoided, minimized, and mitigated to fully offset, or offset to the maximum extent practicable, the impacts of the taking. Under CESA, the impacts of the taking must be avoided, minimized, and "fully mitigated", which is typically interpreted by CDFW to require compensatory mitigation beyond what is required under the federal ESA. This represents a possible additional protection afforded by a listing under CESA; however, specifics regarding how this provision of CESA would translate to additional benefits to southern California steelhead are not supported by the best available science.

United appreciates the opportunity to provide comments and information to inform CDFW's status review of southern California steelhead. Along with contributing to the best available science, the information summarized herein demonstrates the need for close examination of all relevant scientific information of the proposed listing unit, which includes both the resident and anadromous life-history forms of *O. mykiss*. Given this, the status review is an opportunity to evaluate all factors related to the status of the overall species, leading to biologically sound and appropriate conclusions. United implores CDFW to continue outreach and engagement with interested stakeholders, as well as the scientific community, during the status review process to ensure that a comprehensive assessment that reflects the complexity of the species is completed.

Respectfully,

Anthony Emmert
Assistant General Manager

Attachment: A. – *O. mykiss* Survey Data and Results

Attachment A. *O. mykiss* Survey Data and Results

Watershed	Sub-watershed	Year	Study lead	Results	Source
Santa Clara River	Piru Creek (middle)	2008	CDFW	Fish Creek - 288 resident *O. mykiss* (est. 3,113 *O. mykiss* per mile) Agua Blanca - 208 resident *O. mykiss* (est. 1,316 *O. mykiss* per mile)	CDFW 2008a
	Piru Creek (upper)	2008	CDFW	Upper Piru Creek - est. 331 *O. mykiss* per mile Buck Creek - est. 953 *O. mykiss* per mile Alamo Creek - est. 2,648 *O. mykiss* per mile Mutau Creek - est. 334 *O. mykiss* per mile	CDFW 2008b
	Sespe Creek	2004	Stoecker	2,954 *O. mykiss* observed	Stoecker and Kelley 2005
	Sespe Creek	2018	USFS	35 *O. mykiss* in Sespe Creek 373 O. mykiss in Lion Creek	USFS 2018
	Sespe Creek	2017	USFS	215 O. mykiss in Lion Creek 44 *O. mykiss* in Tule Creek	USFS 2017
	Santa Paula Creek	2018	USFS	62 *O. mykiss* observed	USFS 2018
	Rock Creek	2018	USFS	1 *O. mykiss* observed	USFS 2018
	Santa Clara mainstem	1994-2020	United	*O. mykiss* observations between 1994-2014 at the Freeman Diversion: 13 adult steelhead (2 hatchery), 2,128 smolts, 210 YOY, 116 resident, 92 hatchery An additional 2 adult steelhead were identified in the fish passage facility in spring 2020	Booth 2016 United unpublished data
Ventura River	Lower Ventura-San Antonio Creek-Matilija Creek-North Fork Matilija Creek	2005-2020	Casitas Municipal Water District	Peak annual snorkel counts during the monitoring period (2005-2020) generally between 350-400 *O. mykiss*. No *O. mykiss* observed in 2020	CWMD 2020
	Lower Ventura	2006-2012	Allen	Near zero abundance of fry and juvenile O. mykiss observed in 2006 and 2007 but increasing to a maximum of 2,348 fry and 3,739 juvenile O. mykiss in 2012 and 2008, respectively	Allen 2015
	Middle Ventura	2006-2012	Allen	Maximum abundance of fry in 2012 totaling 6,637 individuals and maximum abundance of juvenile in 2008 totaling 3,555 individuals	Allen 2015
	Upper Ventura (including Matilija Creek)	2006-2012	Allen	Higher abundance estimates in the upper segment are largely due to the higher average densities of O. mykiss in the reaches above Matilija Dam, which encompass approximately one-half of the stream miles that are currently available for rearing below the dam (not including dry channels)	Allen 2015
	Matilija Creek	2017	USFS	62 *O. mykiss* in Matilija Creek 301 *O. mykiss* in Upper North Fork Matilija Creek	USFS 2017
	Matilija Creek	2018	USFS	1 *O. mykiss* in Matilija Creek 0 *O. mykiss* in Upper North Fork Matilija Creek	USFS 2018
	Murrieta Creek	2018	USFS	10 *O. mykiss* in Murrieta Creek	USFS 2018
Santa Maria River	Sisquoc River	2005	Stoecker	4 *O. mykiss* in the lower Sisquoc (0.02 fish/ 100 ft) 190 *O. mykiss* in the upper Sisquoc (3.9 fish/ 100ft) 231 *O. mykiss* in Manzana Creek (2.8 fish/ 100ft) 288 *O. mykiss* in Davy Brown Creek (6.8 fish/ 100ft) 122 *O. mykiss* in South Fork Sisquoc (20.4 fish/ 100ft) 6 *O. mykiss* in Rattlesnake Creek (0.6 fish/ 100ft) Total = 841 *O. mykiss* (2.0 fish/ 100ft)	Stoecker 2005
		2018	USFS	514 *O. mykiss* in Davy Brown Creek	USFS 2018
	Munch Creek	2018	USFS	69 *O. mykiss* in Munch Creek	USFS 2018
	Malibu Creek	2005-2014	Santa Monica Mountains Resource Conservation District	5 adult *O. mykiss* observed in 2007 and 2,200 *O. mykiss* young of the year (YOY) in 2008. During surveys completed in 2005, 2008, 2011, 2014, and 2015, YOY observations varied from 11 to 590 individuals	Moyle 2017

Santa Monica Mountains	Topanga Creek	2013-2018	Santa Monica Mountains Resource Conservation District	Observed *O. mykiss* of all life stages ranged from 0 to approximately 170 during the study period. Other streams included in the survey (Big Sycamore, Las Flores, Solstice, Trancas, Zuma) were negative for *O. mykiss* during the study period. Note that the study period was largely during the prolonged 2012-2016 drought	SMMRCD 2018
Santa Ynez River	Santa Ynez	1994-2004	Cachuma Operations and Maintenance Board	Annual snorkel surveys between 1994-2004 resulted in identification of between 0-84 adult *O. mykiss* and 0-346 juvenile *O. mykiss* in the lower Santa Ynez River. Annual snorkel surveys during the same period in the tributaries (Salsipuedes, Hilton, Quiota, El Jaro, Nojoqui) yielded between 0-575 adult *O. mykiss* and between 0-909 juvenile *O. mykiss* . Adult and juvenile status was based on size class	SYRAMC 2009
	Santa Ynez	2017	USFS	92 *O. mykiss* in Alder Creek 292 *O. mykiss* in Fox Creek	USFS 2017
Los Angeles River	Pacoima, Lower Big Tujunga, Haines, Alder, Arroyo Seco, Big Santa Anita Creeks	2018	Southwest Resource Management Association	Presence/ absence surveys. *O. mykiss* identified in Lower and Upper Big Tujunga, Lower Alder, Arroyo Seco, Eaton Canyon, and Big Santa Anita Creeks. Of the native species, coastal rainbow trout were the most abundant.	SRMA 2020
San Gabriel River	Buckhorn, Fish Creek, San Gabriel River, Bear, Cattle Canyon, Lower San Dimas, San Antonio,	2018	Southwest Resource Management Association	Presence/ absence surveys. O. mykiss identified in Lower and Upper Buckhorn, Fish, Cattle Canyon, Lower San Dimas, and San Antonio Creeks, as well as the North, East, and West Forks of the San Gabriel RIver. Of the native species, coastal rainbow trout were the most abundant.	SRMA 2020

RANCHO MISSION VIEJO

Via Email: fgc@fgc.ca.gov
April 3, 2024

The Honorable Samantha Murray
President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Reference: Agenda Item 22: Southern California Steelhead (*Oncorhynchus mykiss*) CESA Petition

Subject: Rancho Mission Viejo – Additional Comments

Dear President Murray:

Rancho Mission Viejo (RMV) writes in regard to the petition currently pending before the California Fish and Game Commission (Commission) to list Southern California Steelhead (*Oncorhynchus mykiss*) ("Steelhead Petition") as an Endangered Species under the California Endangered Species Act (CESA, Fish and Game Code § 2050 et seq.).

RMV lands are located in Southern Orange County and are owned and managed by the O'Neill family. Since 1882, the O'Neill family has been a responsible steward of these lands ("the Ranch"). We have and continue to actively manage the Ranch to protect the resources on it. We intend to continue this tradition of stewardship into the future through implementation of the Southern Subregion Habitat Conservation Plan (SSHCP), approved by U.S. Fish and Wildlife Service on January 10, 2007.

RMV is the principal permittee under the SSHCP. In summary, the SSHCP Conservation Strategy provides a comprehensive, habitat-based approach to the protection of SSHCP Covered Species and their habitats by focusing on the lands and aquatic resource areas essential for the long-term conservation of these species and by providing for appropriate management for those lands. The SSHCP Habitat Reserve ultimately will conserve approximately 32,818 acres in southern Orange County, comprised of historical RMV lands and three County of Orange wilderness parks.

RMV previously provided comments on the Steelhead Petition (RMV, August 9, 2022 and September 17, 2021) in which we summarized our actions to protect and manage San Juan Creek within RMV lands through implementation of the SSHCP. In our prior correspondence we noted our plans to remove a large Arizona style crossing of San Juan Creek identified as fish passage barrier in the Southern California Steelhead Recovery Plan and build a bridge downstream of the crossing location. Removal of this barrier (Action #SJT-SCS-3.2) is ranked as 1A in the Southern California Steelhead Recovery Plan. We wish to inform the Commission that RMV has built the bridge (Gibby Bridge) and removed the Arizona style crossing. We are in the process of restoring all areas impacted by either the bridge construction or removal of the crossing. Exhibits 1 and 2 show before and after photos.

As we previously indicated, by protecting potential suitable habitat and implementing management measures thereon, consistent with the SSHCP, RMV has provided suitable habitat conditions for Southern steelhead should it colonize San Juan and/or Arroyo Trabuco creeks upstream of I-5 in the future Thus, if the Southern steelhead is listed under CESA, RMV requests that the SSHCP be recognized as contributing to the protection and management of the Santa Catalina Gulf Coast population such that "Covered Activities" under the SSHCP (including specified development and infrastructure projects) would not be considered "take" pursuant to California Fish and Game Code Section 86 and would not require a Section 2081(b) Incidental Take Permit.

RMV appreciates the opportunity to provide these comments. Should you have any questions regarding our comments, please feel free to contact me at (949) 240-3363 Ext. 297 or via email at lcoleyeisenberg@ranchomv.com.

Sincerely,

Laura Coley Eisenberg
Senior Vice President, Regulatory Compliance & Open Space Management

Attachment A:
Exhibit 1: Before – Arizona Style Crossing
Exhibit 2: After – Gibby Bridge

cc: The Honorable Erika Zavaleta, Vice President, California Fish and Game Commission
The Honorable Jacque Hostler-Carmesin, Member, California Fish and Game Commission
The Honorable Eric Sklar, Member, California Fish and Game Commission
The Honorable Darius W. Anderson, Member, California Fish and Game Commission
Ms. Melissa Miller-Henson, Executive Director, California Fish and Game Commission
Mr. Scott Gardner, Wildlife Branch Chief, California Department of Fish and Wildlife

Attachment A

Exhibit 1: Before – Arizona Style Crossing of San Juan Creek (looking upstream)

Exhibit 2: After – Gibby Bridge over San Juan Creek (looking downstream)

April 4th, 2024

California Fish and Game Commission

P.O. Box 944209

Sacramento, California 94244-2090

RE: California Trout, Inc.'s Petition to list Southern California Steelhead (*Oncorhynchus mykiss*) as Endangered Office - Administrative Law's Notice ID #Z2021-0702-02 and Z2022-0426-01

President Murray and Commissioners,

We express our full support for designating the Southern California steelhead as endangered under California's Endangered Species Act. Southern steelhead are on the brink of extinction. You must act now, without delay, to prevent the total and irreversible loss of this species.

Recent research tells us that Southern steelhead populations are in danger of extinction within the next 25 to 50 years if current trends persist. Since their listing as endangered under the federal Endangered Species Act in 1997, Southern steelhead numbers have continued to decline to dangerously low levels. This is the result of continued urbanization, agriculture, and water development. These activities have compromised and drastically reduced their essential required habitat. The legacy of degradation will only be exacerbated by climate crisis projections of intensified floods, droughts, and extreme heat.

The rivers and streams in Southern California once saw Southern steelhead adults return in the tens of thousands. In the past 25 years, only 177 adult Southern steelhead were documented in their native range. Allowing this species to disappear is not acceptable. CalTrout's petition, reaffirmed in State Courts as containing sufficient information to warrant a decision, and California Department of Fish and Wildlife's (CDFW) peer-reviewed species status report present you with the best available science and a clear mandate to make the decision to fully list this species immediately.

These fish play a key role in our ecosystems on which we all depend. They are a crucial part of the integrity of watersheds in which they swim. Their continued survival and recovery will reflect the resilience of our communities in the face of growing climate crisis challenges. We can look to them for clues on how California must work to address bigger problems in our Southern California rivers, streams, watersheds, and coastlines. These aquatic ecosystems, extending from summits to the seabed, provide countless environmental, social, and economic benefits for the entire state. We believe that we prosper, now and in the future, when Southern steelhead are thriving in our rivers.

For all these reasons, we, without reservation, support listing Southern steelhead as endangered in all waters within historic range below natural or man-made barriers.

Respectfully,

Clean Water Action
Wishtoyo Chumash Foundation
Los Angeles Waterkeeper
Heal the Bay
TreePeople
SCV Eco Alliance
Latino Outdoors
Mission Canyon Association
Hills For Everyone
Santa Barbara Museum of Natural History Sea Center
Merito Foundation
SB CAN
Santa Clara River Conservancy
Santa Barbara Museum of Natural History
Channel Islands Restoration
Santa Barbara Channelkeeper
Santa Barbara Urban Creeks Council
Friends of the LA River
The River Project
Matilija Coalition
Los Padres ForestWatch
Friends of Ballona Wetlands
Environmental Defense Center
Coastal Ranches Conservancy
Friends of the Santa Clara River

Linda Krop – Chief Counsel
Environmental Defense Center

Richard Smalldon – Director
Santa Barbara Museum of Natural History – Sea Center

Ken Owen – Executive Director
Channel Island Restoration

James Danza – Board Chair
Friends of the Santa Clara River

Candice Meneghin - Executive Director
Coastal Ranches Conservancy

Ted Morton - Executive Director
Santa Barbara Channelkeepers

Paul Jenkin – Chair
Matilija Coalition

Benjamin Pitterle - Director of Advocacy & Field Operations
Los Padres Forest Watch

Anne Burdette - President
Santa Barbara Urban Creeks Council

Jazzari Taylor - Policy Advocate
Latino Outdoors

Katherine Pease, Ph.D. – Director of Science and Policy - Heal the Bay

Peter Massey - Project Manager Water Equity Programs - TreePeople

Claire Schlotterbeck - Executive Director
Hills For Everyone

Rocío Lozano-Knowlton - Executive Director
Merito Foundation

Andria Ventura - Legislative and Policy Director - Clean Water Action

Mati Waiya - Executive Director
Wishtoyo Foundation

Don Chartrand - Executive Director
Creek Lands Conservation

Candice Dickens-Russell - CEO
Friends of the Los Angeles River

Eugenia Ermacora - Chapter Manager
Surfrider Los Angeles

Jeanne Sparks - Co-Executive Director
Santa Barbara County Action Network

Ron Merkord - President
Santa Clara River Conservancy

Benjamin Harris - Senior Staff Attorney
Los Angeles Waterkeepers

Cher Gilmore -- Facilitator
SCV Eco Alliance

Scott Culbertson – Executive Director
Friends of the Ballona Wetlands

Steve Terui - President
Pasadena Casting Club

Melanie Winter - Founder & Director
The River Project

April 4th, 2024

California Fish and Game Commission
P.O. Box 944209
Sacramento, California 94244-2090

RE: California Trout, Inc.'s Petition to list Southern California Steelhead (Oncorhynchus mykiss) as Endangered Office - Administrative Law's Notice ID #Z2021-0702-02 and Z2022-0426-01

President Murray and Commissioners:

As a concerned California resident, I write to you today to express my full support for designating the Southern California steelhead as endangered under California's Endangered Species Act.

Southern steelhead are an iconic native species, but without further protections we risk losing them forever. That's not a California I want to live in. Do you? You must act immediately to put in place all precautions to prevent this species from total loss.

Recent research tells us that Southern steelhead populations are in danger of extinction within the next 25 to 50 years if current trends persist. Since their listing as an endangered species in 1997 under the federal Endangered Species Act, Southern steelhead numbers have continued to decline to precariously low levels. In the past 25 years, only 177 adult Southern steelhead were documented in their native range! Allowing this species to disappear is not acceptable, and more protections are essential.

These fish play a key role in our ecosystems, and they can give us crucial information about the greater health of the watersheds they swim in (and that our communities rely upon). We can look to them for clues on how California must work to address bigger problems in our southern rivers and streams, watersheds that provide countless societal and economic benefits for the entire state. I believe that we prosper when rivers and waterways in key locations are thriving, and in many of these places there is work to be done.

These fish may also play a role in providing resiliency for ecosystems further north along the coast. Southern steelhead are uniquely adapted to Southern California's warmer Mediterranean climate. As climate change continues to increase water temperatures and alter flow regimes along the entire West Coast, Southern steelhead could be critical to the long- term resiliency of their northern relatives.

For all these reasons, I wholeheartedly support California Trout's recommendation that Southern California steelhead be listed as endangered in all waterways within historic range below natural or man-made barriers. CalTrout chose this delineation thoughtfully, so that fishing and continued management for rainbow trout, the freshwater form of this amazing species, would still be possible above these barriers.

It's not too late to save the Southern California steelhead species from blinking out – but if you don't act urgently, we may very well miss our chance. Please make protection of these amazing and important fish a conservation priority by listing them as endangered under the state's Endangered Species Act.

Sincerely,

A Concerned Californians and Individuals All Over

1. **Felino Bautista** (*ZIP code: 91765)*

2. **Steven Hair** (*ZIP code: 90404)*

3. **Angel Castillo** (*ZIP code: 91789)*

4. **Jason Dunn** (*ZIP code: 95648)*

5. **Olympia Foster** (*ZIP code: 95928)*

6. **Pranav Prakash** (*ZIP code: 94539)*

7. **David Blackburn** (*ZIP code: 92058)*
Species becoming extinct is unacceptable as long as there is any way to stop it

8. **kate d** (*ZIP code: 90405)*

9. **Barbara Gibson** (*ZIP code: 92026)*

10. **Joe Mendoza** (*ZIP code: 92688)*
Save the Steelhead!

11. **Stewart Smith** (*ZIP code: 95060)*

12. **Achille Ratti** (*ZIP code: 29123)*

13. **Debbie Frame** (*ZIP code: 91214)*

14. **L. Andrew Alper** (*ZIP code: 90272)*

15. **Aaron Gomperts** (*ZIP code: 90272)*

16. **Aida Ashouri** (*ZIP code: 90027)*
Northern California removed a dam to preserve the fish. We need to do something similar here. These are key animals in our ecosystem.

17. Andrew Becker (*ZIP code: 91601)*

18. Abigail Pratt (*ZIP code: 92064)*

19. Abraham Hidalgo (*ZIP code: 90039)*
Save the steeelyssss

20. Anne Buttyan (*ZIP code: 90404)*

21. Anthony Sheridan (*ZIP code: 90049-5234)*

22. Alec Zapata (*ZIP code: 91324)*

23. Adam Daigian (*ZIP code: 94122)*
Trout are beautiful. Save them!

24. Adam Kilburn (*ZIP code: 94510)*

25. Adam Test (*ZIP code: 92028)*

26. Adam Zamastil (*ZIP code: 93023)*

27. Addae melhuish (*ZIP code: 90016)*

28. Sam Adelson (*ZIP code: 95018)*
Critical to ecosystems and culture. Let's list the SoCal steelhead so they can be better protected and stewarded. Take down unnecessary dams and restore habitat, and include the indigenous community and traditional ecological knowledge.

29. Adry Furchtgott (*ZIP code: 90041)*

30. Andrew Steiger (*ZIP code: 90006)*

31. Kenneth Lee (*ZIP code: 93906)*

32. David Cruze (*ZIP code: 94599)*
Please help save these wonderful creatures.

33. Amy Fieling (*ZIP code: 92028)*

34. alan freisleben (*ZIP code: 92675)*

35. Alicia Torres (*ZIP code: 95688)*

36. Haven Kiers (*ZIP code: 95616-0848)*

37. Angelina Huber (*ZIP code: 97701)*
38. Peter Burnes (*ZIP code: 95945)*

39. Aiden Bradley (*ZIP code: 93834)*

40. Anthony Swentosky (*ZIP code: 97702)*

41. Anthony Bendik (*ZIP code: 94954-2314)*
Please consider listing Southern California steelhead! Every little move helps improve the entire ecosystem.

42. Audrey Kenney (*ZIP code: 80437)*

43. Akane Tada (*ZIP code: 90805)*

44. Alexis Laplante (*ZIP code: G2k1j7)*

45. Windspirit Aum (*ZIP code: 95410)*
Take out the dams!

46. Alden Greathouse (*ZIP code: 93940)*

47. Alec Villanueva (*ZIP code: 95817)*

48. Alejandra Bellavance (*ZIP code: 95037)*

49. Alexander Burke (*ZIP code: 94025)*

50. Alex Wright (*ZIP code: 90068)*

51. Alex Honor (*ZIP code: 93420)*
Please protect the steelhead

52. Alex Macswain (*ZIP code: 94901)*
Save this fish!

53. Alice Feller (*ZIP code: 94705)*

54. Alisan Theodossiou (*ZIP code: 94501)*

55. Alison Lancaster (*ZIP code: 90404)*
Preserve these invaluable members of our SoCal watersheds!

56. Alison Cordera (*ZIP code: 95519)*

57. Alissa Cox (*ZIP code: 95928)*
Save the steelhead!

58. Allen Luce (*ZIP code: 94960)*

59. Allen Osterberg (*ZIP code: 92562)*

60. Allison Bray (*ZIP code: 92026)*

61. Ally Woods (*ZIP code: 96150)*
Steelhead are a major role in any ecosystem and we need to act before it's too late!

62. Amanda Smith (*ZIP code: 90031)*

63. Al Suker (*ZIP code: 93401)*

64. Annette Lucas (*ZIP code: 91321)*
We need to save our endangered species

65. Alyssa Cruz (*ZIP code: 91402)*

66. Amanda Begley (*ZIP code: 90027)*

67. Amanda Riley (*ZIP code: 95451)*
Please protect the native species our society has ruined the environment for.

68. Alix Martin (*ZIP code: 94122)*

69. Cheri Daniels (*ZIP code: 93455)*

70. Kim Mutaw (*ZIP code: 91101)*

71. James Muzzio (*ZIP code: 95003)*

72. Adrianne Nakagawa (*ZIP code: 95820)*

73. Andrew Gottlieb (*ZIP code: 92603)*
I fully support listing Southern steelhead as endangered under California's ESA. Please help save this species.

74. andrew mcdonald (*ZIP code: 91106)*

75. Andrew Youngmeister (*ZIP code: 94608)*

76. Andrew Johansen (*ZIP code: 90042)*

Save them!

77. Andrew Jupina (*ZIP code: 08234)*

78. Andrea Zambrano (*ZIP code: 93103)*
Save the local fish!

79. Angela Romero (*ZIP code: 93033)*

80. Carlos Navarro (*ZIP code: 92544)*

81. Josias Herrera (*ZIP code: 90241)*

82. Anna Kokotovic (*ZIP code: 93117)*

83. Anna Eisenberg (*ZIP code: 84105)*

84. Anna Yoo (*ZIP code: 92883)*

85. Anthony Gilleece (*ZIP code: 94502)*

86. Audie Paulus (*ZIP code: 97211)*

87. Paloma Moreno (*ZIP code: 90280)*

88. Venus Bakhtiari (*ZIP code: 94550)*

89. David Bailey (*ZIP code: 84103)*

90. Allan Poobus (*ZIP code: 98405)*
Save wild steelhead!

91. Araceli Hernandez (*ZIP code: 91345)*

92. Arthur Reifman (*ZIP code: 91901)*

93. John Arensmeyer (*ZIP code: 92647)*

94. Arnold Henry-John (*ZIP code: 91302)*

95. Alaina Murphy (*ZIP code: 93117)*

96. Liz Arroyo (*ZIP code: 90630)*

97. Arthur Babcock (*ZIP code: 91390)*

98. art page (*ZIP code: 92024)*
As a concerned California resident, I write to you today to express my full support for designating the Southern California steelhead as endangered under California's Endangered Species Act.

99. Debbie Collins (*ZIP code: 92593)*

100. Andrew Sackheim (*ZIP code: 95825)*

101. Andrew Schneider (*ZIP code: 95819)*
Now or never. You exist to protect our resources and once gone they are not coming back. Please act and leave this legacy for California.

102. Amanda Schuler (*ZIP code: 96003)*

103. Alan Colombano (*ZIP code: 95616)*
Please do not allow Southern Steelhead to go extinct.

104. Andrew Espinoza (*ZIP code: 93021)*
Save the damn steelhead in Southern California

105. Alexia Skrbic (*ZIP code: 90501)*

106. Ana-Sofia M (*ZIP code: 91744)*

107. Michael Weigand (*ZIP code: 91360)*
Saving the habitat for steelhead will benefit the environment for us and future generations.

108. Allen Peters (*ZIP code: 94947)*

109. Adam Stein (*ZIP code: 83702)*

110. Arthur Strauss (*ZIP code: 92603)*

111. Andrea Svenneby (*ZIP code: 90813)*

112. Denis Higginson (*ZIP code: 92602)*
These fish must be protected and helped to renew this species

113. Audrey Sayer (*ZIP code: 94117)*

114. Audrey Jones (*ZIP code: 98168)*

115. Derek Flor (*ZIP code: 90631)*
The dams in place are obsolete in many instances and need to be gone to restore a more natural

habitat for a messy humanity that does not appreciate nature's delicate balance. Malibu's dam comes to mind and too much foot dragging is going on.

116. **Tiffany May** (*ZIP code: 94122)*

117. **Austin Helmer** (*ZIP code: 97302)*
Let's help these native beauties!!

118. **Autumn Summers** (*ZIP code: 95473)*

119. **Ava Leupold** (*ZIP code: 93023)*

120. **Matthew Johnston** (*ZIP code: 90638)*

121. **Ava Farriday** (*ZIP code: 91377)*

122. **Anthony Avellino** (*ZIP code: 94954)*

123. **Andria Ventura, On behalf of Clean Water Action** (*ZIP code: 95125)*

124. **Avery Edgar** (*ZIP code: 95073)*

125. **Avery Gonsalves** (*ZIP code: 90004)*
Save our steelhead from extinction!

126. **Robert Ford** (*ZIP code: 93901)*

127. **David Miller** (*ZIP code: 92082)*

128. **Axel Johnson** (*ZIP code: 93111)*

129. **Ayaana Desai** (*ZIP code: 90007)*

130. **Richard Ayer** (*ZIP code: 92672)*

131. **Azsha Sharon** (*ZIP code: 92395)*

132. **Aidan Zubak** (*ZIP code: 92882)*

133. **Brian Scholz** (*ZIP code: 95065)*

134. **BALDOMERO FERNANDEZ** (*ZIP code: 90274)*

135. **Stanley Backlund** (*ZIP code: 95682)*

136. **Darren Marshall** (*ZIP code: 95928)*

137. **Ed & Helen Maurer** (*ZIP code: 92691)*

138. **Kirk Clague** (*ZIP code: 93271)*

139. **Barbara Washburn** (*ZIP code: 95693-9681)*

140. **Alexej Borissenko** (*ZIP code: 93527)*

141. **Nancy Baron** (*ZIP code: 93013)*

142. **Barry Thall** (*ZIP code: 85750)*

143. **Christopher Croom** (*ZIP code: 92116)*
Better late than never, by why isn't this species already on the Endangered Species List?

144. **Charles Battaglia** (*ZIP code: 95695)*

145. **Bill Barker** (*ZIP code: 93442)*

146. **Brett Browning** (*ZIP code: 92373)*

147. **Bill Bruce** (*ZIP code: 93619)*
These fish are worth protecting!

148. **Charming Evelyn** (*ZIP code: 90020)*
We must act urgently to prevent the irreversible loss of this species and list them as endangered on the Endangered Species List if they are ever to recover.

149. **Behzad Compani** (*ZIP code: 91001)*

150. **Benjamin Croce** (*ZIP code: 80439)*

151. **Brian Loven** (*ZIP code: 93631)*
These fish and their habitats must be protected before it’s too late. Once they are gone, all we will be able to do is tell grand stories of the past - is that the legacy we want to leave for our Grandkids??

152. **Blair Williams** (*ZIP code: 90503)*
Save the Southern California Steelhead.

153. **Rebecca Bassak** (*ZIP code: 94549)*

154. **Belén Bernal** (*ZIP code: 91754)*

155. Mari Beltran (*ZIP code: 93003)*

156. Benjamin Hamilton (*ZIP code: 90045)*
Absolute Victory, Nothing Short!

157. Ben Cruz (*ZIP code: 94947)*

158. Ben Ewart (*ZIP code: 93105)*

159. Benjamin Goedert (*ZIP code: 96007)*

160. Ben Bressler (*ZIP code: 98126)*
Please protect steelhead. They are critical to our ecosystem and many people's way of life.

161. Benjamin Thomas (*ZIP code: 14526)*

162. Vincent Benlloch (*ZIP code: 91406)*

163. Ben Sherman (*ZIP code: 93401)*

164. Ben Ward (*ZIP code: 93422)*

165. Bruce Thomson (*ZIP code: 97330)*
Rewild... its what works best! Protect the native southern steelhead, please !!

Allowing this fish species to disappear is not acceptable when there are ways to protect and even increase the number of native fish.

166. Rebecca Keyser (*ZIP code:)*

167. Bruce Fayman (*ZIP code: 92116)*
Please don't let the Southern Steelhead go extinct!

168. Bill Gardner (*ZIP code: 95942)*

169. James Tsuda (*ZIP code: 91505)*

170. brad gee (*ZIP code: 94556)*

171. Bryan Godber (*ZIP code: 92672)*

172. Blake Hayunga (*ZIP code: 94904)*

173. Bruce Harrison Campbell (*ZIP code: 92040)*
Once there were enough to feed the First Nation people, and within my memory I remember seeing as many as 10

in one spot. Now there are none in San Diego County streams, in spite of bringing
their status to CDFW

174. bruce hirayama (*ZIP code: 90034)*

175. Beth Holden (*ZIP code: 90272)*
Please save this endangered fish!

176. Bianca Berron (*ZIP code: 92009)*

177. Brian Ibenthal (*ZIP code: 92679)*

178. Jesec Griffin (*ZIP code: 90026)*
Listen to the scientists! Save the Southern Steelhead.

179. David Shaw (*ZIP code: 94515)*

180. Mike Moreno (*ZIP code: 97756)*
These fish are the predictors of the future of mankind. They have earned our help. Without it, we're finished.

181. Charles Perdomo (*ZIP code: 91351)*

182. niko Rodriguez (*ZIP code: 91403)*
Save our California wildlife!

183. Charlie Schneider (*ZIP code: 94952)*

184. Tyler Compton (*ZIP code: 84653)*

185. Tyler Compton (*ZIP code: 90001)*
Please save the fish

186. William Speck (*ZIP code: 91011)*
Save the Southern Steelhead! They were once plentiful here, and now are nearly gone. It’s a preventable tragedy!

187. William Joost Jr (*ZIP code: 94946)*

188. Bill Uyeki (*ZIP code: 94070)*

189. Bill Baquet (*ZIP code: 91007)*
Important cause ! These fish are our modern " canary in the coal mine".

190. William Castellon (*ZIP code: 94605)*

191. William Happy (*ZIP code: 92624)*

192. Judith Petrick (*ZIP code: 15017)*

193. William Potts (*ZIP code: 94550)*
We can't lose another species.

194. Karl Rohlin (*ZIP code: 92595)*

195. Bill Russ (*ZIP code: 93103)*

196. Bill Stagnaro (*ZIP code: 94116)*

197. Bill Street (*ZIP code: 97520)*

198. Bill Tippets (*ZIP code: 92037)*
California Fish and Game Commissioners. I fully support the listing of Southern Steelhead as endangered under the CA ESA. This segment of the West Coast steelhead species faces many ongoing threats to its existence from past dams and diversions of its spawning and rearing streams, development of its watersheds, and past and future impacts from climate change.

The listing will heighten the public's awareness of its endangered status, help focus efforts to conserve, restore and manage its critical habitat (streams and their watersheds), and meet California's commitment to provide effective conservation of its natural resources heritage.

199. BRANDON GOYER (*ZIP code: 08234)*

200. Brandon Kalpin (*ZIP code: 91020)*

201. Dan Blackburn (*ZIP code: 95603)*

202. Blanche Zelko (*ZIP code: 92651)*

203. Ryan Blasena (*ZIP code: 93101)*

204. Brian Baldauf (*ZIP code: 90501)*

205. Ray Lorenson (*ZIP code: 94555)*

206. Christopher Gunsky (*ZIP code: 95128)*

207. Bryan Matsumoto (*ZIP code: 91780)*

208. Bo Adams (*ZIP code: 90503)*

209. Robert Kryger (*ZIP code: 91711)* Do the right thing - Save this species before it is gone forever.

210. Robert Mooney (*ZIP code: 90027)*

211. Robert Nicksin (*ZIP code: 91202)*
I strongly support efforts to protect Southern California steelhead.

212. robert holcomb (*ZIP code: 94546)*

213. Bob Beler (*ZIP code: 92399)*

214. Robert Nicksin (*ZIP code: 91202)*
I support the listing of Southern Steelhead on the California Endangered Species list. I had the opportunity to fish for steelhead on Malibu Creek prior to its closure, and believe it would be terrific if populations of steelhead rebounded to levels that would support catcch and release angling. Thank you.

215. Bob Nydam (*ZIP code: 91024)*

216. Olivia La Via (*ZIP code: 90272)*

217. Robert Redman (*ZIP code: 92808-1637)*
Save our Steelhead!

218. Bobby Maupin (*ZIP code: 84106)*

219. Robert Stefano (*ZIP code: 93536)*
We need to make improvements to help save the California steelhead population

220. Robert Tranter (*ZIP code: 93555-4303)*
Let's do this before it's too late!

221. Bodhi Tippo (*ZIP code: 97402)*

222. Bo Adams (*ZIP code: 90503)*

223. Deborah Carey (*ZIP code: 97333)*

224. Bud Oliveira (*ZIP code: 92027)*

225. Bonnie Felix (*ZIP code: 94956)*

226. Ashley Oki (*ZIP code: 90039)*

227. Craig Bradshaw (*ZIP code: 94553)*

228. Brad Monsma (*ZIP code: 98116)*
In my book The Sespe Wild, I wrote a chapter on the southern steelhead many years ago, and it's disheartening that it has taken so long for the species to be listed under the CA ESA. Please, now!

229. Brad Colgate (*ZIP code: 92108)*

230. Bruce Ajari (*ZIP code: 96145)*

231. Brandon Maraglia (*ZIP code: 93105)*

232. Brandon McGuire (*ZIP code: 92562)*
Work with the Pechanga tribe to save the steelhead!

233. Brandon Herman (*ZIP code: 80207)*

234. Charles Barnhart (*ZIP code: 91103)*

235. Brendan Hanley (*ZIP code: 92679)*

236. Brennan Steffes (*ZIP code: 80631)*
don’t kill da fish

237. Brent Ryhlick (*ZIP code: 92679)*

238. Brian Joseph (*ZIP code: 93453)*

239. Brian Kraz (*ZIP code: 93035)*

240. Brian Queen (*ZIP code: 91106)*

241. Brianna Ordung (*ZIP code: 95456-9641)*

242. Brian Rudloff (*ZIP code: 90250)*

243. Brian Waters (*ZIP code: 94563)*

244. Briar Conrey (*ZIP code: 52245)*

245. Brittany Heslin (*ZIP code: 92675)*

246. Brittney Mendez (*ZIP code: 90255)*

247. Brock Peterson (*ZIP code: 95616)*

248. **Brock Vasey** (*ZIP code: 89411)*

249. **Scott Broome** (*ZIP code: 92660)*

250. **bruce sterten** (*ZIP code: 93923)*
I support this effort to save the Southern Steelhead from extinction.

251. **Bruce Bowles** (*ZIP code: 94602)*

252. **Brad Ruddell** (*ZIP code: 93422)*

253. **Bryce Bandish** (*ZIP code: 96161)*
Save the socal steelhead.

254. **Brandon Ignas** (*ZIP code: 93454)*

255. **Brian Leon** (*ZIP code: 91361)*

256. **bruce sterten** (*ZIP code: 93923)*

257. **Michael Lerschen** (*ZIP code: 94542)*

258. **Brian Trautwein** (*ZIP code: 93101)*

259. **Claudia Lopez** (*ZIP code: 91106)*

260. **Stephen Burns** (*ZIP code: 98926)*

261. **Lycia Mann** (*ZIP code: 95928)*

262. **Mike Scalia** (*ZIP code: 91007)*

263. **Harold Knight** (*ZIP code: 96067)*

264. **An anonymous signer** (*ZIP code: 84050)*

265. **Christiane Schlumberger** (*ZIP code: 93101)*

266. **Alexander Broom** (*ZIP code: 94509)*

267. **Ken Teakle** (*ZIP code: 94549)*

268. **Caephren McKenna** (*ZIP code: 94609)*

269. **Cailynne Graham** (*ZIP code: 95501)*

270. **Lynne Hargett** (*ZIP code: 93436)*

271. **Cameron Dobbs** (*ZIP code: 92691)*

272. **Cami Child** (*ZIP code: 93065)*

273. **DONALD CAMPBELL** (*ZIP code: 94521)*

274. **Ken Giannotti** (*ZIP code: 95746)*

275. **Camryn Romo** (*ZIP code: 91361)*

276. **Christopher Anderson** (*ZIP code: 94044)*

277. **Blake Mcleod** (*ZIP code: 90290)*

278. **Johnna Roberts** (*ZIP code: 93940)*

279. **George Barnhill** (*ZIP code: 93611)*

280. **Caren Hanson** (*ZIP code: 92585)*
Please list the steelhead fish to protect it from extinction

281. **Carl Di Giorgio** (*ZIP code: 94549)*
Please protect California steelhead !
Thanks for your help!
Carl

282. **Carlos Valle** (*ZIP code: 94563)*

283. **Carol Lam** (*ZIP code: 92832)*

284. **Carol DiBenedetto** (*ZIP code: 94114)*

285. **Caroline Eva** (*ZIP code: 96001)*

286. **Carol Keator** (*ZIP code: 93101)*
Please protect this species.

287. **carrie davies** (*ZIP code: 90405)*

288. **Michael Carty** (*ZIP code: 93463)*

289. **Sergio Casas** (*ZIP code: 92376)*

290. **Casey OSullivan** (*ZIP code: 94063)*

291. **Matt Kane** (*ZIP code: 94116)*

292. **Cate Baroni** (*ZIP code: 10960)*

293. **Cathy Fletcher** (*ZIP code: 93110)*
Save our environment please!

294. **Raymond Segura** (*ZIP code: 93454)*

295. **Crystal Barajas** (*ZIP code: 90020)*

296. **Craig Beal** (*ZIP code: 97470)*
I support this movement. Lets get it done!

297. **Claire Buchanan** (*ZIP code: 95608)*

298. **Corey Butler** (*ZIP code: 93041)*
I've been a resident of both Northern and Southern California. I've experienced the high-sierras and the costal ranges, and I know, clean clear waters and healthy streams are California's life source. The Salmon and Steelhead run along our entire coastline is vitally important. It provides nutrients and life to predators and streams that many anglers will never see or touch. This is not about sport fishing. This is about trying to retrieve a natural equilibrium in our California ecosystems and making sure our future generations are better off than we are. Protect the runs!

299. **Conrad Calimpong** (*ZIP code: 95536)*

300. **Carson Cox** (*ZIP code: 94940)*

301. **Chris Elisara** (*ZIP code: 92025)*

302. **Gregory Abe** (*ZIP code: 90404-3051)*

303. **Gregory Abe** (*ZIP code: 90404)*

304. **Ellen James** (*ZIP code: 93001)*
As a resident of Ventura who lives a mile from the Ventura River, I know how vitally important it is to protect salmonid habitat: we have regular homeless encampments in the river bottom just upstream from the mouth of the Ventura River (similar situation as the Santa Clara River estuary a few miles south). These estuaries are home to a lot of wildlife, but still get fouled up by human use and no one seems to mention that estuarine habitats for critically endangered species are supposed to be protected by law!

305. **Charles Falchetti** (*ZIP code: 92064)*

306. **Christopher F Allen** (*ZIP code: 94010-6333)*

307. **charles bell** (*ZIP code: 95949)*

308. **charles bell** (*ZIP code: 95949)*

309. **Colleen Fonseca** (*ZIP code: 92592)*

310. **Glenn Cantello** (*ZIP code: 93109)*

311. **Chris Kirby** (*ZIP code: 90292)*

312. **Charles Plopper** (*ZIP code: 96137)*

313. **Chad Bolich** (*ZIP code: 94544)*

314. **Charles Hammerstad** (*ZIP code: 95120)*

315. **Charles Ehm** (*ZIP code: 94960)*

316. **Charles Wood** (*ZIP code: 92595)*

317. **Charles Middleton** (*ZIP code: 92110)*

318. **Charlie Atteberry** (*ZIP code: 60093)*

319. **Chase Smith** (*ZIP code: 92672)*

320. **Paul Seeman** (*ZIP code: 90265)*

321. **Ralph Tingle** (*ZIP code: 95448)*
Save them, large & small.
Catch & Release.

322. **Chelsea Hands** (*ZIP code: 90036)*

323. **Daphne Cheney** (*ZIP code: 95595)*
Don't screw around.

324. **Cheryl Lynn Cline** (*ZIP code: 99501)*
We need to insure the survival of this uniquely adapted fish, particularly to enable diversity during radical climate variation.

325. **Steven Chester** (*ZIP code: 91403)*

326. **CL Cruickshank** (*ZIP code: 97415)*

327. **Chase Higgs** (*ZIP code: 80525)*

328. **Chip Owen** (*ZIP code: 92107)*

329. **Charles McKinley** (*ZIP code: 94707-1731)*

330. **Chris Dunham** (*ZIP code: 92673)*

331. **Christine Finch** (*ZIP code: 94805)*

332. **Christopher Wiechert** (*ZIP code: 92104)*

333. **Chris Worcester** (*ZIP code: 96160-2511)*

334. **Christopher Chang** (*ZIP code: 90028)*
When will we learn?

335. **Chris Crofford** (*ZIP code: 95364)*

336. **Chris Elwell** (*ZIP code: 90019)*

337. **Chris Lima** (*ZIP code: 83544)*

338. **Chris Storm** (*ZIP code: 95258)*

339. **Christine Walker** (*ZIP code: 94942)*

340. **Christopher Vasil MD** (*ZIP code: 95032)*

341. **Dayna Barrios** (*ZIP code: 93001)*

342. **Cierra Sterling** (*ZIP code: 91321)*

343. **Cindy Charles** (*ZIP code: 94107)*

344. **Carol Iwafuchi** (*ZIP code: 96150)*

345. **Christopher Lang** (*ZIP code: 92020)*

346. **Clayton Dewberry** (*ZIP code: 94598)*
don't let the steelhead become extinct.

347. **Cameron McCamy** (*ZIP code: 92116)*

348. **Christian Heslin** (*ZIP code: 93117)*

349. **Patricia Leavitt-Pagaling** (*ZIP code: 93023)*

350. **Claire Robinson** (*ZIP code: 91001)*

351. **Dane Clarke** (*ZIP code: 95948)*

352. **Clarke Michalak** (*ZIP code: 94123)*

353. **Clark Johnson** (*ZIP code: 94954)*

354. **Carl Boling** (*ZIP code: 95136)*
All resources are precious. Restoring our waterways benefits more than just steelhead.

355. **Clint Kelley** (*ZIP code: 95482)*
Please don't let this iconic species disappear in its southern reaches!

356. **Charles Bottino** (*ZIP code: 93405)*

357. **Alan La Pointe** (*ZIP code: 94805-1157)*

358. **Zachary Williams** (*ZIP code: 93001)*

359. **Clyde Langley** (*ZIP code: 32931)*

360. **Chris Manning** (*ZIP code: N2G 0C3)*
Please protect Southern steelhead and list them as endangered under California’s Endangered Species Act

361. **Caroline McCoy** (*ZIP code: 97211)*

362. **CRAIG MCCULLOCH** (*ZIP code: 95818)*

363. **Colleen McNally-Murphy** (*ZIP code: 95062)*

364. **Candice Meneghin** (*ZIP code: 93117)*

365. **Craig Merkin** (*ZIP code: 94121)*

366. **Curtis Kroeker** (*ZIP code: 94941)*
Please take bold action to save this species and restore our rivers. Thank you.

367. Erwin M Goldbloom (*ZIP code: 93012)*

368. Cody Schaaf (*ZIP code: 92014)*

369. Chase Holt (*ZIP code: 93065)*

370. Jeremy Cole (*ZIP code: 93001)*

371. Colleen Fonseca (*ZIP code: 92592)*

372. Danny Collins (*ZIP code: 92590)*
It would be great to have steel head trout return to our great state.

373. Steven Loiseau (*ZIP code: 93442)*
would particularly like to see an effort to bring steelhead back to the San Gabriel, which I see as most viable.

374. JEFF HAYNES (*ZIP code: 96073)*

375. Calleen Pardinas (*ZIP code: 93063)*

376. Kate C Connell (*ZIP code: 93103)*

377. Conner Everts (*ZIP code: 90405)*

378. Conor Leighton (*ZIP code: 90501)*
Thank you for working to save our Native steelhead!

379. Douglas Lovell (*ZIP code: 93703)*

380. Jim Butler (*ZIP code: 89703)*

381. Consuelo Kammerer (*ZIP code: 97369)*

382. Friends of the LA River (*ZIP code: 90065)*

383. James Cook (*ZIP code: 94611)*

384. Corbin Woods (*ZIP code: V0E2S0)*

385. Bruce Kirbis (*ZIP code: 91601)*

386. Corie Littlejohn (*ZIP code: 92346)*
allowing this species to disappear is not acceptable. I fully support listing Southern steelhead as endangered under

California’s ESA.

387. Timbre Shoemaker (*ZIP code: 92583)*

388. Cory Krug (*ZIP code: 94901)*

389. Richard Hayashi (*ZIP code: 92720)*

390. William Wolcott (*ZIP code: 94117)*
extinction is forever! please designate this mykiss species as endagered so that we can give them the chance to survive that they so desrve

391. V Courtney Broaddus (*ZIP code: 94114)*
Save our Steelhead - SOS

392. Chanae Owens (*ZIP code: 90290)*
Please list Southern steelhead as an endangered species under California’s ESA to protect this species from extinction!

393. Charles Bucaria (*ZIP code: 916/3924583)*

394. Carlos Perez (*ZIP code: 92878)*

395. Carlos Perez (*ZIP code: 92878)*

396. Chase Holt (*ZIP code: 93065)*
Indicator species. Important stuff. These fish matter.

397. Craig Porter (*ZIP code: 93555)*

398. COREY RAFFEL (*ZIP code: 94131)*
What a shame it will be should we lose even one species on anadromous fish.

399. Paul Crafts (*ZIP code: 93402)*

400. Craig Mackay (*ZIP code: 93010)*

401. Craig LaFargue (*ZIP code: 95248)*

402. Craig Lee (*ZIP code: 92037)*

403. Charles Eyler (*ZIP code: 91326)*

404. Cristina Violante (*ZIP code: 94706)*

405. **Christine Jimenez** (*ZIP code: 91776)*

406. **Carol Lewis** (*ZIP code: 91011)*

407. **Chris Rossow** (*ZIP code: 92024)*

408. **Brian Crowder** (*ZIP code: 98116)*

409. **Stephen Crump** (*ZIP code: 91103)*
Save the Steelhead!

410. **Colin Sako** (*ZIP code: 90245)*

411. **Claus Herther** (*ZIP code: 91001)*

412. **Courtney Shreve** (*ZIP code: 91306)*

413. **Eden Myers** (*ZIP code: 92629)*

414. **Corinne Tanner** (*ZIP code: 95973)*

415. **Connor Tushla** (*ZIP code: 93060)*

416. **Connor Tushla** (*ZIP code: 93060)*

417. **Susanne Cumming** (*ZIP code: 90292)*

418. **Curtis Kerick** (*ZIP code: 91016)*

419. **Cameron Weeks** (*ZIP code: 90401)*

420. **Charles West** (*ZIP code: 93546)*
I'm blessed to recreate and live in a state with spectacular beauty. Nature is important to people for more than just recreation though. Natural ecosystems are essential partners to our urban areas. They produce healthy wildlife that supplement our unnatural ecosystems. People are part of nature after all and we can always learn and grow from working together with it. Protecting the future of Californian steelhead in this state is protecting the future of Californian peoples.

421. **Chris Wolken** (*ZIP code: 94025)*
Save rare southern steelhead and preserve diversity of our crucial fish/aquatic life!

422. **Dick Galland** (*ZIP code: 95033)*

423. **Dave Baumgartner** (*ZIP code: 91010)*
I would like to see the land locked progeny of Southern California Steelhead protected as well. Just like is any other

progeny of a protected species.

424. Michael Cooper (*ZIP code: 92008)*

425. Donald Coyne (*ZIP code: 94402)*
Time is running out!

426. Michael Dailey (*ZIP code: 94933)*

427. Dakotah Tilton (*ZIP code: 91601)*

428. Daniel Stofka (*ZIP code: 92010)*

429. Dana Miller (*ZIP code: 95926-3140)*

430. Rae Newman (*ZIP code: 92075)*
Let's do this!

431. Dan Culhane (*ZIP code: 93405)*
Need to preserve this species.

432. Danette Bouzanquet (*ZIP code: 91770)*

433. Daniela Loureiro (*ZIP code: KY12 0JA)*

434. Daniel Ochoa (*ZIP code: 93110)*

435. Daniel Tapanes (*ZIP code: 92373)*

436. Daniella Hawkins (*ZIP code: 94583)*

437. Daniel Kowalski (*ZIP code: 92130)*
The only way this fish gets saved with government help is the endangered species act

438. Daniel Martinez (*ZIP code: 90250)*
Save the steelhead

439. Daniel Phillips (*ZIP code: 92335)*

440. Dan Oliver (*ZIP code: 92627)*

441. Daniel Shetron (*ZIP code: 90041)*

442. Darca Morgan (*ZIP code: 94706)*

443. **Darien Vilchez** (*ZIP code: 91744)*

444. **Darin Takeda** (*ZIP code: 93101)*
Please save the steelhead!

445. **Darrell Clarke** (*ZIP code: 91103)*

446. **Vance Veynar** (*ZIP code: 92064)*

447. **Darwin BondGraham** (*ZIP code: 94619)*

448. **Clifford Feldheim** (*ZIP code: 95815)*
Southern Steelhead need listing to help prevent extinction, I urge you to support the listing!

449. **Dave Crane** (*ZIP code: 94020)*
Please do everything possible to save this valuable resource.

450. **Dave Douglas** (*ZIP code: 96145)*
I fully support listing listing Southern steelhead as endangered under California's ESA.

451. **David Allen** (*ZIP code: 94605)*

452. **David Haskell** (*ZIP code: 94960)*

453. **David Cowell** (*ZIP code: 95949)*
Sespe and Malibu Creek are one-of-a-kind streams and their eco-survival is imperative.

454. **David Ruddle** (*ZIP code: 94550)*
Please protect this valuable species with a listing.

455. **David Curran** (*ZIP code: 91016)*

456. **David Clark** (*ZIP code: 94574)*

457. **David Lopez** (*ZIP code: 90041)*

458. **David De La Vega** (*ZIP code: 90623)*

459. **David Koch** (*ZIP code: 95003)*

460. **David Lamiquiz** (*ZIP code: 95125)*

461. **David Long** (*ZIP code: 96150)*
It is important to save these iconic fish and to reintroduce them to rehabilitated streams within their historic range.

462. **David Davis** (*ZIP code: 91755)*

463. **David Warren** (*ZIP code: 90608)*

464. **Dawn Murray** (*ZIP code: 93111)*

465. **Daniel Bartee** (*ZIP code: 95472)*

466. **Dale Dalrymple** (*ZIP code: 92117-6310)*

467. **DAVID HOHLER** (*ZIP code: 97330-1733)*
Southern steelhead are a critical genetic component for the species and must be saved.

468. **Donald Fithian** (*ZIP code: 92122)*
I support this petition.

469. **Dan Davis** (*ZIP code: 93465)*

470. **Dominick Delise** (*ZIP code: 94)*

471. **Daniel Donoghue** (*ZIP code: 92067)*

472. **Debra Barlow** (*ZIP code: 92253)*

473. **debbie carty** (*ZIP code: 93463)*

474. **Deb Hinrichsen** (*ZIP code: 50014)*

475. **Deborah Joost** (*ZIP code: 94946)*

476. **Debra Sally** (*ZIP code: 95422)*

477. **David Delprato** (*ZIP code: 92646)*

478. **Demetrio Munoz** (*ZIP code: 94806)*

479. **denise marshall** (*ZIP code: 95503)*
anything to help our native fish
We are responsible for doing more since we created so much devastation.

480. **Denise Revel** (*ZIP code: 95688)*
Save the Steelhead.

481. **Dennis Murphy** (*ZIP code: 95831)*

482. Dennis Rudloff (*ZIP code: 92029)*
Thanks for your leadership and perseverance on this.

483. Dennis Leski (*ZIP code: 90006)*

484. Derek Chan (*ZIP code: 94608)*

485. Derek Laubscher (*ZIP code: 91364)*

486. Ernie Swanson (*ZIP code: 94087)*

487. Devin Hibler (*ZIP code: 93117)*

488. Don DeZurik (*ZIP code: 54961)*

489. David Felix (*ZIP code: 92109)*

490. dylan gasperik (*ZIP code: 90032)*

491. David Geisser (*ZIP code: 94605)*
Think of the future of grandkids

492. Doug Giancoli (*ZIP code: 94708)*

493. David Glanzman (*ZIP code: 90035)*

494. Dennis Pagones (*ZIP code: 94502)*

495. Donald Hennessee (*ZIP code: 90065)*

496. David Ethier (*ZIP code: 95370-9399)*

497. David Hobbs (*ZIP code: 94595)*

498. David Hoffberg (*ZIP code: 91377)*

499. Diane Brink (*ZIP code: 94930)*

500. gabe Abraham (*ZIP code: 90291)*

501. Diego Tamayo (*ZIP code: 91765)*

502. Dina Lasky (*ZIP code: 29842)*

Hi Ella is this in ojai

503. Patrizia Hironimus (*ZIP code: 95928)*
Salmon too!

504. Richard Dow (*ZIP code: 94904)*

505. David Jefferson (*ZIP code: 97304)*
Please save the Southern STEEL HEAD

506. David Johnson (*ZIP code: 94526)*
Thank you

507. DJ Nielsen (*ZIP code: 90404)*

508. Daniel Apodaca (*ZIP code: 91750)*

509. Denise Lynn Marshall (*ZIP code: 95540)*
PLease, please do this work to save this watershed and its fish.

510. Stan Perry (*ZIP code: 92106)*
We must save this species!

511. Daniel Carolan (*ZIP code: 84321)*

512. David Clausen (*ZIP code: 90066)*

513. DAVID HESS (*ZIP code: 94568)*

514. David Mierkey (*ZIP code: 95209)*

515. David Morrow (*ZIP code: 91355)*
Steelhead trout are an iconic species up and down the West Coast. The Southern steelhead is close to extinction and needs protection.

516. Deane Plaister (*ZIP code: 93101)*
If we don't save them now, we lose our chance forever.

517. An anonymous signer (*ZIP code: 90064)*

518. Dennis Reis (*ZIP code: 94587)*

519. megan gamble (*ZIP code: 92028)*
we live on the Santa Margarita/ Sandia Creek -for over 40 years -we need this!

520. **Don Calegari** (*ZIP code: 95448)*

521. **Donald Chartrand** (*ZIP code: 93402)*
It is unconscionable that CFGC has not yet listed the Southern Steelhead Distinct Population Segment as endangered. There is no question that the changes wrought by human actions have imperiled this iconic representative of California's resilient spirit. For a state whose flag represents poor stewardship of natural resources, flying an extirpated species, California must now take the obvious step of expressing concern for Southern California steelhead.

522. **Don Scott Macdonald** (*ZIP code: 80218)*

523. **Donald Lewis** (*ZIP code: 93101)*
Save the steelhead!

524. **Donald Fuhrer** (*ZIP code: 94208)*

525. **Thomas Donnelly** (*ZIP code: 94556)*

526. **Doug Ballinger** (*ZIP code: 94062)*
Prevent the loss of this species!

527. **douglass armstrong** (*ZIP code: 92627)*

528. **Jordan Mitchell** (*ZIP code: 91208)*

529. **Douglas Ramezane** (*ZIP code: 95032-4456)*

530. **Larry Basham** (*ZIP code: 93111)*

531. **Dan Brugger** (*ZIP code: 95618)*
For generations to come. Extinction is forever

532. **Robert Chacon** (*ZIP code: 94568)*

533. **Dennis Reasoner** (*ZIP code: 96080)*

534. **Andrew Bassak** (*ZIP code: 94549)*

535. **Andrew Summers** (*ZIP code: 80113)*

536. **Summer Driscoll** (*ZIP code: 95945)*
Preserving genetic diversity among steelhead runs is essential to the species.

537. **Brandon Paul** (*ZIP code: 98563)*

538. Damian Ross (*ZIP code: 91762)*
People were gathering to fish for them in 1967

539. W. Preston Lear (*ZIP code: 90048)*
A life without native salmonids for posterity would be an unforgivable tragedy. In the grand scheme of things, protecting the Southern Steelhead is a small but essential investment.

540. Wayne Merhoff DVM (*ZIP code: 96080)*

541. dustin sawyer (*ZIP code: 92057)*
Cal trout and other have made good progress over the past 10 years. Keep up the great work!

542. Devina Schneider (*ZIP code: 93001)*

543. Destiny Beltran (*ZIP code: 32703)*

544. Olivia Nakamura (*ZIP code: 92130)*

545. David Beegan (*ZIP code: 95864)*

546. Douglass Vidal Jr (*ZIP code: 92683)*

547. David Rosen (*ZIP code: 90046)*
We must preserve the Southern steelhead from extinction.

548. Dylan Bothman (*ZIP code: 95060)*

549. Dylan Velastegui (*ZIP code: 92883)*

550. Erwin Bol (*ZIP code: 94506)*

551. Ed Rossi (*ZIP code: 94901)*

552. Edward Wallace (*ZIP code: 91105)*

553. Elizabeth Moore (*ZIP code: 93103)*

554. Earl Jessee (*ZIP code: 95926)*

555. Erin Barlow (*ZIP code: 90027)*

556. Edward M Barich (*ZIP code: 95405)*
The Southern Steelhead should be listed as an endangered species now!

557. Elisabeth Bersin (*ZIP code: 90403)*

The Trout are vital to our ecosystem

558. Elizabeth Burns (*ZIP code: 93001)*
Southern steelhead need this protection to stop the rapid decline of the species.

559. Ed Filice (*ZIP code: 95476)*

560. Eric DeWitt (*ZIP code: 91501)*
Please protect our trout

561. Ely Phillips (*ZIP code: 90802)*

562. Erin Jones (*ZIP code: 90403)*

563. Ethan Elisara (*ZIP code: 93103)*
Species collapse is no joke. We need to do better and protect our steelhead.

564. Eugenia Ermacora (*ZIP code: 90066)*

565. Erik Hallen (*ZIP code: 95695)*
I caught and released Southern steelies in Malibu Creek back in the mid 70's. It was quite the surprise then as no one really knew they were there at that time.
Like many species of anadromous fish on the west coast these fish all deserve our attention to their survival

566. Erik Gabele (*ZIP code: 95864)*

567. Elliot Grant (*ZIP code: 95060)*

568. Edward Gray (*ZIP code: 92111)*

569. Patrick Crooks (*ZIP code: 93013)*

570. Eric Flores (*ZIP code: 92374)*

571. Evan Larson (*ZIP code: 94501)*
Part of the special beauty of our state is that we are a land of extremes. Nothing captures that more beautifully for me than the southern steelhead - a cold water migratory fish hiding out in the recesses of Southern California. We must protect this unique and beautiful part of our ecosystem - they are a distinct subpopulation that needs its own protections.

572. Evan Kershaw (*ZIP code: 10009)*

573. Ethan Kim (*ZIP code: 94133)*

574. Eric Yamasaki (*ZIP code: 90274)*

575. Elan Powless (*ZIP code: 84105)*

576. Matthew Schwegler (*ZIP code: 94107)*
Keep saving our native fisheries!

577. Laurel Ransom (*ZIP code: 94602)*

578. Elena Rios (*ZIP code: 93023)*

579. Elias Sidney Blood (*ZIP code: 96150)*

580. Eli Nevarez (*ZIP code: 87120)*

581. Elisabeth Bucy (*ZIP code: 81428)*
Thank you

582. Eli Turner (*ZIP code: 95678)*

583. Bill Scrimpsher (*ZIP code: 92646)*
We need our Southern Steelhead

584. Ella Taylor (*ZIP code: 90265)*

585. Ella Bogdanski (*ZIP code: 90026)*

586. Elliot Elisara (*ZIP code: 92025)*

587. James Elmore (*ZIP code: 95612)*

588. Alyssa Clark (*ZIP code: 90026)*

589. Emily Eccles (*ZIP code: 93101)*

590. Emiliano Santin (*ZIP code: NA)*

591. Emilia Roberts (*ZIP code: 90230)*
Protect fish!! Protect indigenous sovereignty!!

592. Emily Kreisberg (*ZIP code: 90704)*

593. Emily Moloney (*ZIP code: 95822)*
In support of listing the southern steelhead and in support of recovery efforts

594. Emily McCormick (*ZIP code: 91362)*

595. **Emmett Medrano** (*ZIP code: 91411)*
Please Protect the California Southern Steelhead

596. **Emily Morrison** (*ZIP code: 93117)*

597. **Erik Owens** (*ZIP code: 95926)*
I saw one in Big Chico creek along Bidwell Ave

598. **Ethan Newby** (*ZIP code: 94960-2734)*

599. **Edward Patten** (*ZIP code: 92082)*

600. **Enoch Hale** (*ZIP code: 95525)*
Please commit to saving this species and biodiversity.

601. **Ethan Zubak** (*ZIP code: 92881)*

602. **Edgar Pierluissi** (*ZIP code: 94134)*

603. **Eric Pirone** (*ZIP code: 94901)*
This is mandatory. We have one chance to stop this decline. Thanks!

604. **Ron Melin** (*ZIP code: 95570)*
They've been in coastal so. Cal. forever and have survived in an environment
that have been extremely altered by humans to the point they're on the brink. We can't wait any longer to save these amazing fish.

605. **Erynn Rebol** (*ZIP code: 95403)*

606. **Eric Arentsen** (*ZIP code: 90266)*
I fully support listing Southern California steelhead as endangered under California's Endangered Species Act

607. **Eric Abramson** (*ZIP code: 92104)*
The Southern California Steelhead should absolutely be protected under California's Endangered Species Act.

This species is remarkably important to Californians and ecosystem health. Allowing them to go extinct when we completely have the ability to save them is, quite simply, morally wrong.

Protecting them would ensure an important cultural species is around for my kids' generation and beyond. It would also have the add on effect of protecting human communities since classifying them as endangered would promote actions such as removing obsolete dams, securing instream flow, and restoring watersheds; all actions that protect communities from catastrophic flooding and local ecosystem collapse.

Again, it's completely in your power to stop a species from irreversibly going extinct, and I implore you to use that power in the morally and ethically correct way. Thank you

608. **Erik Nelson** (*ZIP code: 92630)*

I taught at a school a short walk from San Juan creek. I have seen smolts in the estuary at Doheny and in Trabuco creek near Holy Jim. We can do this. Nature will reclaim the watersheds if we just pave the way. That dam on Malibu creek needs to go among other things

609. **Erin Viera** (*ZIP code: 91505)*

610. **Erin Telford** (*ZIP code: 90290)*

611. **Ernesto Anguiano** (*ZIP code: 95062)*

612. **elise roberts** (*ZIP code: 93117)*

613. **Evan Sedlock** (*ZIP code: 94903)*

614. **Ronald Escue** (*ZIP code: 91011)*
Save our steelhead before it's too late

615. **Ed Sozinho** (*ZIP code: 98177)*

616. **Elizabeth Taylor** (*ZIP code: 92672)*

617. **Ethan Nelson** (*ZIP code: 91730)*

618. **Evan Kyser** (*ZIP code: 93001)*

619. **Evan Bryant** (*ZIP code: 95628)*

620. **Sam Cavoulas** (*ZIP code: 92078)*
Save our fish!

621. **Eric Schneider** (*ZIP code: 95667-6051)*

622. **Gene Weber** (*ZIP code: 94123)*

623. **Steve Schiffern** (*ZIP code: 92860-2313)*

624. **Kenneth Walker** (*ZIP code: 30064)*

625. **Carol Pierce** (*ZIP code: 93023)*

626. **Fletcher Chouinard** (*ZIP code: 93001)*

627. **Katie Hawley** (*ZIP code: 95926)*

628. **Ric Martinelli** (*ZIP code: 93637)*

629. **Jeffrey Erickson** (*ZIP code: 90503)*
We can figure out how to balance outdoors with civilization

630. **Finn Seifert** (*ZIP code: 28803)*

631. **David Finn** (*ZIP code: 95224)*

632. **finn yarnes** (*ZIP code: 95694)*

633. **M Ebby** (*ZIP code: 93933)*

634. **Valerie Adams** (*ZIP code: 95628)*

635. **Craig Hanson** (*ZIP code: 94941)*

636. **Gene Gantt** (*ZIP code: 95687)*
Save fish!!

637. **Kazunori Okada** (*ZIP code: 90065)*

638. **Gavin Simmons** (*ZIP code: 92024)*

639. **Frederic Uno** (*ZIP code: 90065-4001)*

640. **Kate Riley** (*ZIP code: 94112)*
save the steelhead !!

641. **Fred Schardt** (*ZIP code: 95667)*
Extinction is forever. And forever is truly hard to fathom for humans

642. **Christopher Boldt** (*ZIP code: 91001)*
Of the utmost importance please protect this fish.

643. **Lawrence Kress** (*ZIP code: 95965)*
Please help save Southern California steelhead by putting them on the endangered species list . Thank you

644. **Rick Russo** (*ZIP code: 91311)*

645. **Irene Hipskind** (*ZIP code: 93015)*

646. **Forrest Oldham** (*ZIP code: 95695)*
Every backup version of our fishes saved better guarantees their future.

647. **Annelisa Moe** (*ZIP code: 91505)*

648. **Frank Emerson** (*ZIP code: 93940)*
The Public and Tribal Trust Resources are gravely affected by potential exinction of important fisheries.

649. **Frank cook** (*ZIP code: 95948)*
We need all the steelhead

650. **Francis Willis** (*ZIP code: 93311)*

651. **Ray Nunez** (*ZIP code: 95765)*

652. **fred Bellero** (*ZIP code: 94903)*

653. **Fred Rinne** (*ZIP code: 94112)*
Southern Steelhead is a crucial part of the ecosystem and key to any future restorations.

654. **Anita Frost** (*ZIP code: 91384)*

655. **Frank Swanson** (*ZIP code: 94402)*

656. **Bruce Lenhart** (*ZIP code: 95133)*

657. **darren mcmillan** (*ZIP code: 92677)*

658. **Ginny Pitchford** (*ZIP code: 91011)*

659. **Gabe Bancock** (*ZIP code: 97370)*
I've lived part time in California for the last ten years and believe steelhead need all the protection they can get. They're an indicator of healthy ecosystems. Thank you

660. **Gabe Ward** (*ZIP code: 93446)*

661. **Gabriel Manzanedo** (*ZIP code: 93722)*

662. **john stokes** (*ZIP code: 95521)*

663. **Gale Gallegos** (*ZIP code: 94576)*

664. **Thomas Galindo** (*ZIP code: 94610)*

665. **John Gallo** (*ZIP code: 07621)*

666. **Graham Gardner** (*ZIP code: 95816)*
I'm a Californian, angler, and father-to-be concerned about the continued destruction of our environment, and

committed to the preservation of threatened species. The loss of southern steelhead would be a (preventable) tragedy. List southern steelhead as endangered.

667. Gary Burrie (*ZIP code: 92082)*

668. Garret Erskine (*ZIP code: 90732)*

669. Garrett Mann (*ZIP code: 92129)*

670. Gary Arabian (*ZIP code: 95448-4754)*

671. Gary Sikkens (*ZIP code: 91106)*

672. Gary Favero (*ZIP code: 91730)*
Please take action to save this species.

673. Gary Grimm (*ZIP code: 94708)*
Please do the maximum to protect the California Southern steelhead!

674. Gary Luoto (*ZIP code: 92007)*

675. Gary McDougal (*ZIP code: 95620)*

676. Gary Morisoli (*ZIP code: 94573)*
Please help save these fish. Thank
You.

677. Gary Barisone (*ZIP code: 94010)*
I am a Northern California steelhead fisherman. I have fished the Klamath and Trinity rivers for 40 plus years and have witnessed the decline of steelhead in these and other California rivers. It would be a shame to lose Southern Steelhead.

678. Gabriel Varela (*ZIP code: 90723)*

679. Gary Crocker (*ZIP code: 91935)*

680. G sweeting (*ZIP code: 97005)*

681. Geoff Coster (*ZIP code: 90405)*
Please save this magnificent So Cal native fish!

682. Geoffrey Garth (*ZIP code: 90803)*

683. Geofrey Wyatt (*ZIP code: 93108)*
These are magnificent creatures! Let's not be the ones who preside over their extinction!

684. **George Gates** (*ZIP code: 92128)*

685. **George Salmas** (*ZIP code: 90067)*
Need to save the steelhead

686. **George Coughlin** (*ZIP code: 94507)*
I support this petition. GC

687. **Gerald Cunha** (*ZIP code: 94404)*
As a concerned California resident, I write to you today to express my full support for designating the Southern California steelhead as endangered under California's Endangered Species Act.

688. **Gerald Ichikawa** (*ZIP code: 93111-1230)*

689. **Geraldine Fontanini** (*ZIP code: 92067)*

690. **Harold Turner** (*ZIP code: 95140)*

691. **Gabe Ethier** (*ZIP code: 95370)*

692. **Carolyn Sue Palmer** (*ZIP code: 91361)*

693. **Giancarlo Alvarado** (*ZIP code: 93546)*

694. **Gien Gip** (*ZIP code: 94117)*

695. **Gil Takemori** (*ZIP code: 95133)*

696. **Ari Gold** (*ZIP code: 92562)*

697. **Cher Gilmore** (*ZIP code: 91321)*
We need more help for this beleaguered species!

698. **Gilbert Munz** (*ZIP code: 94903)*

699. **george Cotsirilos** (*ZIP code: 94707)*

700. **Wayne Johnson** (*ZIP code: 92082)*

701. **Gregory Leitch** (*ZIP code: 94526)*

702. **Gary Applebee** (*ZIP code: 92374)*

703. **Michael A. Glazeski, OD** (*ZIP code: 94611)*

704. Lei Villa (*ZIP code: 93105)*

705. Glenda Nowakowski (*ZIP code: 91384)*

706. Glenn Ueda (*ZIP code: 92648)*

707. Glenn Short (*ZIP code: 91403)*
Sierra Pacific Fly Fishers supports this petition.

708. DARREN MCMILLAN (*ZIP code: 92677)*

709. Geneva Omann (*ZIP code: 96094)*

710. GREG NELSON (*ZIP code: 92677)*

711. Steven Wong (*ZIP code: 90048)*
Bring back the steelhead trout!

712. Bob Gomez (*ZIP code: 92780)*

713. Thomas Rasmussen (*ZIP code: 90505)*

714. Jonathan Wilson (*ZIP code: 93636)*

715. Timothy Y (*ZIP code: 94544)*
Save Our Wild Steelhead and Salmon!

716. Gordon Dow (*ZIP code: 94904)*

717. Gordon Hollingsworth (*ZIP code: 95355)*

718. Garen Pekacheky (*ZIP code: 90401)*

719. George Farrell (*ZIP code: 95834)*
Please save the Southern steelhead!

720. Grace Willett (*ZIP code: 92629)*

721. Bobbie Hawkins (*ZIP code: 91977)*

722. Gill Realon (*ZIP code: 92821)*
We need to protect this endangered fish. Please make every effort to establish a plan and resources to save this species from extinction.

723. George Ream (*ZIP code: 91916)*
Save this fish!!!

724. Jonathan Appelbaum (*ZIP code: 92116)*
Clearly this ESU is long overdue for listing. The ESU is Federally-listed, the State should follow their lead (and the science) and fully protect the southern steelhead ESU and list it as Endangered under CESA.

725. Hardy De La Cruz (*ZIP code: 33033)*

726. Paul Rokich (*ZIP code: 92623)*

727. Ryan Beattie (*ZIP code: 91352)*

728. Greg Dinger (*ZIP code: 96067)*

729. Greg Owsley (*ZIP code: 80524)*

730. GREG NELSON (*ZIP code: 92677)*

731. Gregory Chiate (*ZIP code: 90265)*

732. greg miner (*ZIP code: 99362)*
Please list southern steelhead under ESA .

733. Gregor Andreas (*ZIP code: 94611)*

734. GREGORY ZASTE (*ZIP code: 95482)*
Please save our steelhead

735. Greg Thomson (*ZIP code: 94965)*

736. Gregory Waters (*ZIP code: 94903)*
SOS! Save our Steelhead!

737. Gregg Wrisley (*ZIP code: 95472)*

738. GROVER HOWARD (*ZIP code: 92009)*
This is urgently needed to not only save the Southern Steelhead but to also improve biodiversity.

739. Glen Scrivens (*ZIP code: 90304)*

740. Gary Slade (*ZIP code: 95666)*

741. Gregory Stone (*ZIP code: 92116)*

742. **Gary Thomas** (*ZIP code: 91335)*

743. **Glenn Tochioka** (*ZIP code: 92683)*

744. **Gerrick Yamada** (*ZIP code: 95129)*

745. **Garrett Gunning** (*ZIP code: 93460)*

746. **Guy Ferrante** (*ZIP code: 91770)*

747. **Guy Otoshi** (*ZIP code: 94116)*

748. **Gregg Wrisley** (*ZIP code: 95472)*

749. **Gwyneth Perry** (*ZIP code: 90042)*

750. **Gene Yano** (*ZIP code: 90066)*

751. **Kenneth Haber** (*ZIP code: 91001)*

752. **Hugh Bialecki** (*ZIP code: 92317)*

753. **Hadrian Predock** (*ZIP code: 90405)*

754. **Kelli Hailey** (*ZIP code: 91101)*

755. **Halee Bernard** (*ZIP code: 91214)*

756. **Hye Kim** (*ZIP code: 91602)*

757. **Haley Coffman** (*ZIP code: 84115)*
These fish need to be protected under law!

758. **halli gigante** (*ZIP code: 90601)*

759. **Suzanne Hall-Whitney** (*ZIP code: 94553)*

760. **An anonymous signer** (*ZIP code: 95519)*

761. **John Ferguson** (*ZIP code: 95050)*

762. **CJ Vapenik** (*ZIP code: 90041)*

763. **Hanna Hanson** (*ZIP code: 94107)*

764. **Happy Nguyen** (*ZIP code: 95821)*

765. **dale harper** (*ZIP code: 93527)*
California

766. **Jonathan Harrington** (*ZIP code: 94043)*

767. **Terry Thomas** (*ZIP code: 95831)*
Please help us save this precious fish. This could be our last chance.

768. **Jamie Higgins** (*ZIP code: 92647)*

769. **Hannah Cady** (*ZIP code: 28411)*

770. **Hannah Benharash** (*ZIP code: 90272)*

771. **Herb Bishop** (*ZIP code: 91364)*

772. **Patt Healy** (*ZIP code: 90265)*

773. **Heidi Foubare** (*ZIP code: 91350)*

774. **He-Lo Ramirez** (*ZIP code: 95928)*

775. **Kenneth Cullings** (*ZIP code: 93035)*
Please prioritize the removal of Matilijah dam. It's a critical step for this area and the Sespe drainage.

776. **Stephen Smith** (*ZIP code: 94306)*
please save the southern CA steelhead from extinction

777. **Jo Ann Herr** (*ZIP code: 94602)*

778. **Robert Kanne** (*ZIP code: 92887)*

779. **William Leach** (*ZIP code: 93561)*

780. **Hiroaki Hayashigatani** (*ZIP code: 94403)*

781. **Howard Pippen** (*ZIP code: 92056)*
Please affirm the findings of California DFW and relevant Federal agencies.
All have clearly documented the urgent need to sustain extensive ongoing restoration efforts for this heritage indicator species.

782. **HEATHER CARMODY** (*ZIP code: 95667)*

783. **Holly Meadors** (*ZIP code: 93023)*

784. **Bob Hogan** (*ZIP code: 94599)*

785. **Ruth Holbrook** (*ZIP code: 94608)*

786. **Del Holland** (*ZIP code: 91355)*

787. **Casey Horgan** (*ZIP code: 93103)*

788. **Helga Conkln** (*ZIP code: 92120)*
save Southern steelhead from extinction!

789. **Howard Sawada** (*ZIP code: 92067)*

790. **Howard Strauss** (*ZIP code: 90232)*

791. **Frank Humberstone** (*ZIP code: 91722)*

792. **Hunter Vaught** (*ZIP code: 93534)*
Give wild steelheads the chance to recover by listing them as an endangered species.

793. **Hunter Mayer** (*ZIP code: V3M3W5)*
As a concerned resident of the pacific coast in British Columbia, where native wild steelhead populations face the same tragic fate, I plead the California Fish and Game Commission to list Southern steelhead on the California ESA. Take this opportunity to show leadership in advancing protections for wild steelhead populations.

Thank you.

794. **Steven Huntley** (*ZIP code: 91104)*

795. **Russell Hunziker** (*ZIP code: 90272)*

796. **Arthur Hurley** (*ZIP code: 94558)*
Please act to save this species from extinction!

797. **David Hurley** (*ZIP code: 94602)*

798. **Hannah Vaughn-Hulbert** (*ZIP code: 93109)*

799. **Harry White** (*ZIP code: 95747)*
Please save these beautiful fish from extinction! Thank you.

800. **Levie Isaacks** (*ZIP code: 95472)*

801. **Illece Buckley Weber** (*ZIP code: 91301)*
Please protect the Southern Steelhead by listing it as endangered under CA's Endangered Species Act.

802. **Isabelle Voler** (*ZIP code: 94109)*

803. **Ivan Castillo** (*ZIP code: 90034-5537)*
It is crucial that we protect the habitat of the Southern Steelhead. Please list the species as endangered so we can protect it's disappearing ecosystem.

804. **ian Douglas** (*ZIP code: 92692)*

805. **Valentin Mendoza** (*ZIP code: 93003)*

806. **Ian** (*ZIP code: 94044)*

807. **Ingrid Serafin** (*ZIP code: 93117)*

808. **Terrence Tinucci** (*ZIP code: 92321)*

809. **Stephen Parry** (*ZIP code: 94558)*

810. **Drew Irby** (*ZIP code: 95648)*
This is an action that should have been taken long ago. The feds have SS as an endangered species, why not the state? What bureaucracy is holding this listing back? Millions have been spent on restoration and planning to remove and or mitigate barriers to sSS passage and this listing needs to be in place fetch to let these projects go forward.

811. **Iris Yuh** (*ZIP code: 93117)*

812. **Nate Irwin** (*ZIP code: 93103)*

813. **Isabella Ponce** (*ZIP code: 93106)*

814. **Isabella Caruso** (*ZIP code: 90291)*

815. **Kris Iverson** (*ZIP code: 92123)*

816. **Ly Yang** (*ZIP code: 90503)*

817. **Justin Andres** (*ZIP code: 91711)*

818. **jeffrey bloch** (*ZIP code: 90018)*

819. **Alex Ceja** (*ZIP code: 95401)*

820. **Jon Barnea** (*ZIP code: 92629)*

821. **Jay Beckstead** (*ZIP code: 97202)*

822. **John M. Shelton** (*ZIP code: 93720)*

823. **Jack Lemein** (*ZIP code: 93001)*

824. **Jack Ackerman** (*ZIP code: 92694)*
Save the Southern Steelhead.

825. **Jack Campbell** (*ZIP code: 95120)*
Immediate action necessary

826. **Jack Neff** (*ZIP code: 90004)*

827. **Jackson Valencia** (*ZIP code: 93460)*

828. **jackson collins** (*ZIP code: 90808)*
:?

829. **Jackson Gould** (*ZIP code: 95814)*

830. **Jacob Jett** (*ZIP code: 93908)*

831. **Jacob Smith** (*ZIP code: 95521)*

832. **Jacob Paul** (*ZIP code: 92583)*

833. **Jacob Roeder** (*ZIP code: 90036)*

834. **Jacob Mullins** (*ZIP code: 94133)*

835. **Jorge Cortez** (*ZIP code: 91001)*

836. **Judith Adams** (*ZIP code: 91381)*

837. **Jade Zounes** (*ZIP code: 91335)*

838. **Jade Tippo** (*ZIP code: 93022)*

839. **Jaime Burrola** (*ZIP code: 91775)*

840. **Anthony Iantosca** (*ZIP code: 94024)*

841. **Jacob DeWald** (*ZIP code: 41075)*

842. **James Avant** (*ZIP code: 94010)*

843. **Mike James** (*ZIP code: 94954)*

844. **James Bading** (*ZIP code: 91030)*

845. **James Burton** (*ZIP code: 94941)*

846. **James Chong** (*ZIP code: 92870)*

847. **James Kampas** (*ZIP code: 92234)*

848. **James Beeson** (*ZIP code: NP8 1AR)*
I support this petition as a European steelheader and regular visiting angler.

849. **James Lynch** (*ZIP code: 95442-0655)*

850. **Jamie De La Vega** (*ZIP code: 92867)*

851. **James Stewart** (*ZIP code: 95405)*

852. **Janin Paine** (*ZIP code: 90291)*

853. **Jann Dorman** (*ZIP code: 95613)*

854. **Sean Jansen** (*ZIP code: 59718)*

855. **Jason Beasley** (*ZIP code: 94618)*

856. **Jason Erbert** (*ZIP code: 94555)*

857. **Jason Lozano** (*ZIP code: 96003)*

858. **Jason Drew** (*ZIP code: 95432)*

859. **jason forman** (*ZIP code: 90032)*

860. **Jason Quan** (*ZIP code: 90274)*

861. **Jason Vang** (*ZIP code: 91801)*

862. **Jeffrey Trafican** (*ZIP code: 93711)*

863. **Jay Kaneshige** (*ZIP code: 94552)*

864. **Judith Chumlea-Cohan** (*ZIP code: 93458)*

865. **Jay Monahan** (*ZIP code: 95818)*
Keep up the good fight!

866. **Jazzari Taylor** (*ZIP code: 91722)*
Latino Outdoors is happy to support the protection of Southern Steelhead from extinction.

867. **John Balestra** (*ZIP code: 90277)*

868. **John Brennan** (*ZIP code: 96094-9752)*

869. **Juan Bautista** (*ZIP code: 95348)*
Save California steel head !!!!

870. **Joseph Benton** (*ZIP code: 94509)*

871. **James Haufler** (*ZIP code: 95747)*
All we are saying is, "Give fish a chance."

872. **Josh C.** (*ZIP code: 90029)*

873. **John Cowan** (*ZIP code: 95973)*

874. **John Willie** (*ZIP code: 92802)*

875. **Jonathan Dadon** (*ZIP code: 91208)*
List the Southern California steelhead as endangered. Save our native fish

876. **Joanne Dow** (*ZIP code: 95409)*

877. **John Deily** (*ZIP code: 92614)*

878. **James Doalson** (*ZIP code: 92673)*
Very important to save this fish!

879. **James Valle-Schwenk** (*ZIP code: 94116)*

880. **Jean Sedar** (*ZIP code: 93101)*

My first fishing memory was as a toddler watching my father fly fish for Steelhead on the Santa Ynez River. I'm now 70. We MUST protect this beautiful, valuable species to enrich our native environment! Jean Sedar, 5th Generation Santa Barbaran

881. Jeffrey Muscatine (*ZIP code: 95247)*

882. Jeffrey Kruger (*ZIP code: 94920-1056)*

883. Jeff Williams (*ZIP code: 92705)*

884. Jeff Lincer (*ZIP code: 92036)*
Please do a better job of protecting this species.

885. Jeff Mazet (*ZIP code: 94970)*

886. Jeff Sermak (*ZIP code: 92010)*

887. Jeffrey Henigan (*ZIP code: 95758)*

888. Jeffrey Coupe (*ZIP code: 95661)*

889. Jeffrey Fairfield (*ZIP code: 94087)*

890. Janet Kubler (*ZIP code: 91355-3116)*

891. Jelly Kahler (*ZIP code: 90292)*

892. Jen Greenberg (*ZIP code: 96150)*

893. Jenifer Yager (*ZIP code: 83702)*

894. Jennifer Cossaboon (*ZIP code: 92103)*

895. Jenn Guess (*ZIP code: 91302)*

896. Jen Stein (*ZIP code: 93117)*

897. Jennifer O'Brien (*ZIP code: 97702)*
Please do the right thing and protect Southern California steelhead under the ESA listing.

898. Jennifer Rudloff (*ZIP code: 92029)*
Protect our CA natives!

899. Jenny Ziesenhenne (*ZIP code: 93105)*

900. Jeremiah Nicholson (*ZIP code: 59801)*

901. Jeremy Bonsall (*ZIP code: 90065)*

902. Sherry Ashbaugh (*ZIP code: 92020)*

903. Jerome Damian (*ZIP code: 95327)*
I feel they need to start putting those fish in other locations throughout California. The Pilot Peak cut throat is a perfect example. Same with the marble trout in Sylvania.

904. Jerry Matthews (*ZIP code: 92131)*

905. Jerry Bender (*ZIP code: 95409)*

906. Jerry Urban (*ZIP code: 95355)*

907. jerry krohn (*ZIP code: 94044)*
thank you

908. Jessica Rodriguez (*ZIP code: 90065)*

909. Jessi Vannatta (*ZIP code: 93225)*

910. Jessica Minucci (*ZIP code: 91320)*

911. Brett Jensen (*ZIP code: 96073)*
Please do the right thing.

912. Edward Jew (*ZIP code: 94526)*

913. Julie Ford (*ZIP code: 90740)*

914. James Gill (*ZIP code: 91030)*

915. Jacob Gorman (*ZIP code: 91104)*

916. Jay Grandon (*ZIP code: 91001)*

917. Jaime Calle (*ZIP code: 93036)*

918. John Herrera (*ZIP code: 95437)*

919. John Simpson (*ZIP code: 93108)*

920. Jillian Jaeger (*ZIP code: 93446)*

921. jill freeland (*ZIP code: 93101)*

922. Jim Ries (*ZIP code: 904040)*

923. Jim Arce (*ZIP code: 94920)*
Let's save this important species.

924. Jim Nomura (*ZIP code: 91106)*

925. James Young (*ZIP code: 93111)*

926. James Pon (*ZIP code: 90631)*

927. Jim Stewart (*ZIP code: 90712)*
Please save the steelhead!

928. James Ahrens (*ZIP code: 93306)*

929. Jim Crabtree (*ZIP code: 95448)*

930. Jim Fricks (*ZIP code: 92679)*

931. James Ells (*ZIP code: 92325)*
Save the steelhead and save the West Fork of the San Gabriel River!

932. James Lin (*ZIP code: 92037)*

933. James Zelko (*ZIP code: 94553)*
Save the streams and the Steelhead

934. Jon Jaeger (*ZIP code: 93446)*
Save them!

935. Joe Cech (*ZIP code: 95616)*

936. Jeff Havlik (*ZIP code: 93101)*

937. Jason Olson (*ZIP code: 95757)*

938. John Kaiser (*ZIP code: 92646)*

939. John Koene (*ZIP code: 94965)*

940. **Jeff Kaminski** (*ZIP code: 91307)*
Save the Steelhead, stop destroying our planet and it's inhabitants!

941. **Janet Amundson** (*ZIP code: 55434)*

942. **Jennifer Beatty** (*ZIP code: 90064)*

943. **Jose Luis Carrillo** (*ZIP code: 93105)*

944. **John Hermon** (*ZIP code: 94506)*

945. **Jim Lindland** (*ZIP code: 84092)*
Hello,

I'm currently an Utah resident, but spent my formative years (1988 to 2017) growing up in Southern California. Please list southern steelhead.

Sincerely,
Jim
Lindland

946. **john nesheim** (*ZIP code: 95066)*

947. **James Murdock** (*ZIP code: 15003)*

948. **Joel Martin** (*ZIP code: 91360)*

949. **James Mcguirk** (*ZIP code: 91320)*
This is a critical species of fish that is becoming endangered across the pacific. We must do our very best to allow this species the space and habitat it needs to thrive again.

950. **Jeff Megorden** (*ZIP code: 92130)*

951. **James Mitchell** (*ZIP code: 89519)*
I support efforts to save Southern California Steelhead trout, I support all Conservation Groups working to save the fish by improving the fish's habitat.
James D Mitchell

952. **Jim Molinari** (*ZIP code: 95448)*
Please protect steelhead and other anadromous fish vital to a healthy ecosystem.

953. **John** (*ZIP code: 95469)*

954. **John Murphy** (*ZIP code: 94002)*

955. **Jeremy Netka** (*ZIP code: 91367)*

956. **Judith Nicolaidis** (*ZIP code: 92105)*
What a beauty! And what a shame to lose it. We need to save and nurture every part of nature, ultimately part of ourselves!

957. **Jon Copeland** (*ZIP code: 93405)*

958. **Joseph Golightly** (*ZIP code: 95667)*

959. **Joseph Howard** (*ZIP code: 93003)*

960. **Joel Cheney** (*ZIP code: 95595)*
Please protect these iconic fish.

961. **Joseph Valerio** (*ZIP code: 90041)*
The Southern Steelhead needs all our help in order to help the species rebound. We as humans have directly impacted their migration to the ocean by building dams and diverting water. Please let's find a way to help the southern steelhead before it's too late.

962. **Johanna Moynahan** (*ZIP code: 90220)*
Fish Rule!

963. **Jayme Ohlhaver** (*ZIP code: 94129)*

964. **John Chmiola** (*ZIP code: 90232)*

965. **John Frazer** (*ZIP code: 92122)*

966. **John Loo** (*ZIP code: 92081)*

967. **John Pohorsky** (*ZIP code: 92337)*
California steelhead and salmon need our help. Please help protect the watershed sand their environment.

968. **John Jarve** (*ZIP code: 94027)*
Please protect and improve our waterways! Thank you!

969. **John Kim** (*ZIP code: 91381)*
Thank you for all you do!!!!

970. **John Baxter** (*ZIP code: 85396)*

971. **john moniz** (*ZIP code: 95220)*

972. **John Charbonneau** (*ZIP code: 91977)*

973. John Collins (*ZIP code: 92131)*
Save our steelhead!

974. John Finney (*ZIP code: 92630)*

975. John Frankot (*ZIP code: 60618)*

976. john dorwin (*ZIP code: 93427)*
Bureau of Reclamation, County of Santa Barbara , and Cachuma Operating and Maintenance Board have been evading environmental review of the Cachuma Project for years. They have done nothing to restore the Santa Ynez River Fishery and wasted hundreds of thousands of dollars of taxpayer money in the process. State enforcement outside the Cachuma Project is long overdue to protect the remaining Southern Steelhead Trout below the Bradbury Dam in the River and the critical habitat which can still be preserved.

977. John Mykkanen (*ZIP code: 92706)*
We need steelhead!!!

978. John Stanley (*ZIP code: 95688)*

979. John Pelley (*ZIP code: 93908)*

980. Johann Piff (*ZIP code: 95628)*

981. John Lucas (*ZIP code: 92101)*

982. Miki Nakamura (*ZIP code: 94578)*

983. Jon Boorstin (*ZIP code: 91604)*

984. Jon Bowman (*ZIP code: 95060)*

985. Cory Jones (*ZIP code: 93422)*
They are a representation of health and resilience for our regional watersheds. Let's not lose them and keep them as a symbol for future generations.

986. Jonathan Hubbard (*ZIP code: 95818)*
Restore analogous fish in California!

987. Jordan Hook (*ZIP code: 91303)*
Would love to see steelhead numbers come back!

988. Jorome Cruz (*ZIP code: 80528)*

989. Joseph Davies (*ZIP code: 91702)*
Save the fish!

990. Joseph Moyle (*ZIP code: 97405)*

991. Josh Bolden (*ZIP code: 95476)*
Save nature! It's all we have in this state!!!

992. Joshua Bergan (*ZIP code: 59714)*

993. Joshua Schweitz (*ZIP code: 91803)*
With less and less available habitat and proper streams for these fish to reproduce, it's important to mark them as endangered to help protect them and give them a chance to rebound

994. Josue Penuelas (*ZIP code: 92532)*

995. Joseph Silveira (*ZIP code: 95367)*

996. John Clark (*ZIP code: 90266)*

997. John Davey (*ZIP code: 94027)*
It is no mystery that Steelhead are an endangered species.

998. Justin Peek (*ZIP code: 95926)*

999. Jeff Haas (*ZIP code: 93035)*

1000. J. Pearce Hurley MD (*ZIP code: 94708)*

1001. Jerry Rapier (*ZIP code: 95252)*
No native species should become extinct!

1002. Joseph Colton (*ZIP code: 95864)*

1003. John Reed (*ZIP code: 94024)*

1004. I (*ZIP code: 92117)*

1005. Jinesse Reynolds (*ZIP code: 94960)*

1006. Kathryn Ridgley-Lunetta (*ZIP code: 91364)*

1007. John Rusmisel (*ZIP code: 94542)*

1008. John Thomson (*ZIP code: 93003)*
Stop killing all the fish for a few extra pieces of paper. It's paper not a living thing anymore. It is also dead. Stop with the damming of every water source in the country already. Take them down and let our kids and grandkids have some wild life in their lives. We are all pet of the problem and will feel it more and more in years to follow.

Please let's all work together to protect our world and ourselves.

1009. Jim Deacon (*ZIP code: 93117)*
We've destroyed most of what California was.   Surely we can protect the few remaining steelhead.

1010. Jeffrey Caulkins (*ZIP code: 93422)*

1011. Jenna Segal (*ZIP code: 90401)*

1012. Judith E Long Judith E Long (*ZIP code: 93109)*
Please help save this vital resource

1013. John Vogh (*ZIP code: 92130)*

1014. John Sheridan (*ZIP code: 13207)*

1015. James Fousekis (*ZIP code: 94618)*

1016. Jack Ish (*ZIP code: 93619)*
Please save our fish

1017. Jane Tsong (*ZIP code: 91207)*

1018. JUAN ZAMORA (*ZIP code: 90650)*

1019. Judith Blocker (*ZIP code: 90405)*

1020. Jule Baughman (*ZIP code: 90277)* **1021.**

Julie du Bois (*ZIP code: 91304-3049)* **1022. Julian**

Engel (*ZIP code: 94903)*
Save Southern Steelhead

1023. Julie Kelner (*ZIP code: 98312)*

1024. Julie Lumley (*ZIP code: 93108)*

1025. June Lancaster (*ZIP code: 95549)*

1026. Justin Coupe (*ZIP code: 95650)*
I fully support fully support listing Southern steelhead as endangered under California's ESA - by April 4, 2024.

1027. Justin Hopfer (*ZIP code: 90035)*

1028. Justin Goodwater (*ZIP code: 91784-1306)*
Please help save the steelhead!

1029. Justin Rathert (*ZIP code: 95833)*

1030. Justin Christodoulou (*ZIP code: 90701)*

1031. Judith Uthus (*ZIP code: 91302)*

1032. Jonathan Walker (*ZIP code: 94941)*

1033. Justin Ward (*ZIP code: 93422)*

1034. Jonathan Webber (*ZIP code: 92128)*

1035. Josh Wheaton (*ZIP code: 94117)*

1036. Joe Wiederhold (*ZIP code: 98229)*

1037. Joseph Rudolph (*ZIP code: 95826)*
Save southern California steelhead

1038. John Streeter (*ZIP code: 91011)*
I always vote.

1039. John Wylie (*ZIP code: 92106)*

1040. Jim Yarbrough (*ZIP code: 91320)*
It is very important to un-dam the Ventura River and to bring back the Southern steelhead! Time is running out. Southern steelhead must be listed as endangered!

1041. John Zvetina (*ZIP code: 92037)*

1042. Keith Goursky (*ZIP code: 95355)*

1043. Kyle Mendenhall (*ZIP code: 43206)*

1044. Edward Sherlock (*ZIP code: 95831)*
Save the steelhead!!

1045. Kristine Olmstead (*ZIP code: 93455)*

1046. Kaden Ward (*ZIP code: 93422)*

1047. Kaeden Anderson (*ZIP code: 95448)*

1048. Daniel Kagey (*ZIP code: 91436)*

1049. kana lee (*ZIP code: 91755)*

1050. karen wilson (*ZIP code: 94590)*

1051. Kat Selm (*ZIP code: 93001)*

1052. Kathleen Smith (*ZIP code: 90018)*

1053. Katelyn Fansler (*ZIP code: 95928)*

1054. Katherine Daly (*ZIP code: 94062)*

1055. Kathleen Johnson (*ZIP code: 90039)*

1056. Katherine McKenna Rosario (*ZIP code: 94108)*

1057. Kathy Knight (*ZIP code: 90405)*
PLEASE help us save this wonderful fish that has been a big part of our rivers and streams.

1058. Katie Faris (*ZIP code: 93001)*

1059. Katie Zubak (*ZIP code: 92881)*

1060. Kathryn Lindsay (*ZIP code: 95246)*
Please consider the importance of this!

1061. James Kawamura (*ZIP code: 92336-5905)*

1062. Kenneth Lueth (*ZIP code: 95765)*

1063. ken briscoe (*ZIP code: 89703)*

1064. Kanan Beissert (*ZIP code: 95521)*
Saving fish saves humans too.

1065. Keegan Uhl (*ZIP code: 91505)*

1066. Keith Gendler (*ZIP code: 90278)*

1067. L Keith Zandona (*ZIP code: 93105)*
save the southern steelhead

1068. Kelli Frye (*ZIP code: 90401)*

1069. Kelly Barlow (*ZIP code: 94549)*

1070. Kelsey McCurdy (*ZIP code: 94924)*

1071. Kelsey Reckling (*ZIP code: 90031)*

1072. Kelsi Sigurdson (*ZIP code: 96080)*
I have a lot of faith in CalTrout, thank you for all you do to save the salmon!!

1073. Kelven Diehl (*ZIP code: 92310)*

1074. Kenneth Nicholson (*ZIP code: 94117)*

1075. Ken Rasler (*ZIP code: 94539)*
SAVE THE SOUTHERN CALIFORNIA STEELHEAD!!!!!!!

1076. Kern Aughinbaugh (*ZIP code: 92078)*
I fully support the listing of the Southern Steelhead on the California ESA.

1077. Marina Cheney (*ZIP code: 95595)*
Please look out for the longevity of these beautiful fish!

1078. KEVIN EAGLETON (*ZIP code: 92596-8878)*

1079. Capt Kevin S McQuiston (*ZIP code: 90277)*
Please consider!

1080. Kevin Bendian (*ZIP code: 94577)*
My name kevin bendian I support this fully

1081. Kevin Jontz (*ZIP code: 90045)*

1082. Kevin Sheldahl (*ZIP code: 91001)*
Please act now to save Southern California steelhead!! Losing a key ingredient to vital watersheds would be unacceptable. We need to properly share our resources wisely with fish, wildlife, and people.

1083. Kara Glenwright (*ZIP code: 94133)*

1084. Kyle Baker (*ZIP code: 94702)*

1085. Kian Kaeni (*ZIP code: 91784)*

1086. Kieran Campbell (*ZIP code: V0r2z0)*

1087. Christopher Kight (*ZIP code: 95661)*
It is unacceptable to allow ANY wild species to dwindle down to nothing, expecially when humans contributed to the situation.

1088. Killian LeDuke (*ZIP code: 90046)*

1089. Logan Gillingham (*ZIP code: 93437)*

1090. Kim Lloyd (*ZIP code: 95630)*
Now is the time to take action. Every effort is a step in the right direction. No effort increases the loss of the SoCal steelhead. This loss cannot be allowed to happen.

1091. James Wong (*ZIP code: 9134)*

1092. Grace Countryman (*ZIP code: 94611)*

1093. Kyle Kertscher (*ZIP code: 95540)*

1094. Keith Kolischak (*ZIP code: 27196)*

1095. Kevin Kuhn (*ZIP code: 95959)*

1096. Jeffrey Klein (*ZIP code: 91214)*

1097. Kelly Kelly (*ZIP code: 90808)*

1098. Keith Johnson (*ZIP code: 94602)*
I am in full support of saving the steelhead, returning the rivers to their original condition and removing as many dams as possible.

1099. Kerri King (*ZIP code: 92536)*
We are losing tooooo many species! Please do all you can to protect the Southern California Steelheads from extinction!

1100. Kate Stirr (*ZIP code: 94501)*

1101. kent morris (*ZIP code: 92831)*

1102. Kevin Morrison (*ZIP code: 95003)*
Save our Steelhead!!!

1103. Nicole Howell (*ZIP code: 96067)*

1104. Kathleen Komar (*ZIP code: 90066)*
please keep the southern steelhead from going extinct!

1105. August Konrad (*ZIP code: 92122)*

1106. Kirston Koths (*ZIP code: 94530)*

1107. Kathye Armitage (*ZIP code: 91390)*

1108. Katherine Pease (*ZIP code: 90404)*

1109. Kristina Stodder (*ZIP code: 92024)*

1110. Kristin Womack (*ZIP code: 94960)*

1111. Kevin Saul (*ZIP code: 93003)*
Please help my local Steelhead survive.

1112. Kevin Barnard (*ZIP code: 92029)*
Board member of the Escondido Creek Conservancy. It would be a game changer for all of So Cal to see these runs again.

1113. Kristen Schonert (*ZIP code: 90291)*

1114. Kevin Smith (*ZIP code: 95254)*
Thank you for helping

1115. Katie Converso phillips (*ZIP code: 90802)*

1116. Ken Tetzel (*ZIP code: 94551)*

1117. Kamala Tippo (*ZIP code: 97401)*

1118. Katherine Lynch (*ZIP code: 92025)*
For those of us who are native Californians, and for enthusiasts of trout fishing everywhere, the preservation of our Southern steelheads is paramount. Let's add them to the endangered species list and protect the Southern Steelhead so that mankind doesn't lose yet another species to humanity's indifference to the natural world.

1119. Kris Tucker (*ZIP code: 91942)*

1120. Gary Kurashige (*ZIP code: 90503)*

1121. Steven Kwok (*ZIP code: 95404)*

1122. Katherine Carmichael (*ZIP code: 93109)*

1123. Kyle Frank (*ZIP code: 94707)*

1124. Kyle Satterlee (*ZIP code: 93012)*

1125. Kyle O'Connor (*ZIP code: 92116)*

1126. Monica Alvarez (*ZIP code: 90063)*

1127. Kristen Metcalfe (*ZIP code: 95619)*

1128. Lacey Prescott (*ZIP code: 93906)*

1129. Susan Henry (*ZIP code: 90024)*

1130. linda miller (*ZIP code: 92082)*
Please continue your work to see the SoCal steelhead

1131. Johanna Moynahan (*ZIP code: 90220)*

1132. LouAnne Insprucker (*ZIP code: 91011)*
Please give southern Steelheads a chance

1133. Lori Howk (*ZIP code: 97229)*

1134. Eric Edmunds (*ZIP code: 90049)*

1135. Timothy Lambert (*ZIP code: 90815)*

1136. Lance Rava (*ZIP code: 92677)*

1137. Lance Spece (*ZIP code: 95628)*

1138. Lani Wild (*ZIP code: 94708)*

1139. Lani Dinh (*ZIP code: 91709)*

1140. Bernard Yin (*ZIP code: 90401)*
The fish need this additional protection.

1141. Larry Volpe (*ZIP code: 95139)*
Please do it. Before it’s too late.

1142. Larry Nakamura (*ZIP code: 92130)*

1143. Larry Volpe (*ZIP code: 95139)*

1144. GEORGE BROWN (*ZIP code: 94510)*

1145. Lawrence Robison (*ZIP code: 95821)*

1146. Philip Carl (*ZIP code: 94019)*

1147. Dave Schlom (*ZIP code: 96080)*
Please help preserve this wild part of our SoCal heritage.

1148. Jack Hodges (*ZIP code: 90405)*

1149. Laura Ayala-Huntley (*ZIP code: 91104)*

1150. Laura Hampton (*ZIP code: 91942)*

1151. Lauren Hall (*ZIP code: 95961)*

1152. Stacy Lawson (*ZIP code: 93454)*

1153. Lynn Cannady (*ZIP code: 94549)*
When will our politicians actually do something important?!

1154. Richard Louderback (*ZIP code: 90004)*

1155. larry chambers (*ZIP code: 94933)*

1156. Laura Cunningham (*ZIP code: 92323)*
I worked with Southern California Steelhead in the 1990s as a Scientific Aid with the (then) California Department of Fish and Game. The issues facing steelhead then were onerous, and I believe these fish need the maximum level of protection in order to keep populations from slipping into extinction.
Thank you.

1157. Larry Sasscer (*ZIP code: 95120)*

1158. Leanne Ly (*ZIP code: 92069)*

1159. Andrew Vizir (*ZIP code: 90272)*

1160. Lee Leardini (*ZIP code: 94947)*

1161. Lee Morgan (*ZIP code: 44067)*

1162. Mathieu Bonin (*ZIP code: 90011)*
We need to protect wildlife

1163. Lena Goldberg (*ZIP code: 93442)*

1164. William Lenheim (*ZIP code: 96002)*
save the strain for the future

1165. Leon Felus (*ZIP code: 90034)*

1166. leonard Perry (*ZIP code: 95521)*

1167. Leon Martinez (*ZIP code: 92509)*
Please save the Southern California steelhead from extinction

1168. Lucy Fellner (*ZIP code: 94133)*

1169. Lawrence Matson (*ZIP code: 95521)*

1170. Liam Massie (*ZIP code: 93546)*

1171. John Yeakel (*ZIP code: 94609)*

1172. Danielle Dowling (*ZIP code: 91342)*

1173. margaret light (*ZIP code: 90272)*
I caught my first fish at 2 years old (with my Dad - we should all be so lucky). Today I fish for steelhead in northern California and Michigan - they are amazing fish. Please save the southern california steelhead so future generations can benefit and enjoy the "wild".

1174. Alondra Sandoval (*ZIP code: 91732)*

1175. Lili Khosravi (*ZIP code: 91605)*

1176. Rebecca Lee (*ZIP code: 33137)*

1177. Linda Strong (*ZIP code: 90640)*
This important species must not be allowed to go extinct. It is an integral part of the Southern California ecosystem and its importance will increase due to climate change as its range will expand north.

1178. Linda Mondaca (*ZIP code: 92405-4134)*

1179. Lindsey Jurca (*ZIP code: 90065)*

1180. Alberto Cuellar (*ZIP code: 94536)*

1181. Lionel Mares (*ZIP code: 91352)*
Protect vulnerable fish and species!

1182. Lisa Hogan (*ZIP code: 97220)*
1183. Lisa Fimiani (*ZIP code: 90066)*

1184. Dylan Granberg (*ZIP code: 92692)*
California needs to stop acting in favor of the rich & politicians and act on what it has left of non- destroyed land and wildlife!

1185. Valerie Lizarraga (*ZIP code: 90640)*

1186. Elizabeth Dodge (*ZIP code: 94708)*

1187. Liz Wages (*ZIP code: 91214)*

1188. Liz Keitz (*ZIP code: 90032)*

1189. Lizzy Sorce (*ZIP code: 93430)*

1190. Jeff Phillips (*ZIP code: 93109)*

1191. Larry Jindra (*ZIP code: 92056)*

1192. Linnea Wickstrom (*ZIP code: 94306)*
Saving salmon means saving so much for fish, plants, other animals, and ourselves. Do not allow short-term thinking to let salmon go extinct. Instead, take action to save salmonids!!

1193. Lloyd DeArmond (*ZIP code: 93111)*

1194. Lloyd Hackel (*ZIP code: 94550)*
I am also committed to removing the 17-foot barrier on Niles Creek in Fremont

1195. Linda Pankonin (*ZIP code: 96088)*

1196. LAWRENCE KENNEY (*ZIP code: 94901-3410)*
It's way past time to do the right thing! Please get on board.

1197. Landon Neustadt (*ZIP code: 93110)*

1198. Deborah Loehr (*ZIP code: 92116)*

1199. Luca Rakichevich (*ZIP code: 93117)*
Save the steelhead they are an important staple of a healthy ecosystem

1200. Loren Francis (*ZIP code: 90230)*
Save the Californian southern steelhead!

1201. Martina Jacobs (*ZIP code: 90211)*

1202. Logan Lannon (*ZIP code: 90631)*

1203. Jerry Salazar (*ZIP code: 94595)*
Time to save these fish before they are gone!

1204. Lonny Retzloff (*ZIP code: 94553)*

1205. Loretta Keller (*ZIP code: 94114)*

1206. Jonathan Steinberg (*ZIP code: 95060)*
Extinct is forever!

1207. Richard Unger (*ZIP code: 94618)*

1208. Louis Dupuy (*ZIP code: 42153)* **1209.**

Analiza del Rosario (*ZIP code: 91702)* **1210.**

Daniel Lowman (*ZIP code: 93546)*

1211. Lawrence Piepmeier (*ZIP code: 94030-2142)*

1212. Luke Proskine (*ZIP code: 94025)*

1213. Lewis Albright (*ZIP code: 93555)*
It is imperative that we save Southern Steelhead for future generations!!

1214. Leo Marrs (*ZIP code: 94513)*

1215. Lowell Turner (*ZIP code: 14850)*

1216. Luis Santana (*ZIP code: 95485)*

1217. Lew Leichter (*ZIP code: 93455)*

1218. Louis Ternullo (*ZIP code: 93105)*
Southern steelhead are the seminal fish all steelhead originate from. Climate change could wipe out many populations in other areas. Having Southern steelhead in decent numbers could provide strong fish to rebuild stocks effected by these changes. Please give them a chance to return to their native waters where they used to number in the thousands before the interference of humans.

1219. Luis Chaves (*ZIP code: 90503)*

1220. Luis Rincon (*ZIP code: 90031)*

1221. Luke Paterson (*ZIP code: 93110)*
I am an advocate for all wildlife who uses art to try to support organizations. Despite my 13 years of life I have only

seen a steelhead once. I am down to help save them.

1222. Luke Daynard (*ZIP code: 95519)*

1223. LARRY LUNDBERG (*ZIP code: 95112)*
Once gone, they can never be brought back. Please protect them!

1224. Lionel Valley (*ZIP code: 95928)*

1225. Linda Pankonin (*ZIP code: 96088)*

1226. Lynne Plambeck (*ZIP code: 91321)*
Please promote efforts that will save the steelhead. If we save the fish, we will save the people.

1227. Melissa Scalia (*ZIP code: 91007)*

1228. Michael Taylor (*ZIP code: 96027)*

1229. Michael Sarkisian (*ZIP code: 95603)*

1230. marc hogue (*ZIP code: 89704-9019)*

1231. Mark Allen (*ZIP code: 96067)*

1232. Maaya Hensman (*ZIP code: 95062)*

1233. Mac Esters (*ZIP code: 94117)*

1234. Douglas Macbeth (*ZIP code: 43214-1107)*
For our children and grandchildren, and as responsible stewards of a land of vibrant life.

1235. Ian Mahaffey (*ZIP code: 95062)*

1236. Mackenzie Berg (*ZIP code: 98144)*

1237. Julie MacLean (*ZIP code: 94027)*
Our survival depends on our ability to recognize and support, the unity of our physical world. The
preservation of species is dependent on the preservation of all species. Protect steelhead while we still have time.

1238. James Kirwan (*ZIP code: 95762)*

1239. Maddy Avila (*ZIP code: 95762)*

1240. madison salinas (*ZIP code: 94510)*

1241. Christopher Gagnon (*ZIP code: 12839-1861)*

1242. Drew Madrigal (*ZIP code: 93003)*
This has been a concern of mine for decades so yew I support the need to protect this treasure of the California.

1243. kenny maier (*ZIP code: 93631)*
please save!!!

1244. Kim Stringfellow (*ZIP code: 92252)*

1245. Malcolm Fea (*ZIP code: 95501)*

1246. Armando Gonzalez Guerra (*ZIP code: 92508)*

1247. Manny Villanueva (*ZIP code: 90304)*

1248. Manfred Antar (*ZIP code: 94122)*

1249. Michael Roosevelt (*ZIP code: 94104)*

1250. Merlin Freitag (*ZIP code: 21423)*
Merlin

1251. Marc Umeda (*ZIP code: 91711)*
This decision is simple: SoCal steelhead are so limited in number, that there is likely no other species as endangered. Add them to the California endangered species list.

1252. Mark Martin (*ZIP code: 92336)*
We need to do everything we can to save steelhead in Southern California. Thank you!

1253. Mareencita Ramos (*ZIP code: 85142)*

1254. Margarita Lopez-Pelayo (*ZIP code: 91342)*

1255. Marie Martin (*ZIP code: 93030)*

1256. Marissa Cupta (*ZIP code: 94920)*

1257. Marjorie Betz (*ZIP code: 92649)*

1258. Mark Moskowitz (*ZIP code: 94507)*

1259. Mark Pinard (*ZIP code: 95762)*

1260. Mark Triska (*ZIP code: 94550-7333)*

1261. Mark GANGI (*ZIP code: 91208)*
One of the most important challenges CalTrout is taking on. Also hard fully grasp the magnitude of how important this is for problems and challenges we will face in the future and the possibility of this Steelhead's role in vibrant, thriving changing ecosystem.

1262. Mark Alexander (*ZIP code: 93003)*

1263. Mark Box (*ZIP code: 94025)*

1264. Mark Utter (*ZIP code: 92075)*

1265. Mark Rangel (*ZIP code: 91733)*

1266. Mark Salcido (*ZIP code: 95032)*
I support

1267. Mark Lesko (*ZIP code: 95112)*
The inaction of the government to save our wildlife is deplorable

1268. Marlee Johnson (*ZIP code: 90245)*

1269. Marlon Harrington (*ZIP code: 91710)*

1270. Marrina Nation (*ZIP code: 93546)*

1271. Marti Smith (*ZIP code: 91320)*
Thank you for your consideration of this request.

1272. Marty Reed (*ZIP code: 92014)*

1273. Mary Jochum (*ZIP code: 93117)*

1274. Mary Rose (*ZIP code: 93101)*

1275. Mary Hamilton (*ZIP code: 93420)*

1276. Maryn Marlow (*ZIP code: 93002)*

1277. Mary Renaker (*ZIP code: 90404)*

1278. Michael Shimokaji (*ZIP code: 92688)*

1279. Matthew Schenone (*ZIP code: 92662)* **1280.**

Mason Ciddio (*ZIP code: P7b 7b7)* **1281. Matt**

Berry (*ZIP code: 95959-9054)*

1282. Matt Cervantes (*ZIP code: 95630)*
Please do your part to save an important species in California.

1283. Matt Benton (*ZIP code: 90066)*

1284. Matthew Biggins (*ZIP code: 91105)*

1285. Matt Brown (*ZIP code: 94960)*

1286. Matt Crawford (*ZIP code: 90046)*

1287. Matt Davidson (*ZIP code: 91436)*

1288. Matt Kane (*ZIP code: 94116)*

1289. Matthew Clague (*ZIP code: PL9 7AZ)*

1290. Matthew Clark (*ZIP code: 90049)*

1291. Matthew Wright (*ZIP code: 94114-1453)*
Save the Trout!!!! Let Nature Thrive!

1292. Matthew Santana (*ZIP code: 93110)*
They need us now more then ever.

1293. Matthew A Little (*ZIP code: 93921)*

1294. MICHAEL WILSON (*ZIP code: 95448)*
protect SoCal steelhead

1295. Maximillian Marvin (*ZIP code: 92107)*
Steelhead are a keystone species and we must take every effort to ensure their existence for future generations. If we loose all our native wonders, appreciation for and conservation of California's unique species will decline! Thank you for your careful consideration

1296. Maya Callaway (*ZIP code: 90290)*
Save the trout! We need them !

1297. Maddie Duda (*ZIP code: 94610)*
Steelhead are an integral part of a holistic ecosystem that we rely on - please put resources to urgently prevent irreversible loss!

1298. Marcus Bole (*ZIP code: 95692-9501)*
Senior Fisheries Biologist, Bole & Associates, Wheatland, CA 95692

1299. Mike Brinkley (*ZIP code: 97405)*

1300. Michael Caparelli (*ZIP code: 90039)*

1301. Michael Cerny (*ZIP code: 94127)*
I live in San Francisco, CA, up in the Mt. Davidson neighborhood. There is a nice mountain called, Mt. Davidson where there is a beautiful eucalyptus forest that could definitely use some restoration work. I already picked up a bag bottle's, can's, and trash from the mountain. It's time to help the Golden State Poppy Orchard by pulling up the unwanted flower's and , weed's.

1302. Mark Cottrell (*ZIP code: 95948)*

1303. Scott McCardell (*ZIP code: 92065)*

1304. Kevin Mclarney (*ZIP code: 95030)*

1305. michael clifton (*ZIP code: 92123)*

1306. michael clifton (*ZIP code: 92123)*
Lets get endangered species status for this fish (and their habitats) as soon as possible!!

1307. Carol McMillan (*ZIP code: 95945)*

1308. Nadine McMillan (*ZIP code: 94602)*

1309. robert mcparland (*ZIP code: 93726)*

1310. Michael Culcasi (*ZIP code: 95125)*

1311. Malachi Curtis (*ZIP code: 95436)*

1312. Michael Driessnack (*ZIP code: 90016)*

1313. Megan Marble (*ZIP code: 93003)*
Please list the California steelhead on the endangered species act these fish need to be protected

1314. Melanie Abrams (*ZIP code: 94949)*

1315. Melissa Racklyeft (*ZIP code: 92011)*

1316. Melissa Bumstead (*ZIP code: 91307)*
I live in SoCal and this is important to me.

1317. Michael Fraser (*ZIP code: 94703)*

1318. maurice walcott (*ZIP code: 94019)*

1319. Mario Ontal (*ZIP code: 90027)*
Please.

1320. Mark Green (*ZIP code: 95409)*
Signing on behalf of Calwild.

1321. Michael Zubak (*ZIP code: 92882)*

1322. Melville Behrendt (*ZIP code: 94610)*

1323. MacKenzie Hein (*ZIP code: 91301)*
I've been trying to think of ways that I can do something about problems that are going on in the world. Signing on to this petition and letting officials know that people care about maintaining California's wildlife seems like the least that I could do.

1324. Michael Meneses (*ZIP code: 91340)*
We must protect our relatives who have done their part to care for this land we call home.

1325. Michael Meyer (*ZIP code: 92260)*

1326. Mike Zeug (*ZIP code: 91301)*
Lets bring these fish back to their home, my home!

1327. Michael Wittman (*ZIP code: 91360)*

1328. Michael Coleman (*ZIP code: 90042)*

1329. Michael Colemab (*ZIP code: 90042)*

1330. michael sieber (*ZIP code: 94062)*

1331. Michael Wellborn (*ZIP code: 92708)*

1332. Michael Meko (*ZIP code: 93420)*

1333. Michael Gassen (*ZIP code: 94941)*

1334. Michael McGannon (*ZIP code: 95003)*

1335. Michelle Reis (*ZIP code: 94619)*

1336. Michelle Velarde (*ZIP code: 94019)*
This is really important.

1337. Midi Berry (*ZIP code: 91301)*

1338. Michael Jon Bessie (*ZIP code: 92110)*
Please let’s reach our goal with signatures

1339. Michael Keller (*ZIP code: 92691)*

1340. Michael Hodgkinson (*ZIP code: 94549)*

1341. Michael Dyer (*ZIP code: 95949)*

1342. Mike Bobbitt (*ZIP code: 95476)*

1343. mike donia (*ZIP code: 92373)*

1344. Charles Michael Edelstein (*ZIP code: 95670)*

1345. Michael Warner (*ZIP code: 90274)*

1346. Mike Pugh (*ZIP code: 93110-4506)*

1347. Mike Stivers (*ZIP code: 92010)*

1348. MIKE FERGUSON (*ZIP code: 92119)*
Let's protect what is here.

1349. Robin Mitchell (*ZIP code: 94530)*

1350. Larry Miller (*ZIP code: 94566)*

1351. Millie Strawn (*ZIP code: 94928)*

1352. Michelle Bowman (*ZIP code: 92024)*

1353. Karen Boyarsky (*ZIP code: 90025)*
We can's save species that have already been extinguished, but we can act to save the steelhead. PLEASE DO SO.

1354. Karen Davis (*ZIP code: 91759)*

1355. Gillian Jacobs (*ZIP code: 90211)*

1356. C P (*ZIP code: 93003)*
Habitat is going away, leaving these fish vulnerable. We need to protect them!

1357. Jessika Mitchell (*ZIP code: 91405)*

1358. Dave Loomis (*ZIP code: 59804)*
Fished for steelies in Malibu Creek and Ventura River in the 70s.

1359. Mike Gilroy (*ZIP code: 91914)*

1360. Michelle Jimenez (*ZIP code: 90255)*

1361. Martin Loomis (*ZIP code: 94588)*

1362. Mary Smith (*ZIP code: 95521)*

1363. Ian Wilson (*ZIP code: 93060)*
Keep up the good work!

1364. Mary Lou Rosczyk (*ZIP code: 92562)*
I am totally supportative of California Department of Fish and Wildlife's study report that Southern California's Steelhead Trout are deserving of protection under the California Endangered Species Act. However, it is not enough to name the trout endangered if their habitat is not also improved.

1365. Michael Marsden (*ZIP code: 94553)*

1366. Michael McDevitt (*ZIP code: 94952)*

1367. Marshall Kilduff (*ZIP code: 94117)*

1368. Michael Montero (*ZIP code: 95066)*

1369. Michael Morgan (*ZIP code: 91355)*

1370. Mark Silbernagel (*ZIP code: 93023)*
Absolutely necessary for the wellbeing of our watersheds for the future.

1371. Mary Stites (*ZIP code: 97217)*

1372. Michael Paisano (*ZIP code: 94601)*

1373. M Obrien (*ZIP code: 94610)*

1374. Monica Campbell (*ZIP code: 91325)*

1375. Rachel Lu (*ZIP code: 90703)*

1376. John Wymore (*ZIP code: 92307)*

1377. Brian Bennett (*ZIP code: 98023)*

1378. Molly Morse (*ZIP code: 93103)*

1379. Molly Russ (*ZIP code: 93101)*

1380. Monique Tejada (*ZIP code: 91331)*

1381. Frank Toriello (*ZIP code: 96064)*

1382. Monique Streit (*ZIP code: 95945)*

1383. Monique Streit (*ZIP code: 95959)*

1384. Thomas Moore (*ZIP code: 95070)*

1385. Tobias Moore (*ZIP code: 97302)*

1386. Morgan Collings (*ZIP code: 95928)*

1387. Morgan Sarno (*ZIP code: 9140)*

1388. Brandon Beck (*ZIP code: 96148)*
Save the steelhead

1389. Marisol Pantoja (*ZIP code: 93313)*

1390. Michael Parrett (*ZIP code: 94901)*

1391. Michael Peratis (*ZIP code: 91311)*

1392. Peter Steinberg (*ZIP code: 91302)*
Save the Steelhead

1393. Mitchell Randall (*ZIP code: 98166)*

1394. Sergio Godoy (*ZIP code: 92703-1610)*

1395. Robert Gregg (*ZIP code: 93004)*

1396. MATTHEW R CLARK (*ZIP code: 94018-0652)*

1397. Larry Hardesty (*ZIP code: 93003)*

1398. Michael Riney (*ZIP code: 96067)*

1399. Dr. C.Mark Rockwell (*ZIP code: 93111)*
These fish have long been on the brink of extinction, and conditions are worse now than ever. It is a must that the state lists them under the CESA. Now is the time to act.

1400. Maricela Rodriguez (*ZIP code: 91010)*

1401. Judy Garrett (*ZIP code: 93454)*

1402. Tate Bankston (*ZIP code: 97701)*

1403. Anthony Castillo (*ZIP code: 90805)*

1404. Michael Welch (*ZIP code: 92092)*

1405. Jane Miller (*ZIP code: 93010)*

1406. Mark Borchert (*ZIP code: 91011)*
Save our steelhead; save our state; save our planet!

1407. Mike Schilling (*ZIP code: 97128)*

1408. Matthew Leyden (*ZIP code: 92596)*

1409. Mark Smithers (*ZIP code: 94574)*
Save ALL FISH. I don't want to eat non-wild farmed fish. That's like eating green pills from the book Soylent Green. Yuck.

1410. Mark Speer (*ZIP code: 95442)*
Put Southern California steelhead on the endangered species act.

1411. Michael Stone (*ZIP code: 90274)*

1412. Michael Tomlinson (*ZIP code: 95818)*

1413. Bill Hughes (*ZIP code: 29508)*
Bring wild fish back and protect them from 'fishers' who want to only eat them.

1414. Melissa Patten (*ZIP code: 95816)*
These fish are incredibly threatened and as a biologist I know how important listing status is for protecting a species. I support the endangered listing status!

1415. Mark Wilhelm (*ZIP code: 90266)*

1416. Mike Woods (*ZIP code: 89706)*

1417. Scott Carden (*ZIP code: 93001)*

1418. Myron Grossman (*ZIP code: 91104)*

1419. Naia Wilcox (*ZIP code: 93117)*

1420. Nancee Murray (*ZIP code: 95818)*
Southern California steelhead are on the brink of extinction and deserve CESA protection. Thank you.

1421. Nancy Pak (*ZIP code: 94598)*

1422. Nancy Ihara (*ZIP code: 95521)*

1423. Nick Deaver (*ZIP code: 94109)*

1424. Natalie Sampo (*ZIP code: 92337)*
save the steelhead!

1425. Nathan Sells (*ZIP code: 95124)*

1426. Nathaniel Ramos (*ZIP code: 95076)*

1427. Mayl (*ZIP code: 33301)*

1428. nathan charpentier (*ZIP code: J2c 6y2)*
protect our home water

1429. Noah Ben-Aderet (*ZIP code: 92037)*

1430. Nancy Babbott (*ZIP code: 93111)*

1431. Nathaniel Whitmill (*ZIP code: 37302)*

1432. neal hoffberg (*ZIP code: 98027)*
The steelhead must be saved.

1433. Neara Russell (*ZIP code: 91103)*

1434. William Flanders (*ZIP code: 91016)*

1435. Nenetzin Rodriguez (*ZIP code: 91702)*

1436. Cris Caldwell (*ZIP code: 95962)*
Please help

1437. Nicholas Barclay (*ZIP code: 96150)*

1438. Nicholas Tumbale (*ZIP code: 92626)*

1439. Nicolas Watson (*ZIP code: 92101)*

1440. Nicole Schager (*ZIP code: 92509)*
I wasn't confident that I would ever seen a SoCal steelhead, but I saw a few in 2017 in Santa Barbara and LA Counties. They are magnificent fish. I was once told that losing a species is like losing a letter in the alphabet. You lose information about life. They might not have huge numbers in Socal, but they are an important reminder of what our waterways used to be. They are a symbol of resilience.

1441. Levon Nishkian (*ZIP code: 94114)*

1442. Nabil Lachgar (*ZIP code: 94109)*

1443. Nicholas Hudson (*ZIP code: 95616)*

1444. Nick Loizeaux (*ZIP code: 94706)*
This is a no-brainer. Use Federal infrastructure funding to fix impediments to upstream migration. Crack down on unpermitted water diversions/aquifer pumping! Give these fish a chance!!!

1445. Noah Herbst (*ZIP code: 95928)*

1446. Noah Herbst (*ZIP code: 92024)*

1447. Garett Gentry (*ZIP code: 94114)*

1448. Kevin McRoberts (*ZIP code: 90278)* **1449.**

Nolan Le Vine (*ZIP code: 95928)* **1450. Jim**

Nomura (*ZIP code: 91106)*

1451. Colin Farrell (*ZIP code: 93003)*
This is the last chance for these fish. They have little habitat left land if there is any hope they need as many protections as possible.

1452. Nico Reyes (*ZIP code: 91106)*

1453. Nancy Krupa (*ZIP code: 92627)*

1454. Nicole Rosenberg (*ZIP code: 93950)*

1455. Nicholas Salle (*ZIP code: 92879)*

1456. Nancy Shrodes (*ZIP code: 90401)*

1457. Nathaniel Wilson (*ZIP code: 90404)*

1458. Mike Ricca (*ZIP code: 92656)*

1459. Orion Good (*ZIP code: 96114)*

1460. Donna Oliver (*ZIP code: 94904)*

1461. Olivia Henderson (*ZIP code: 95973)*

1462. Olivia VanDamme (*ZIP code: 94132)*

1463. Olivia Johnson (*ZIP code: 90034)*

1464. Oliver McGibben (*ZIP code: 93105)*

1465. Sierra Paliaga (*ZIP code: 95522)*

1466. Olwen Thomas (*ZIP code: SK15 3AD)*
I may not live in California but have visited your beautiful state from the UK and intend to as often as I can, it breaks my heart that this beautiful fish could be extinct in the near future, my bucket list number one is to travel the states to fish for all the trout species as they are my favourite fish and conservation is extremely important to me, please please list them on the endangered species list and help efforts to save them from extinction. Thank you deeply from the bottom of my heart, kind regards Olwen

1467. Omar Crook (*ZIP code: 90043)*
Save the steelhead!

1468. Mary Larson (*ZIP code: 90807)*
It's critical that this iconic keystone species be given full protection by the Fish & Game Commission. For southern California coastal watersheds, southern steelhead are the equivalent of a canary in a coal mine. Their presence in our watersheds is indicative of a healthy ecosystem that can sustain aquatic, terrestrial and avian wildlife.

1469. Mark D Brock (*ZIP code: 95252)*
Save the Steelhead!!

1470. Patricia Kowalski (*ZIP code: 92130)*

1471. Oli (*ZIP code: 14512)*

1472. Peter Abrams (*ZIP code: 94949)*
Steelhead are an indicator species!

1473. Hugo Montoya (*ZIP code: 94612)*

1474. Robert Leedy (*ZIP code: 94903)*

1475. KYLE DANIELS (*ZIP code: 90274)*
Let's all work to restore nature's balance for our future generations!

1476. Charles Page (*ZIP code: 94022)*

1477. Page Schult (*ZIP code: 90066)*

1478. Ralph Pagter (*ZIP code: 92706)*

1479. Paige Horvate (*ZIP code: 53202)*

1480. Benjamin Green (*ZIP code: 87025)*

1481. Pam Gates (*ZIP code: 93455)*

1482. Pam Nelson (*ZIP code: 92086-9275)*
steelhead habitat is good for all wildlife

1483. Stuart Park (*ZIP code: 96002)*
These steelhead need all the help they get !!!

1484. PATRICK BURKE (*ZIP code: 93004-2894)*

1485. Patrick McKee (*ZIP code: 98040)*

1486. Patricia Kline (*ZIP code: 92284)*

1487. Patrick Owen (*ZIP code: 91977)*

1488. Paul Jablon (*ZIP code: 90049-6610)*

1489. Paul Backes (*ZIP code: 91214)*
Save the trout for future generations to enjoy.

1490. Paul Bettelheim (*ZIP code: 94549)*

1491. Paul Kelsey (*ZIP code: 92679)*
I implore the state to affirm the listing of Southern Steelhead as endangered, and then make real progress ASAP to save this critical species from extinction!

1492. Paul Kretschmer (*ZIP code: 94044)*

1493. Paul Curtis (*ZIP code: 92029)*

1494. Dave Moore (*ZIP code: 91387)*

1495. Peter Moyle (*ZIP code: 95616)*

1496. Patrick Bock (*ZIP code: 95928)*

1497. Paul Jennings (*ZIP code: 91105)*
Restoring steelhead populations would be a wonderful thing to do, and small steps can make it start to happen.
1498. Phil Costic (*ZIP code: 91343)*

1499. Patrick Cousens (*ZIP code: 94706)* **1500.**

Paige A DeCino (*ZIP code: 92008)* **1501. Penny**

McLain (*ZIP code: 81505)*
I live out-of-state now but come to CA to fly fish with friends, Penny McLain

1502. Penny A Marrs (*ZIP code: 94513)*
Bring back the fish that belong here!

1503. Michael Rettie (*ZIP code: 94501)*
Please save our wild heritage.

1504. Pete Beck (*ZIP code: 95203)*

1505. Peter Galli (*ZIP code: 94960)*

1506. Peter Nistler (*ZIP code: 90505)*

1507. Peter Evans (*ZIP code: 94949)*

1508. Henry Castellanos (*ZIP code: 93101)*

1509. Peter Klingman (*ZIP code: 97223)*

1510. peter dorn (*ZIP code: 98102)*
we need to do what it takes to protect these iconic native fish

1511. Peter Steinhart (*ZIP code: 94301)*

1512. Peter Xander (*ZIP code: 92391-0502)*
In 1984, I was a staff member working on permits in Malibu, and the Tapia Water Treatment Plant came in for a permit to quadruple the size of their treatment capacity from 2 million gallons per day to 8 mgd. I conditioned the permit to require tertiary treatment of the effluent and to discharge all of the water into Malibu Creek, in order to protect the southern steelhead spawning and smolt rearing habitat in Malibu Lagoon and the lower part of Malibu Creek>

Even with Rindge Dam blockig th vast majority =of spawning habitat in Malibu and Cold Creeks, my brother caught and released over 3 dozen smolts EACH the year before, in February, 1983, during a break in that El Nino winter. We used 2# test line, ultralight gear, and 1/32 oz lures with barbless hooks to release all fish we caught. All were smolts, fresh in from the sea, with sea lice still attached to the anal fins -- what Rogue River steelheaders call "half-pounders. My brother hooked and later lost a 6 to 18 lb steelhead that was spawned out and resting, or else it would have towed him out to the Channel Islands.

It is shocking that 40 years after I took that action on the permit that kept the southern steelhead population ALIVE during droughts in the late1980s and early 1990s droughts, in which all streams dried up but for Malibu Creek, that the 75+number of fish my brother caught and released that day represents about the total size of the population of southern steelhead in much of its remaining habitat.

IMMEDIATE protections are needed. The Rindge Dam MUST be removed, the natural sand transport system restored, and the full watershed be available for upstream spawning and rearing habitat. That was my dream and fervent wish in 1984; it saddens and ticks me off that 40 years later, not enough has happened to restore Malibu Creek and other passage-blocking manmade obstructions nd save the species.

Saving the southern steelhead population, with their unique adaptations to the harsh conditions now found in an urbanized, global warming, screwed-up planet, MUST be saved. That very genetic diversity has kept scattered populations of ALL steelhead -- within a few years of reproduction, those survivors can pass on their genes and adaptations to a changing world and altered environment. But they PERSIST, barely, and we MUST protect them for future generations.

I want to show my young grandsons what it was like to catch and released unharmed steelhead that their PAPA had tried to save 4 decades ago. That was one of my very proudest achievements, but a spine injury eight years later ended my career as a resource planner, biologist, and inter- governmental agency negotiator whose Mitigation and Monitoring Program policy I wrote in 1988 to increase the amount of restored riparian habitat on a 4:1 basis and a 5-year monitoring program to ENSURE the viability of restored hanitat is STILL used by the State of California for all projects requiring the preparation of a Environmental Impact Report. The U.S. Fish and Wildlife Service and EPA used those same policies for projects all across the nation, until the SCTUS struck those down on a now disgustingly familiar 6-3 right-wing antigovernment Supreme Court vote that removed virtually ALL protected wetlands through the US, setting the stage for a level of environmental destruction not seen since the Industrial Revolution.

YOU can show the nation how resource management and endangered species protection can and MUST be done. Human are that rare species that does all it can to kill itself off, only instead of lemmings diving into the sea to drown, we're killing the entire damn planet. WE have to stand up for what's right. Please give the southern steelhead the protection it needs under California laws and regulations. Show the nation how to cope with changes wrought by urbanization, pollution, habitat loss, and pure reckless stupidity and show people even a critical "canary in the coal mine" species like the southern steelhead CAN be protected before their extirpation.

The choice is easy: Do the right thing, or kill off another valuable species through man's greed and stupidity. I'd like to think that we here i California are some of the remaining true keepers of the faith: We try to do the right thing, even when the situation is critical. THIS is one of those moments in history when you can DO the right thing.

1513. Peter Xander (*ZIP code: 92391)*
Cont….. When on the staff of the CA Coastal Commission's office in Long Beach, I conditioned a permit for the expansion of the Tapia Sewage Treatment Plant. Its wastewater came from out of the Malibu Creek watershed but discharged into upper Malibu Creek. They expanded from 2 mgd to 8, and I required upgrading to tertiary treatment and to discharge all treated effluent into Malibu Creek. This action made Malibu Creek a perennial stream. When droughts i the late 1980s and early 1990s dried up all other streams from Pt Conception to below the Mexican border, Malibu Creek was THE habitat of last resort for the southern steelhead. The NMFS action to declare populations of steelhead threatened or endangered credited that single permit action for keeping the southern steelhead from extinction.

You have the power to increase the protections for this critically endangered population. Please declare them endangered within the meaning of state law and protect this important population. Steelhead and salmon species and populations all have adaptations specific to their home habitats, and the massive introduction of hatchery-created monoculture "factory" rainbow trout has been one of the greatest threats to species and subspecies of trout and salmon species. Yet this endangered species still clings to life in heavily populated southern California and the devastating alteration to native habitats.

It is YOUR charge, your responsibility, to protect this endangered population of steelhead. Please DO so.

1514. Peter Judkins (*ZIP code: 80305)*

1515. An anonymous signer (*ZIP code: 93454)*

1516. Philip Swett (*ZIP code: 94960)*
Save the steelhead.

1517. Pamela Reagan (*ZIP code: 94044)*

1518. Joseph Knowles (*ZIP code: 91107)*

1519. Milton Reynolds (*ZIP code: 94577)*
Times is wasting, but there are actions we can take to protect this cornerstone species. An important first step in the process of saving these amazing fish is getting them listed as endangered. With this protection, we can begin the process of habitat restoration that will allow these fish an opportunity to rebound. Nature work when we allow it to do so. Please support the listing of the Southern California Steelhead so that future generations can witness this amazing fish and that we can do our part to repair some of the harms we have visited upon this species and its native environment.

1520. Franklin P Johnson Jr. (*ZIP code: 94301)*

1521. Brad Gibson (*ZIP code: 90814)*

1522. Robert Piziali (*ZIP code: 94515)*
Please protect Southern California steelhead

1523. Priscilla Klemic (*ZIP code: 91401)*

1524. Patrick McGaugh (*ZIP code: 92507)*

1525. Paul Lester (*ZIP code: 95632)*

1526. Phil Martin (*ZIP code: 97703)*

1527. Paul Martin (*ZIP code: 90272)*

1528. John Tobin (*ZIP code: 91107)*

1529. Matt Friedman (*ZIP code: 95401)*
Save the fish!!

1530. Roxanne Caudill (*ZIP code: 93536)*

1531. Henry Poett (*ZIP code: 59854)*

1532. Ryan Spaulding (*ZIP code: 95503)*

1533. Douglas Daniels (*ZIP code: 93455)* **1534.**

Patrick Shannon Sr. (*ZIP code: 94610)* **1535. Paul**

Cooley (*ZIP code: 90232)*

1536. Bernie Ecker (*ZIP code: 91335)*

1537. Erica Poppen (*ZIP code: 93446)*

1538. Priscilla Torres (*ZIP code: 91601)*

1539. Kevin Allen (*ZIP code: 94517)*

1540. Josh Pryor (*ZIP code: 92675)*

1541. Philip Salibi (*ZIP code: 95005)*

1542. Paul Finkle (*ZIP code: 94904)*

1543. Pamela Smithers (*ZIP code: 94574)*

1544. Phil Starke (*ZIP code: 95120)*

1545. Peter Kim (*ZIP code: 91307)*

1546. Rick Hordin (*ZIP code: 96150)*
It's rather pathetic that we don't just shut down all salmon & steelhead fisheries for next 5 years, and then open them - say every 3 years - for small windows until a quantitative resurgence is realized.

1547. Carrie Barlow (*ZIP code: 94549)*
Save the fish!

1548. Gina Kelley (*ZIP code: 94062)*
Let's get this
done!!
Gina Kelley

1549. Daniel Dillinger (*ZIP code: 95765)*
Let's work to get Southern Steelheads back!

1550. Peter Weinberger (*ZIP code: 90035)*

1551. Vanessa Perez (*ZIP code: 91387)*

1552. Julie Goldberg (*ZIP code: 90064)*

1553. Quentin Fulsher (*ZIP code: 92122)*

1554. Ronni Burgess (*ZIP code: 92311)*

1555. Rachel Bennett (*ZIP code: 95818)*

1556. Rachel (*ZIP code: 94044)*

1557. Rachel Kinnunen (*ZIP code: 94117)*

1558. J. Bruce Johnson, DDS (*ZIP code: 91011)*
Long overdue!

1559. michelle rainville (*ZIP code: 93101)*
There is no time to waste, please list Southern California Steelhead Trout as an Endangered Species without delay, so that actions can begin to save them!

1560. Ralph Hinton (*ZIP code: 96080)*
Seems obvious

1561. Mike Irwin (*ZIP code: 93101)*

1562. Ramilo Delos Reyes (*ZIP code: 91355)*
1563. Ramona Garcia (*ZIP code: 91355)*

1564. Lazara Ramos (*ZIP code: 94110)*

1565. Randell Gribben (*ZIP code: 95608)*
Yes, I lived in Oceanside CA, and on a few occasions seen the steelhead in 2 marine corps base creeks

1566. randy bender (*ZIP code: 93314)*

1567. Joel Rawlins (*ZIP code: 92653)*
Once they are gone, they are gone.

1568. David Raymaker (*ZIP code: 95037)*
I support adding Southern CA Steelhead to the CA Endangered Species Act. The loss of steelhead and the environment they thrive is a direct result of human impact on the ecosystem. Time to reverse course and do our part to save the steelhead, cleanup the ecosystem and return the steelhead to its once thriving levels.

1569. Ron Zigelhofer (*ZIP code: 95667)*

1570. Roger Backlar (*ZIP code: 93065)*

1571. Rich Moore (*ZIP code: 94402)*
Here's to protecting the Southern Steelhead and to ensuring healthy waterways throughout California.

1572. Dick Neuman (*ZIP code: 87107)*

1573. Robert Brodberg (*ZIP code: 95616)*

1574. Robert Burks (*ZIP code: 83714)*

1575. Robert Abbott (*ZIP code: 95492)*

1576. Robert Caron (*ZIP code: 96150)*

1577. Danielle Picciano (*ZIP code: 91304)*

1578. Ron Coulter (*ZIP code: 93923)*
Please save the southern steelhead species. Put them under the ESA and clean up the southern streams and rivers.

1579. Richard Spott (*ZIP code: 59715-8705)*

1580. Robert Woolery (*ZIP code: 91362-3516)*

1581. Darrell Boyle (*ZIP code: 95032)*

1582. Ronald Dean (*ZIP code: 90272)*

1583. Randy Klein (*ZIP code: 95521)*

1584. Robert Leedy (*ZIP code: 94903)*

1585. Reagan Smail (*ZIP code: 94602)*

1586. Becca Fernandez (*ZIP code: 90640)*
Save the truth! I _ fish

1587. Rebecca Williams (*ZIP code: 94568)*

1588. Ralph Barrett (*ZIP code: 95628)*

1589. Chad Roberts (*ZIP code: 95617)*

1590. STEVE SCHRAMM (*ZIP code: 94952)*

1591. Reid Blaich (*ZIP code: 93001)*

1592. Rob Kilbourne (*ZIP code: 95667)*

1593. Reoh Darwell (*ZIP code: 92021)*
These fish once swam thru the valley behind my house. They dont anymore, but could return one day. They need the protection that could enable that salvation.

1594. Ray Evans (*ZIP code: 93110)*

1595. Richard Gienger (*ZIP code: 95589)*
& on behalf of Forests Forever

1596. Suzanne Rhoades (*ZIP code: 89439)*

1597. Rob Hutsel (*ZIP code: 92106)*

1598. Grant Volk (*ZIP code: 95765)*

1599. Rich Huddleston (*ZIP code: 94010)*

1600. Richard Miller (*ZIP code: 95959)*

1601. Richard Favela (*ZIP code: 91786)*

1602. Richard Harvey (*ZIP code: 93446)*

1603. Richard Harrington (*ZIP code: 97045)*

1604. Richard Roggia (*ZIP code: 95020)*

1605. Richard Riley (*ZIP code: 91711)*

1606. Matt Richardson (*ZIP code: 94123)*
We must do everything we can now to protect these native water diamonds and all State biodiversity esp given accelerating climate change

1607. Rich Burns (*ZIP code: 92886)*

1608. Charles Criswell (*ZIP code: 95062)*

1609. Richard Fricke (*ZIP code: 91405)*

1610. richard robinson (*ZIP code: 92021)*
supporting anything to protect pur fisheries.

1611. Rick Wieloh (*ZIP code: 83001)*
Please work to save and restore S CA steelhead.   Congrats on Klamath reatoration win

1612. Rick Lee (*ZIP code: 96817)*

1613. Rick Manley (*ZIP code: 92110)*
How fabulous it would be to see Steelhead in our river!

1614. Rick Price (*ZIP code: 92024)*

1615. Lee Ricks (*ZIP code: 59602)*
Please list the Southern California steelhead on the state’s endangered species list aid this iconic fish’s recovery.

1616. Christy Wheatley (*ZIP code: 95521)*

1617. Trevor Ritter (*ZIP code: 91106)*
Please let’s save the Steelhead!

1618. Judith Stauffer (*ZIP code: 93427)*

1619. Robert Zasoski (*ZIP code: 95616)*

1620. Richard Kenvin (*ZIP code: 92102)*
Protect watersheds.

1621. Robert Bettinger (*ZIP code: 95616)*

1622. Ryan Hinshaw (*ZIP code: 95468)*
Please protect these fish at all costs

1623. Ron Kammann (*ZIP code: 94115)*

1624. Richard Luczyski (*ZIP code: 91104)*

1625. richard yamasaki (*ZIP code: 91731)*

1626. Rick Macala (*ZIP code: 95608)*

1627. Robert Matlock (*ZIP code: 92104)*

1628. Roy Hedin (*ZIP code: 95519)*

1629. Ron Midyett (*ZIP code: 93420)*

1630. Robert Menard (*ZIP code: 94024)*
Please save the Southern Steelhead

1631. Robert Oliver (*ZIP code: 94904)*

1632. Richard Morrison (*ZIP code: 94904)*

1633. Ronald Yoshiyama (*ZIP code: 95616)*
Southern Steelhead are the southernmost anadromous salmonid in North America and are unique.

1634. Neil Jay Mendoza (*ZIP code: 94590)*

1635. John Gross (*ZIP code: 97478)* **1636.**

Robby O'Hara (*ZIP code: 90290)* **1637. Robert**

Crompton (*ZIP code: 95010)*

1638. Robert Fletcher (*ZIP code: 93110)*
SAVE OUR NATIVE STEELHEAD!!!

1639. Robert Anderson (*ZIP code: 94114)*

1640. Robert Peterson (*ZIP code: 97219)*

1641. Robert Yin (*ZIP code: 92037)*

1642. Bob Zimmerman (*ZIP code: 93105)*

1643. Robin Mccormack (*ZIP code: 91602)*
Save the steelhead!

1644. Rocky Taylor (*ZIP code: 97537)*

1645. Robert Roff Barnett (*ZIP code: 95432)*
Our rivers and the fish and wildlife in them are part our heritage that we cannot afford to loose. We owe it to our children and grandchildren to leave them an intact and sustainable environment that they can enjoy and leave intact for their children and grandchildren .

1646. Ron Gregg (*ZIP code: 92675)*
I support saving the trout and steelhead and support protecting Steelhead under CESA. I can volunteer to help, I live in San Juan Cap near 3 of the projects. What can I do ?

1647. Ron Merkord (*ZIP code: 93015)*

1648. Rose Lynch (*ZIP code: 95926)*

1649. Rosemary Evans (*ZIP code: 90815)*

1650. Rosi Dagit (*ZIP code: 90290)*

1651. Ross Damman (*ZIP code: 90032)*

1652. Ross Heckmann (*ZIP code: 91006)*

1653. KATHLEEN SCHARTZ (*ZIP code: 93455)*

1654. tom fahey (*ZIP code: 95667)*
Don't let the fish die off

1655. Antonio Rovira (*ZIP code: 66230)*
A. Rovira

1656. Kathleen Berridge (*ZIP code: 95817)*

1657. Roy LITTLE (*ZIP code: 94920)*
I remember Malibu Creek in the 80's. The LA Times ran pictures of steelhead caught in the Creek. It's not too late.

1658. Ryan Poff (*ZIP code: 95361)*

1659. Richard West (*ZIP code: 94611)*

1660. Robert Silva (*ZIP code: 95252)*

1661. Randy Renick (*ZIP code: 91103)*

1662. Rick Martinez (*ZIP code: 91701)*

1663. Robert Giusti (*ZIP code: 95124)*

1664. Ryan Waldrep (*ZIP code: 28704)*
Save Southern Steelhead and their generic diversity!

1665. Robert Yeager (*ZIP code: 90291)* **1666.**

Ron Tatsui (*ZIP code: 91001)* **1667. Rebecca**

Ramirez (*ZIP code: 90401)*

1668. Rich Terwilliger (*ZIP code: 95742)*

1669. Ruben Alarcon (*ZIP code: 93003)*

1670. Luis Rincon (*ZIP code: 90031)*

1671. Kevin Foley (*ZIP code: 92865)*

1672. Bradley Upton (*ZIP code: 94510)*

1673. Bonnie Randall (*ZIP code: 91381)*

1674. Russell Quistgard (*ZIP code: 961500)*

1675. Ruth Kilday (*ZIP code: 91377)*

1676. Rhys Dapar (*ZIP code: 95066)*

1677. Robert Vogt (*ZIP code: 95501)*

There are no excuses for allowing this species to become extinct. Please do all you can to not let this happen

1678. An anonymous signer (*ZIP code: 93160)*

1679. Ralph Waycott (*ZIP code: 90265)*

1680. Richard Wegman (*ZIP code: 93023)*
Please save our Steelhead!!

1681. Dagwood Smithers (*ZIP code: 92399)*

1682. Ryan Blaich (*ZIP code: 93001)*
I spent a year monitoring populations of Southern California steelhead populations and it was quite apparent that any of these populations are hardly stable. Without proper listing and funding these incredible fish will disappear from places they've called home for thousands and thousands of years.

1683. Ryan Johnson (*ZIP code: 84103)*
Please save the steelhead

1684. Ryan Hoguet (*ZIP code: 94117)*
Yes please steelies

1685. RYAN HITCHINGS (*ZIP code: 93238)*

1686. Ryan Kosh (*ZIP code: 95662)*
Love these fish! Let's do what we can to keep them, including restoring habitat and removing useless dams like Matilija.

1687. Ryan Bullen (*ZIP code: 80204)*

1688. Rylee Walker-patterson (*ZIP code: 96080)*

1689. Stacy Fortner (*ZIP code: 91354)*

1690. Spencer Anenberg (*ZIP code: 91362)*

1691. Sean Starr (*ZIP code: 93312)*

1692. Sabrina Nelson (*ZIP code: 94619)*

1693. Sabrina Lopez (*ZIP code: 91702)*

1694. Sage Boek (*ZIP code: 95472)* **1695.**

Omar A Saleh (*ZIP code: 93110)* **1696. Sam**

Yee (*ZIP code: 95693)*
stop farming saline desert soils to save water for native salmon & steelhead

1697. Sam Norris (*ZIP code: 93923)*

1698. Samantha Luevano (*ZIP code: 90660)*

1699. Samuel Thomas (*ZIP code: 91360)*

1700. Sam weiss (*ZIP code: 80303)*

1701. Medwin Peck (*ZIP code: 92646)*

1702. Sara Waters (*ZIP code: 94553)*

1703. Sarah Walton (*ZIP code: 96002)*

1704. Sarah Brooks (*ZIP code: 95560)*
Please protect these amazing fish!

1705. Sarah Kesty (*ZIP code: 92028)*

1706. Sarah Nava (*ZIP code: 93551)*

1707. Sarah (*ZIP code: 93001)*

1708. Sasha Burik (*ZIP code: 90034)*
Biodiversity is of the utmost importance to our continued existence on this planet.

1709. Esteban Atkinson (*ZIP code: 78526)*
Save the trout!

1710. Reilly Sauer (*ZIP code: 95062)*
This is too important

1711. Tandora Grant (*ZIP code: 92104)*

1712. steve baloff (*ZIP code: 94027)*

1713. Kristi KirkPatrick (*ZIP code: 93110)*
Do this now before it's too late...PLEASE!

1714. Cameron Carey (*ZIP code: 93117)*

1715. Sarah Hearon (*ZIP code: 93105)*

1716. Scott Bivens (*ZIP code: 92692)*

1717. Stephen Black (*ZIP code: 97754)*

1718. Scott Boller (*ZIP code: 91344)*

1719. Scot Butnd (*ZIP code: 93422)*
Save them!!!

1720. Shauni Calhoun (*ZIP code: 92585)*

1721. Sophia Cancelmo (*ZIP code: 93003)* **1722.**

Stephen Caplan (*ZIP code: 95125)* **1723. Shane**

Caudill (*ZIP code: 92395)*
Please help support this!

1724. Steve Curran (*ZIP code: 93546)*

1725. George Sutherland (*ZIP code: 92673)*

1726. Peter Scharnell (*ZIP code: 30024)*

1727. Joel Schilling (*ZIP code: 93514)*

1728. Jeanette Schulz (*ZIP code: 95618)*
Southern California Steelhead thrived in creeks since time immemorial providing a vital source of food for California Tribes. They are a good game fish today. This endemic fish deserves to be protected and listed so that we may enjoy seeing them in an improved ecosystem that benefits everyone.

1729. Elizabeth Schwegler (*ZIP code: 90804)*

1730. Samuel Cohen (*ZIP code: 94952)*
Steelhead a precious resource that shouldn't be lost to future generations. What's good for steelhead is good for riparian habitat and all the species including humans that use California's precious streams.

1731. Scot Gray (*ZIP code: 94510)* **1732. L**

Scott Clark (*ZIP code: 90066)* **1733. Scott**

Harada (*ZIP code: 92603)*

1734. Scott Bennett (*ZIP code: 35226)*

1735. Scott McLeod (*ZIP code: 95442)*

1736. John Moreno (*ZIP code: 96068)*
Save the damn fish!

1737. An anonymous signer (*ZIP code: 95432)*

1738. Syeve Croockewit (*ZIP code: 95833)*

1739. Steve Castles (*ZIP code: 92336)*

1740. Sam Dasher (*ZIP code: 95691)*

1741. steve demetor (*ZIP code: 92325)*

1742. Steve Demetor (*ZIP code: 92325)*

1743. charlene price (*ZIP code: 92037)*

1744. Barrett Edgar (*ZIP code: 95521)*

1745. Genell Fitch (*ZIP code: 95549)*
Please assist with survival of the Southern California steelhead.

1746. Sean O'Brien (*ZIP code: 94563)*

1747. Laura Bermudez (*ZIP code: 95691)*

1748. Makenzie Collins (*ZIP code: 98103)*
No animal should go extinct!

1749. Sebastien Ballesteros (*ZIP code: 90402)*

1750. Sebastian Vazquez (*ZIP code: 94547)*

1751. Abbie Sedillos (*ZIP code: 90275)*

1752. Sarah Flamm (*ZIP code: 49071)*

1753. Steven Esgate (*ZIP code: 91344)*

1754. Seth Blackamore (*ZIP code: 93514)*

1755. Seth Simchowitz (*ZIP code: 92651)*

1756. Stephen Fiduk (*ZIP code: 92708)*

1757. Steven Goodman (*ZIP code: 87506)*

1758. Stephanie Gebhardt Rath (*ZIP code: 90638)*

1759. Jack Cliff (*ZIP code: 92008)*

1760. Patrick Dunn (*ZIP code: 92084)*

1761. Shane Connolly (*ZIP code: 83340)*
The time is now please take action!

1762. Shane Stalling (*ZIP code: 97459)*
These fish are too special to not protect.

1763. Shane Yellin (*ZIP code: 92008)*

1764. Brianna Lopez (*ZIP code: 91702)*

1765. Shea Millan (*ZIP code: 92596)*

1766. Shellie Kirby (*ZIP code: 94563)*

1767. Sherry Butler (*ZIP code: 95928)*

1768. Shirley Lalicker (*ZIP code: 90250)*

1769. Lucie Simmons (*ZIP code: 93q)*

1770. Simon McMahon (*ZIP code: 59802)*

1771. Stephen Ferry (*ZIP code: 93111)*

1772. Sean Herring (*ZIP code: 92646)*
Save the southern steelhead!!

1773. Stephen Karr (*ZIP code: 95616)*

1774. Shawn Kelly (*ZIP code: 93001)*

1775. Scott Mills (*ZIP code: 92673)*

1776. SHARON MURO (*ZIP code: 92503)*
I support this petition.

1777. Mitchell Skpver (*ZIP code: 48002)*

1778. Steve Robb (*ZIP code: 94070)*

1779. Deirdre Black (*ZIP code: 90004)*

1780. Nils Slattum (*ZIP code: 91320)*

1781. Daryl Slawnikowski (*ZIP code: 92307)*
Save Southern California Steelhead and save are Watershed

1782. Stephen Kanne (*ZIP code: 90403)*

1783. Mario Rodriguez (*ZIP code: 90042)*

1784. Robert Watson (*ZIP code: 94566)*

1785. Sylvia Sykora (*ZIP code: 94611)*
How many more species will go to extinction because we fail to act? We must not allow this to happen to the Southern California Steelhead.

1786. Daniel Sullivan (*ZIP code: 96150)*

1787. Steve Merlone (*ZIP code: 94025)*

1788. Vincent Sereno (*ZIP code: 95223)*

1789. Christopher Berry (*ZIP code: 91208)*

1790. steve nelson (*ZIP code: 90274)*
We've lost Enuf of our past already and this would be a great shame!!

1791. Kevin Christian (*ZIP code: 91766)*

1792. Donna Lenahan (*ZIP code: 91103)*

1793. Chris Lewis (*ZIP code: 91741)*

1794. Cece Rubin (*ZIP code: 91361)*

1795. Omer Thompson (*ZIP code: 94037)*

1796. Steven Olivas (*ZIP code: 91104)*

As a southern CA trout angler it is extremely important to me that Southern CA steelhead are protected for future generations.

1797. Shelly Backlar (*ZIP code: 91304)*
No more extirpated species! Let's bring the steelhead back into our rivers and watersheds!

1798. Sophia McGibben (*ZIP code: 93105)*

1799. Sophie Loire (*ZIP code: 93022)*

1800. Jeanne Sparks (*ZIP code: 93455)*

1801. Spencer James (*ZIP code: 132"1 lucky Spur lane corona Ca)*

1802. Spencer Neumann (*ZIP code: 90402)*

1803. John Barrena (*ZIP code: 95503)*
The time is now to save this iconic Californian s subspecies. Let's make it happen for the benefit of all generations to come.

1804. Artin Marootian (*ZIP code: 91206)*

1805. Zachary Spotts (*ZIP code: 94521)*

1806. Steve Reizes (*ZIP code: 91403)*
Save the southern steelhead, an important part of our natural California ecosystem and under a century of pressure from urban centric non-nature flood control infrastructure.

1807. Steven Hager (*ZIP code: 92692)*
It is essential that maximum effort be applied to saving Southern California steelhead! Action is needed now!

1808. Steven Schlegel (*ZIP code: 90248)*

1809. Steve Seville (*ZIP code: 99224)*
List them, save the species

1810. Scott Shaffstall (*ZIP code: 92676)*
I grew up with these trout 25 years ago - now they're gone. Please bring them back so my kids can enjoy a future as rich as our past.

1811. Scott Smith (*ZIP code: 94526)*
Scott Smith

1812. Susan Trolle (*ZIP code: 06611)*

1813. Steve Nakawatase (*ZIP code: 97707)*

1814. Sean Solway (*ZIP code: 94960)*

1815. Stanley Ito (*ZIP code: 91007)*
-

1816. Joel Phillips (*ZIP code: 83833)*
Go Trout

1817. Stanley Ohara (*ZIP code: 95746)*

1818. Karen Hall (*ZIP code: 93060)*
Southern Steelhead are indigenous to So California and uniquely adapted to survive our rounds of heavy rains and drought. Please protect these incredible resilient fish, especially as it has taken decades to remove dams and other obstructions to thier native spawning grounds, inhibiting their annual migrations.

1819. John Sullivan (*ZIP code: 93105)*

1820. Jeff Bright (*ZIP code: 94103)*

1821. JOHN HALE (*ZIP code: 94560)*

1822. Kesley Gallagher (*ZIP code: 91361)*

1823. Stefan Gerard (*ZIP code: 94941)*

1824. Steve Fioretti (*ZIP code: 94025)*
Let's preserve this vital species! Extinction is forever!

1825. Stephen Schmidt (*ZIP code: 92107)*

1826. Steven Mar (*ZIP code: 91030)*

1827. Steven Cates (*ZIP code: 95831)*
Anadromous fish numbers continue to decline. Please take action to protect these fish.

1828. Steven Duever (*ZIP code: 78748)*

1829. Steven Raffin (*ZIP code: 95749)*
Save So. CA steelhead, as best as can be done....

1830. Steven Rudolf (*ZIP code: 06804)*

1831. Steven Ochoa (*ZIP code: 90031)*

1832. Steven Hoffman Hoffman (*ZIP code: 95014-1065)*

1833. Steven Bengis (*ZIP code: 92075)*

1834. Steve Williams (*ZIP code: 90291)*
As a Conservation Biologist for the RCDSMM, I've done snorkel surveys for these fish for 20+ years, and can attest that they are becoming increasingly rare and deserve protection with Endangered status.

1835. Steve Sturken (*ZIP code: 95133)*

1836. Larry Strauss (*ZIP code: 95946)*

1837. Stuart Grusin (*ZIP code: 90405)*
Please act and help us save the Southern California steelhead!

1838. Scott Yamamoto (*ZIP code: 93010)*

1839. Andrew Hall (*ZIP code: 90277)*

1840. Susan Swan (*ZIP code: 92101)*
I am counting on your leadership. We need to keep the steelhead alive.

1841. Sonia Fletcher (*ZIP code: 96067)*

1842. Susan Valle (*ZIP code: 91942)*
We must act urgently to prevent the irreversible loss of Southern California Steelhead!

1843. Susan Divine (*ZIP code: 92101)*

1844. Sherry Vatter (*ZIP code: 90034)*
Please protect the health and viability of California's river ecosystems. We deserve to inhabit an environment full of living things rather than dead human materials.

1845. Stephen Verigin (*ZIP code: 94510)*

1846. Scott Vogelsong (*ZIP code: 90045)*
If you work for fish and game and a steelhead species goes extinct on your watch…what was it for then?

1847. Steven Volski (*ZIP code: 90631)*
I support the efforts to save the steelhead population!!

1848. Steven Waterloo (*ZIP code: 94960)*

1849. Caleb Kleist (*ZIP code: 49801)*

1850. Hector Moreno (*ZIP code: 93065)*
SAVE THE TROUT!!!

1851. Steve Woodward (*ZIP code: 93111)*

1852. Sydney Martinez (*ZIP code: 91006)*

1853. Syl Arena (*ZIP code: 93446)*
Native species deserve our protection and stewardship.

1854. Sylvia Strike (*ZIP code: 90046)*
Today's society must take steps to protect this important species for our children and grandchildren. It is part of their heritage

1855. Tabasa Ozawa (*ZIP code: 90057)*

1856. Adam Franklin (*ZIP code: 95073)*

1857. Greg Takata (*ZIP code: 94024)*

1858. Cindy Mitchell (*ZIP code: 91790)*

1859. tami donnelson (*ZIP code: 95926)*

1860. Vincent Tang (*ZIP code: 90039)*
I support the listing of the Southern California steelhead on the endangered species list.

1861. Johanna Smith (*ZIP code: 95254)*

1862. Tara Saylor (*ZIP code: 93023)*

1863. Terry Roznos (*ZIP code: 90602-2703)*

1864. Tatiana Stanton (*ZIP code: 90043)*

1865. Thomas Woodman (*ZIP code: 93265)*
Southern waters are no less important than any other aquatic system in our beautiful state.

1866. Taylor Christenson (*ZIP code: 84404)*

1867. Taylor Gaw (*ZIP code: 94115)*

1868. Thomas BenzingI (*ZIP code: 95959)*
These fish need a chance to recover. Given the last couple years and additional moisture in Southern California with our help they might just have a chance.

1869. Taylor Bingaman (*ZIP code: 95682)*
Save the steelhead!!!

1870. William Krivan (*ZIP code: 95125)*
The work CalTrout and others have done persuasively show the crisis and the need to real action to save this importance species.

1871. Thomas Pelikan (*ZIP code: 93923)*

1872. Tina Brenza (*ZIP code: 93111)*

1873. Tyler Brewster (*ZIP code: 90603)*

1874. Trygve Sletteland (*ZIP code: 92652)*
We must not allow the Southern steelhead to go extinct as a species!

1875. Timothy Burr (*ZIP code: 92064)*

1876. Thomas Bush (*ZIP code: 94118)*

1877. Thomas Carnessale (*ZIP code: 92020)*

1878. Jeffrey Carr (*ZIP code: 95628)*

1879. CHALMER CAUDILL (*ZIP code: 92295)*
Use some common sense!

1880. Tom Carson (*ZIP code: 95135)*

1881. Tom Simmons (*ZIP code: 93101)*

1882. Daniel Eckhard (*ZIP code: 94960)*
Please do the right thing and protect our Southern California steelhead from extinction. You only get this one chance.

1883. Terry Sternberg (*ZIP code: 94939)*

1884. Terry Manson (*ZIP code: 92592)*

1885. Terry Welsh (*ZIP code: 92626)*

1886. Terry Saucier (*ZIP code: 91356)*
We must move quickly and decisively to save important native species - from the negative impacts of climate change, pollution, and disruption/destruction of habitat. We must protect the Southern California Steelhead and other species before they are gone forever. Future generations are depending on it!

1887. Tevin Schmitt (*ZIP code: 91350)*

1888. TREVOR FAGERSKOG (*ZIP code: 95747)*

This listing is long overdue. Please protect Southern Steelhead from extinction post haste with an endangered listing under CESA.

Thank You,
Trevor S. Fagerskog
Trout Unlimited California Council, Chair

1889. Terry Fernandez (*ZIP code: 93105-2410)*
Please help save this iconic species.

1890. Tony Frascotti (*ZIP code: 02116)*

1891. Barry Temple (*ZIP code: 92374)*

1892. Theresa Acerro (*ZIP code: 91911)*
Southern California Steelhead Trout need to be listed ASAP so projects can get underway to help them survive in our rivers.

1893. Thamar Draper (*ZIP code: 92596)*

1894. Jeff Crenshaw (*ZIP code: 94549)*
Save the steelhead!

1895. Brett Cole (*ZIP code: 95658)*

1896. Joanne Irish (*ZIP code: 90803)*
Please protect this vital natural resource.

1897. Jonathan Kim (*ZIP code: 92128)*
The southern California steelhead is a unique population adapted to environments that other rainbow trout are not found in, and deserve special attention and research to preserve their population.

1898. Jayni Shuman (*ZIP code: 90290)*

1899. Kyle Tzeo (*ZIP code: 97086)*
SAVE THE STEEHEALD!!!

1900. Jay Shields (*ZIP code: 90066)*

1901. Thomas Hofweber (*ZIP code: 48302)*

1902. Thomas Wendorff (*ZIP code: 80016)*

1903. Thomas Brady (*ZIP code: 90027)*

1904. Thomas Weseloh (*ZIP code: 95519)*

1905. Thom Jaquysh (*ZIP code: 94118)*

1906. Thor Darwell (*ZIP code: 92040)*

1907. Tim Wallack (*ZIP code: 93103)*

1908. timothy reuling (*ZIP code: 95436)*
Honestly......The US and CA govts need to be in full support of maintaining...and importantly, restoring the habitat of the So Steelhead. Let's do the best we can ,

1909. Timothy Bartley (*ZIP code: 93514)*

1910. Tim Bosveld (*ZIP code: 91042)*

1911. Tim Howe (*ZIP code: 94611)*
Steelhead are hanging by a thread. Please help them.

1912. Tim Huckaby (*ZIP code: 92008)*

1913. Tim Swan (*ZIP code: 95437)*

1914. Timmarie Hamill (*ZIP code: 95926)*

1915. Tim Rice (*ZIP code: 95010)*

1916. tim polishook (*ZIP code: 94131)*
Thank you

1917. Christima Frazer (*ZIP code: 92122)*

1918. Tina Johnson (*ZIP code: 93003)*
Please and thank you.

1919. Christine Schwartz (*ZIP code: 92845)*

1920. Tina Segura (*ZIP code: 90405)*

1921. Tim Ikeda (*ZIP code: 93612)*

1922. thomas pate (*ZIP code: 95670)*

1923. Thomas Williams (*ZIP code: 86303)*
Born and raised in Santa Barbara. Have seen many steelhead as a youngster, prior to Cachuma Dam and overuse of the aquifer decimating the runs.

1924. Tina Gonzalez (*ZIP code: 91711)*

1925. lily vizcaino (*ZIP code: 90068)*

1926. Todd Rulon-Miller (*ZIP code: 93111)*
Save our fish

1927. George Robinette (*ZIP code: 94010)*

1928. Thomas Farrell (*ZIP code: 93010)*

1929. Tom Burt (*ZIP code: 93110)*
Save these beautiful creatures!

1930. Tom Paplia (*ZIP code: 92630)*

1931. Thomas McGee (*ZIP code: 94044)*

1932. Thomas Curran (*ZIP code: 90720)*
We must save steelhead!

1933. Tom Her (*ZIP code: 53151)*

1934. John Tomlinson (*ZIP code: 91024)*

1935. Steven Woodbury (*ZIP code: 95032)*

1936. Thomas Austin (*ZIP code: 94618)*

1937. Tom Scripps (*ZIP code: 94574)*
Please

1938. Tom Shepherd (*ZIP code: 94928)*

1939. Tom Tartaglione (*ZIP code: 91016)*

1940. Rob Toth (*ZIP code: 93514)*
If not us, who? If not now, when?

1941. mark Towery (*ZIP code: 94549)*
Please let's not let this important species die out. We can protect it.

1942. Thomas Parry (*ZIP code: 94610)*

1943. Tania Pineda (*ZIP code: 90230)*

1944. Tony Quiroz (*ZIP code: 91104)*

Steelhead are important to save.

1945. Tracey Willfong (*ZIP code: 93108)*

1946. Chuck Nelson (*ZIP code: 92647)*

1947. Tim Burwell (*ZIP code: 90275)*

1948. Trevor Thibaut (*ZIP code: 96145)*

1949. Tricia Elisara (*ZIP code: 920236)*
We cannot lose this species!

1950. David Williams (*ZIP code: 92647)*

1951. Jason Muller (*ZIP code: 93003)*

1952. John Triska (*ZIP code: 94062)*

1953. Tristan Woolacott (*ZIP code: 95610)*

1954. Tom Rosenow (*ZIP code: 95973)*

1955. Richard May (*ZIP code: 94127)*
Must save this iconic fish!

1956. Rick Remedi (*ZIP code: 93012)*
Please save the California steelhead

1957. Julia Mitchell (*ZIP code: 94941)*
I fully support listing Southern steelhead as endangered under California's ESA! We must protect our fish!

1958. Douglas Churchill (*ZIP code: 94121)*

1959. T P (*ZIP code: 95726)*

1960. David Carranza (*ZIP code: 93063)*

1961. Tim Haddon (*ZIP code: 96145)*

1962. Alfredo Mascote (*ZIP code: 92582)*

1963. Tim Victor (*ZIP code: 90066)*

1964. Tim Quirante (*ZIP code: 96839)*

1965. Terry Treiber (*ZIP code: 92106)*

1966. Robert Tucker Biorn (*ZIP code: 94301)*

1967. Mike Miller (*ZIP code: 93012)*

1968. Thelma de Castro (*ZIP code: 92115)*

1969. Adam Johnson (*ZIP code: 92057)*

1970. mikey Hanrahan (*ZIP code: 91741)*
save the southern steelhead!!

1971. Timothy Williams (*ZIP code: 92625)*

1972. bruce moore (*ZIP code: 94920)*

1973. Trav Ichinose (*ZIP code: 90807)*

1974. Tyler Isaac (*ZIP code: 93103)*

1975. Tyler Cotton (*ZIP code: 90230)*

1976. Tyler Campbell (*ZIP code: 90731)*

1977. Val Atkinson (*ZIP code: 94122)*
Keep up the great work

1978. Valeree Catangay (*ZIP code: 90034)*

1979. valerie m (*ZIP code: 92833)*

1980. Sheldon Van Oosting (*ZIP code: 92345)*

1981. John Shreve (*ZIP code: 91306)*

1982. Howard Ritchie (*ZIP code: 89074-2856)*

1983. Derek Daley (*ZIP code: 95340)*
Protect southern steelhead!

1984. Veronica Allen (*ZIP code: 90802)*

1985. Victor Garibian (*ZIP code: 91362)*

1986. Victoria Reeder (*ZIP code: 95519)*

1987. Matt Silva (*ZIP code: 92656)*

1988. Vincent La Rocca (*ZIP code: 90640)*

1989. Vince Salazar (*ZIP code: 93022)*

1990. Robert Pope (*ZIP code: 94561)*

1991. Natasha Jivani (*ZIP code: 90063)*

1992. Verna Jigour (*ZIP code: 95311)*
To the above rationale I would add concerns about the likely impacts of climate change and associated wildfire threats to the distinctive watersheds/catchments that have kept southern steelhead hanging on in the context of expanding human land uses. I could not agree more that the genetic heritage of southern steelhead is doubtless critical to sustaining the species as a whole through anticipated environmental changes as our climate gets crazier.

1993. Vincent Narez (*ZIP code: 93110)*
Act now!

1994. Victoria Whitman (*ZIP code: 94602)*

1995. Al Vogel (*ZIP code: 95938)*

1996. Vahan Skenderian (*ZIP code: 92694)*

1997. Vanessa Diaz (*ZIP code: 91606)*

1998. Von Welker (*ZIP code: 92084)*
Save the Southern Steelhead From Extinction!!!

1999. Robert Audibert (*ZIP code: 93444)*

2000. Justin Smith (*ZIP code: 92391)*
We need to do what we can to save this iconic beauty fish.

2001. Harry Goertz (*ZIP code: 95127)*

2002. wade graham (*ZIP code: 90026)*

2003. Wade Gasque (*ZIP code: 90403)*

2004. William Walker (*ZIP code: 94949)*

2005. Andrew Sears (*ZIP code: 93546)*

2006. Walter Finkbeiner (*ZIP code: 95818)*

2007. Betty Joseph (*ZIP code: 90808)* **2008.**

Matt Wapnick (*ZIP code: 90045)* **2009. Bruce**

Rosenblum (*ZIP code: 93422)*

2010. Wayne Ginsburg (*ZIP code: 95695)*

2011. William Brubaker (*ZIP code: 92679)*

2012. Wayne Spencer (*ZIP code: 92116)*

2013. Winston Hurst (*ZIP code: 93117)*

2014. Arthur Webb (*ZIP code: 95020)*

2015. Grant Volk (*ZIP code: 95765)*

2016. Michael Wellborn (*ZIP code: 92708)*

2017. wes lee (*ZIP code: 95409)*
save rare heat adapted stlhead

2018. Wesley Hudson (*ZIP code: 92104)*

2019. Robert Tepper (*ZIP code: 90503)*

2020. Frank Wetmore (*ZIP code: 95501)*

2021. Warren M. Gold (*ZIP code: 94941)*

2022. Jeffrey Beecroft (*ZIP code: 91001-2836)*
We need more of a concentrated effort to save this amazing species. I think our state has no idea how much the impact is financially on the state provided by the multiple sport fisherman that live and visit our state.

2023. William Hoctor (*ZIP code: 92028)*

2024. Gary Wick (*ZIP code: 95682)*
#Saverhefish
#Peopleandfis

h

2025. Norbert Wild (*ZIP code: 92126)*
Saw a small group of steelhead in Penasquitos Creek last year, very heartened by that, but they need protection! Thank you, Norb Wild.

2026. William Bramley (*ZIP code: 92106)*

2027. William Preston Bowling (*ZIP code: 90290)*
Thank you

2028. Jeff Williams (*ZIP code: 91377)*
Now's the time to act before we lose another resource that makes our state great.

2029. Lori Williams (*ZIP code: 93109)*

2030. Allen Williams (*ZIP code: 94925)*
This is a very important issue!!

2031. Will Kluger (*ZIP code: 95501)*

2032. Roger Williams (*ZIP code: 98332)*

2033. Canada Ross (*ZIP code: 96067)*

2034. Wendy Katagi (*ZIP code: 90275)*

2035. William L Martin (*ZIP code: 94112)*
Please save these wonderful fish!

2036. Mark Wells (*ZIP code: 92075)*

2037. William Hossfeld (*ZIP code: 94556)*

2038. Thomas Wright (*ZIP code: 91342)*

2039. Emily Winn (*ZIP code: 80238)*

2040. Michael Borboa (*ZIP code: 93612)*
Save the Southern Steelhead NOW!

2041. William Ellsworth (*ZIP code: 94110)*

2042. Alec Wulff (*ZIP code: 92651)*

2043. Victoria Brandon (*ZIP code: 91325)*

2044. Jason Vail (*ZIP code: 84102)*

2045. Nathan Yancheff (*ZIP code: 92122)*

2046. Aiden Yearta (*ZIP code: 92378)*

2047. Dagwood Smithers (*ZIP code: 92399)*

2048. Zach Edwards (*ZIP code: 90245)*

2049. Zachary Patton (*ZIP code: 94939)*

2050. Laura Cogan (*ZIP code: 93111)*

2051. Ann Bebensee (*ZIP code: 93720)*

2052. Zed Langston (*ZIP code: 97402)*

2053. David Zeff (*ZIP code: 94925)*
Save our species!

2054. Steve Johnston (*ZIP code: 94596)*
Let's save these unicorns.

2055. Zachary Gomez (*ZIP code: 93105)*

2056. Zino Nakasuji (*ZIP code: 90720)*

2057. Zoë Collins (*ZIP code: 90291)*

2058. Liam Zubak (*ZIP code: 92882)*

2059. Dianne Hellrigel (*ZIP code: 91321)*

SCV WATER

April 4, 2024

VIA EMAIL fgc@fgc.ca.gov

Ms. Samantha Murray, President & Members
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244

Subject: Comments on the California Department of Fish and Wildlife Status Report submitted for consideration by the Fish and Game Commission regarding the California Endangered Species Act Status Review of Southern California Steelhead

Dear President Murray and Members:

The Santa Clarita Valley Water Agency (SCV Water) is a California Special District providing water supply services to 278,000 people living in the Santa Clarita Valley in northern Los Angeles County. SCV Water, created in 2018 by Senate Bill 634, strives to create a "one watershed" approach and regional perspective on watershed-wide issues. This letter provides comments on the "California Endangered Species Act Status Review for Southern California Steelhead (*Oncorhynchus mykiss*)" (Status Report) prepared and submitted by the California Department of Fish and Wildlife in January 2024 for consideration by the California Fish and Game Commission. We understand that the Status Report has been prepared in anticipation of the Commission's evaluation whether listing of the Southern California Steelhead (*Oncorhynchus mykiss*) is warranted under the California Endangered Species Act (CESA).

In reviewing the Status Report, SCV Water has identified what appears to be an error in Figure 7 (see copy of Figure 7 below, highlighting the area of our concern). The figure shows in blue lines the "current" and "suspected current" distribution of Steelhead extending within the mainstem of the Santa Clara River eastward of the Piru Dry Gap into the upper basin and south fork tributaries of the Santa Clara River within Los Angeles County. A fundamental concern with Figure 7 is that the Status Report does not disclose any references, justification, underlying occurrence or observation data, or basis for the various occurrence determinations depicted in the figure's stream bodies. SCV Water has seen no evidence either within the Status Report or within any other literature that would support the distribution expressed in this figure either for existing populations or historic populations. We have reviewed the text of the Status Report and we have done a deep review of the references identified in the Status Report and other available information and have found no confirmed indication of the presence of Steelhead ever occurring east of Piru Dry Gap. The attached whitepaper prepared by ESA summarizes the investigation of supporting documentation.

Due to the lack of substantiated evidence of steelhead occupation in the upper watershed, we can only surmise that this determination was made based on the absence of man-made passage impediments in the mainstem. However, lack of barriers is not a determination of presence. Further, this same logic is not applied consistently in Figure 7 (or other distribution figures in the Status Report) where numerous other streams have no passage barriers yet are shown only as historically occupied.

We request that the error in Figure 7 (shown in the attached figure) be corrected to indicate no designation for the mainstem or tributaries of the Santa Clara River eastward of the Piru Dry Gap (approximately the Ventura/Los Angeles County line). If CDFW does not concur that Figure 7 is inaccurate, we request an explanation of the following questions prior to proceeding further with the CESA process.

1) We request that data be provided substantiating the “current” and “suspected current” presence of Steelhead anywhere east of the Ventura County line.
2) We request definitions of “current”, “suspected current”, “historical”, and “suspected historical” used in the Status Report.
3) We request a description of the methodology used by CDFW to assign geographies for these distribution categories in the Upper Santa Clara River watershed.
4) We request a meeting with CDFW to discuss the data substantiating the assignment of distribution categories in the Upper Santa Clara River.

Thank you for your consideration of our comments, and we look forward to receiving responses prior to any action being taken by the Commission.

Sincerely,

Stephen L. Cole
Assistant General Manager
Santa Clarita Valley Water Agency

Enclosed

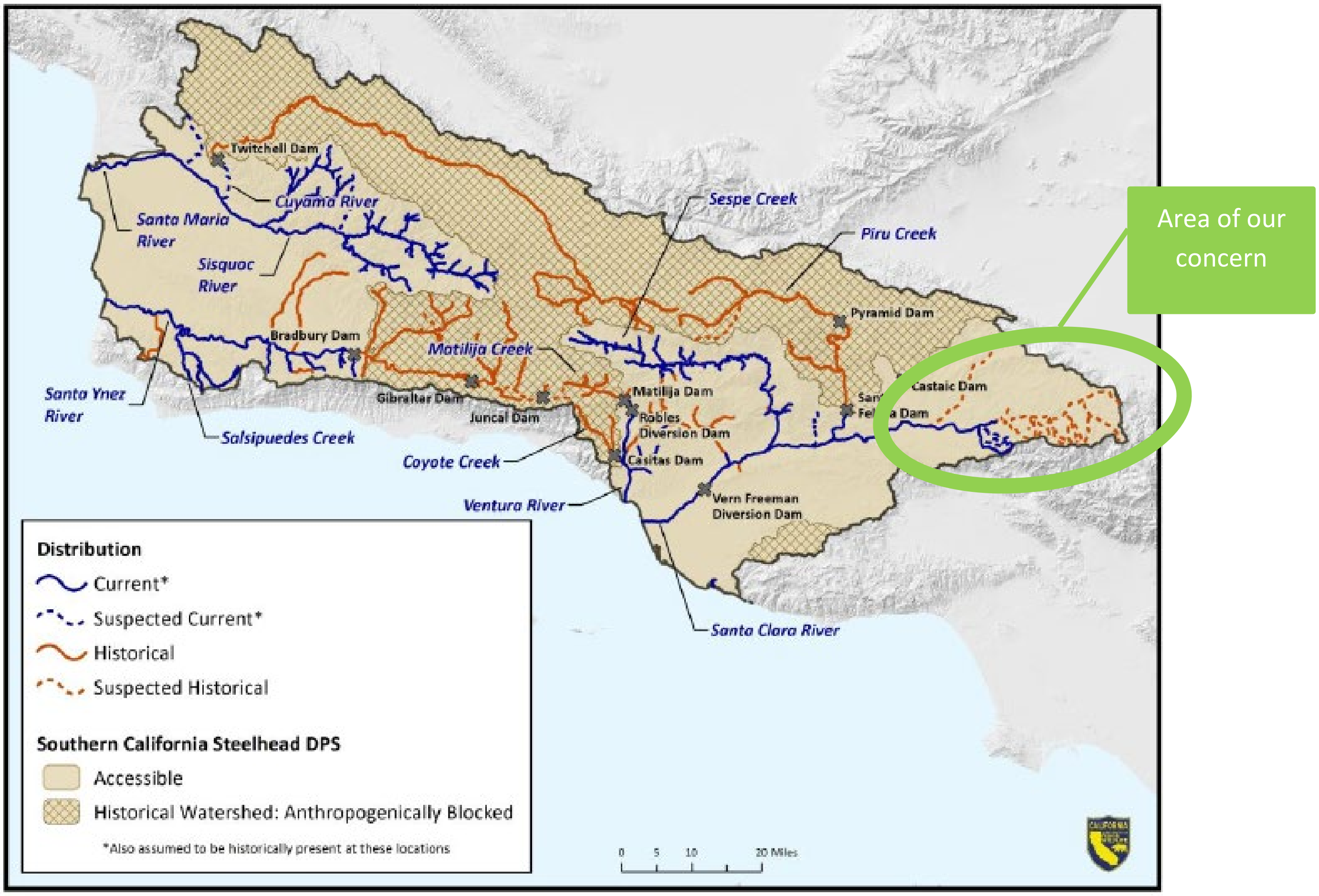

Figure 7. Map of the Monte Arido Highlands BPG depicting known and suspected current and historical distribution.

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ESA

2945 Towngate Road
Suite 200
Thousand Oaks, CA 91361
805.914.1500 phone

esassoc.com

memorandum

date	April 2, 2024
to	Santa Clarita Valley Water Agency
cc	
from	Joel Mulder
subject	Review of Current and Historical Oncorhychus mykiss Occurrences in the Upper Santa Clara River Watershed (Los Angeles County)

Purpose

ESA has prepared this technical memorandum (memo) for Santa Clarita Valley Water Agency to review and document available information on the current and historical distribution of *Oncorhynchus mykiss (O. mykiss)*, including both the anadromous (southern California steelhead, referred to as steelhead herein) and resident (rainbow trout) life history forms of the species, in the upper Santa Clara River watershed within Los Angeles County (i.e., the watershed upstream of the Piru Dry Gap[1]). Information from a variety of sources is summarized in this memo, including biogeographic datasets, state and federal documents, peer-reviewed publications, historical source compilations, non-governmental organization information, and survey data.

Biogeographic Datasets

A query of California Department of Fish and Wildlife (CDFW) California Natural Diversity Database data (both processed and unprocessed data) found no documented occurrence of steelhead in the Santa Clara River watershed upstream of the Piru Creek confluence.

The CDFW Biogeographic Information and Observation System online mapping tool (BIOS) layers for steelhead range and distribution offer conflicting mapping of southern Steelhead distribution, as described below.

Winter Steelhead Range (ds699).

This dataset, developed by CDFW, contains all CalWater 2.2.1 Planning Watersheds where CDFW has documented winter run steelhead to be present (representing planning watersheds intersecting the known distribution, which is based on where the species has been observed and reported) during or after 1990. This

[1] Beginning about 3.5 river miles downstream of the Los Angeles - Ventura County line, the Santa Clara River surface flow is infiltrated into the underlying eastern Piru groundwater basin. Surface flow reappears approximately 6 miles downstream, past the confluence of Piru Creek. The river is dry through this reach most of the year, with water present only when rainfall events create sufficient stormwater runoff into the river (GSI 2008, LARWQCB 2007). This dry ephemeral reach of the river is informally known as the “Piru dry gap” in the Santa Clara River.

dataset does not show winter steelhead range as occurring in the Santa Clara River watershed upstream of the Piru Creek confluence.

Winter Steelhead Distribution (ds340)

This dataset, developed by CDFW, depicts observation-based stream-level geographic distribution of anadromous winter-run steelhead in California. It was developed for the express purpose of assisting with steelhead recovery planning efforts. The distributions reported in this dataset were derived from a subset of the data contained in the Aquatic Species Observation Database (ASOD), a Microsoft Access multi-species observation data capture application. Data source contributors, as well as CDFW fisheries biologists, have been provided the opportunity to review and suggest edits or additions during a recent review. Data contributors were notified and invited to review and comment on the handling of the information that they provided. The distribution was then posted to an intranet mapping application, and CDFW biologists were provided an opportunity to review and comment on the dataset. During this review, biologists were also encouraged to add new observation data. The dataset does not show steelhead distribution as occurring in the Santa Clara River watershed upstream of the Piru Creek confluence.

Southern California Steelhead Range (ds1290)

This dataset, developed by the University of California at Davis (U.C. Davis), shows a species extant range layer for steelhead by HUC12 watersheds based on datasets and interpreted by PISCES, which is software and data describing the best-known ranges for California's 133 native fish and numerous non-native fish. PISCES “models” presence, with corresponding probabilities if appropriate, based on expert opinion and observation data. PISCES biogeographic modeling outcomes reflect environmental and anthropogenic variables that “predict” where a given species may occur (Santos et al. 2014). The metadata for the layer describes the references for the datasets interpreted by PISCES as Moyle, Quinines and Bell (expert opinion) and NMFS Southern California Steelhead ESU Current Stream Habitat Distribution Table.pdf. It is not clear what the source is for the NMFS current stream habitat distribution table.

There are two primary layers in the PISCES model for steelhead. One is HUC12 watersheds with observations of *O. mykiss*. No HUC12 watersheds upstream of the Piru Creek confluence are shown as having positive observations. The other layer is a “historical expert” layer, which depicts HUC12 watersheds where steelhead occurred historically based on expert opinion. This layer shows steelhead occurring in the HUC12 watersheds containing the mainstem from Piru Creek upstream to about Soledad Canyon, and Castaic Creek, based on expert opinion but not on observational data.

Coastal Steelhead Trout Watersheds (ds962)

This dataset, developed by CDFW, provides a minimal set of watershed fields used to identify coastal steelhead management units. This data set is an extract of the California Watershed (CalWater) dataset. It has been generalized to hydrologic sub-areas for those watersheds that are considered part of the coastal steelhead range. However, the source data for the inclusion of hydrologic units in the “coastal steelhead trout range” is not cited or referenced in the dataset metadata. The dataset depicts hydrologic units in the upper Santa Clara River basin (upstream of the Piru Creek confluence) as coastal steelhead watersheds.

Federal and State Documents

Federal Endangered Species Act designated critical habitat for southern California steelhead in the Santa Clara River watershed extends from the Pacific Ocean, upstream the main Santa Clara River to the confluence with Piru Creek; critical habitat in the Santa Clara River does not extend beyond the confluence with Piru Creek (70 FR 52487).

In the NMFS population characterization for steelhead recovery planning, the discussion of the Santa Clara River states “The available evidence suggests that steelhead have been limited to the western part of the Santa Clara basin (Kelley 2004)” (Boughton et al. 2006). The document uses Boughton and Goslin’s (2006) over-summering habitat model (described below) as the basis for its findings.

Boughton and Goslin (2006) developed a model of potential steelhead over-summering habitat using the method of environmental envelopes. Under the envelope method, predicted habitat is the set of stream segments falling within the same range of conditions that encapsulate the known occurrences of the species. In the discussion of results from the Los Angeles Basin, the authors note “The model predicted a distinct patch of potential habitat in the far eastern end of the Santa Clara basin (upper right quadrant, east of Newhall). This did not conform to expectations. Reports from the area suggested that steelhead were confined to the western end of the Santa Clara system. Visits to the eastern area between Newhall and Palmdale indicated that this area is drier than implied by the model, due to a rain-shadow effect from the San Gabriel Mountains (C. Swift, personal communication, Entrix). It probably did not contain potential habitat in reality”. In their discussion of the model’s environmental envelope outputs, the authors note that the Southern California Coast ESU[2] may have more false positives (warm areas with no potential for thermal refugia), but that these false positives may occur at a finer resolution than addressed by the model. In other words, the model may indicate suitable habitat in some areas of Southern California where in reality temperatures and lack of thermal refugia preclude steelhead occurrence.

In NMFS’ 2023 5-Year Review for the species, there is no mention of areas of the Santa Clara River watershed upstream of the Piru Creek confluence (NMFS 2023). In the Southern California Steelhead Recovery Plan (NMFS 2012) discussion of current watershed conditions the only mention of the Santa Clara River watershed upstream of the Piru Creek confluence is that “Fish passage is further impacted by the operation of Castaic Dam on Castaic Creek”. Table 2-1 of the Recovery Plan lists the Santa Clara River watershed as historically occupied by steelhead, citing Becker et al. 2009, Boughton et al. 2005, and Titus et al. 2010 (NMFS 2012). A discussion of those sources is provided below, with a focus on historical occurrences in the upper watershed.

Boughton et al. (2005) assessed the current occurrence of anadromous *O. mykiss* in each coastal basin of southern California in which it occurred historically. While the current and historical occurrences in the Santa Clara River are not described specifically in the memorandum, Figure 4 shows the historic distribution of spawning and rearing basins for steelhead in southern California. The figure shows the Santa Clara River basin up to approximately the Ventura-Los Angeles County line as historically occupied. The figure notes that shading of entire basins implies only that steelhead occurred somewhere, not necessarily everywhere, in a basin. The source

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[2] Listed steelhead are now referred to as a ‘‘distinct population segment’’ (DPS), which is not recognized in the scientific literature. In 1991, NMFS issued a policy for delineating Pacific salmon DPS (56 FR 58612; November 20, 1991). Under this policy a group of Pacific salmon populations is considered an ‘‘evolutionarily significant unit’’ (ESU) if it is substantially reproductively isolated from other conspecific populations, and it represents an important component in the evolutionary legacy of the biological species. Further, an ESU is considered to be a DPS (and thus a ‘‘species’’) under the ESA.

for the historical occurrence data for the figure is noted as Titus et al. 2003, Stoecker et al. 2002, and a third source which was omitted from the figure description (text is cut off). Further discussion of Titus et al. is provided below. Stoecker et al. (2002) is a report on steelhead assessment and recovery opportunities in southern Santa Barbara County as is not relevant to the Santa Clara River.

The Titus et al. 2003 in preparation document cited in Boughton et al. 2005 and Titus et al. 2010 in preparation document cited in the species recovery plan (NMFS 2012) is cited as several sources under different publication years as the document has been in draft form with various updates for some time. As of April 2, 2024, the manuscript is still a draft[3]. The report provides stream-specific information on steelhead in central and southern California gathered from three main sources: (1) A literature search of pertinent journal articles, CDFW (known as California Department of Fish and Game until 2013) administrative reports and fish bulletins, and other resource agency, university, and consultant publications; (2) Resource agency files, especially CDFW stream survey files; (3) Interviews conducted with professional biologists, academicians, and representatives of sportfishing organizations and other special interest groups for information from personal files, and anecdotes based on personal observations. The report's description of the Santa Clara River Headwater Tributaries in Los Angeles County states no historical evidence of steelhead runs. San Francisquito Canyon and Soledad Canyon are noted as two streams for which there are CDFW records for rainbow trout presence and/or stocking dating back to circa 1930.

Non-Governmental Organization Resources

Becker et al. (2009) summarizes historical accounts of *O. mykiss* in streams south of San Francisco Bay based on thousands of documents in public and private collections, and interviews with biologists. Only three areas in the upper Santa Clara River watershed are described in the report as having fish observations. It is important to note that these observations are for fish in general, and not specifically steelhead.

Elizabeth Lake Canyon, tributary to Castaic Creek - Field notes from US Forest Service staff from 1947 indicate that "some fish" were caught in Elizabeth Lake Canyon Creek in the previous season (CDFG 1952). The author noted that the creek was unlikely to support fish life throughout the year, presumably due to low flow.

Fish Canyon, tributary to Castaic Creek - A 1956 CDFW stream inventory for Fish Canyon Creek states, "…some native fish reported in upper reaches" (CDFG 1956b). It adds, "This is definitely a marginal water…"

Bouquet Canyon - According to CDFW records, rainbow trout fry from the Shasta hatchery were planted in Bouquet Canyon Creek in 1943 (CDFG 1943). A 1947 stream survey indicates that *O. mykiss* including a "few fingerlings" were observed in the creek but notes, "Fishing maintained only be frequent plantings" (CDFG 1947b).

In a previous document, Becker et al. (2008) appears to acknowledge the unreliable nature of these observations in Figures 24 and 25 of the report, describing the historic and current, respectively, status of *O. mykiss* in coastal streams of southern Ventura County. In the figures, Castaic Creek and its tributaries, as well as San Francisquito and Bouquet Canyon creeks, are shown as "unknown or insufficient data". Paradoxically, the mainstem Santa Clara River upstream of the Piru Creek confluence is shown as "definite run or population" despite no

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[3] Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=10194

documentation in the report of any observations currently or historically in that section of river. CalTrout, an organization focused on healthy waters and resilient wild fish, provides on The Southern Steelhead page of their website[4] as well as their publication "SOS II: Fish in Hot Water: Status, threats and solutions for California salmon, steelhead, and trout" a map of current and historical steelhead range. The source of the map is noted as PISCES (2017). See the discussion above under Biogeographic Datasets - Southern California Steelhead Range (ds1290) for PISCES.

The conservation group Trout Unlimited's website[5] provides maps of the historical and current status of *O. mykiss* in coastal streams of southern Ventura County, California. Both maps show the mainstem of the upper Santa Clara River from the Piru Creek confluence up to about the N3 Angeles Forest Highway as historically and currently having a "definite run or population". However, the cited source for these maps is Becker et al. 2009, described above, which does not appear to substantiate the steelhead historical and current distribution depicted on these figures.

Other Sources

Stoecker and Kelley (2005) analyzed the habitat conditions, population status and barriers to migration for steelhead in the lower Santa Clara River watershed from the Piru Creek tributary downstream, including significant drainages. There is no mention of steelhead resources upstream of the Piru Creek confluence.

Bowers (2008) compiled historical steelhead accounts in Ventura County, primarily from newspaper accounts, personal fishing logs, books, pamphlets, and Ventura County Board of Supervisors' Minutes. Because the report looked at Ventura County, little mention is made of the upper Santa Clara River watershed in Los Angeles County except two articles from the Santa Paula Chronicle. The first, in 1925, noted five thousand "trout" were planted in Bouquet Canyon. The second, in 1943, described Bouquet Canyon as being "in good shape with plenty of good-sized fish left over from last year's plant", presumably referring to planted *O. mykiss.*

Bell (1978) described the fishes of the Santa Clara River and made collections at 46 stations from the river mouth upstream as far as water existed. In the upper watershed, this included San Francisquito Creek, Castaic Creek, Arrastre Canyon, and the mainstem river. No *O. mykiss* were encountered. Bell cites Hubbs (1946) as reporting large and consistent runs of *Salmo gairdneri* (the former scientific name for *O. mykiss*) in the Santa Clara River. However, Bell notes that at the time of his survey, *Salmo* were abundant in Sespe Creek, but Piru Creek and the Santa Clara mainstem were much less suitable habitat, and trout were restricted to a few deep holes in Piru Creek and as escapees to the mainstem from Fillmore fish hatchery. No mention is made of trout in the upper watershed.

Numerous fish sampling events have been conducted in the upper Santa Clara River, particularly the mainstem, in more recent years. Table 1 below presents a list of the sources examined. No *O. mykiss* were encountered in any of the surveys.

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[4] Available at: https://caltrout.org/sos/species-accounts/steelhead/southern-steelhead#:~:text=Southern%20Steelhead%20Distribution&text=They%20are%20most%20abundant%20in,Ventura%2C%20and%20Santa%20Clara%20rivers

[5] Available at: https://www.tu.org/california-coastal-steelhead-data/. Figure 24 -– Historical and current status of Oncorhynchus O. mykiss in coastal streams of southern Ventura County, California; Figure 25 - Current status of Oncorhynchus mykiss in coastal streams of southern Ventura County, California.

TABLE 1
SUMMARY OF FISH SPECIES PRESENCE IN UPPER SANTA CLARA RIVER WAERSHED BASED ON LITERATURE REVIEW

Santa Clara River Reach[a] and Location		Unarmored Three spine Stickleback	Santa Ana Sucker	Arroyo Chub	Prickly Sculpin	Common Carp	Mosquitofish	Black Bullhead	Fathead Minnow	Green Sunfish	Largemouth Bass	Goldfish	Sailfin Molly	Convict cichlid	Source
SCR	SCR Watershed	X	X	X			X		X	X	X				Bell 1978, Swift et al. 1993
6	Bouquet Canyon area			X	X		X							X	Compliance Biology 2010
6	SWRP outfall channel													X	Dellith Pers. Comm. 2023
6	Iron Horse Bridge area	X													CDFW 2021
6	Iron Horse Bridge area		X	X											CDFW 2022
6	Iron Horse Bridge to VWRP	X	X	X											Haglund & Baskin 2000
6	McBean Parkway area	X					X								Hovore et al. 2008
5/6	Bouquet Cyn. to Castaic Ck.	X	X	X											Haglund & Baskin 1995
5/6	Bouquet Cyn. to Castaic Ck.	X	X	X											Impact Sciences Inc. 2003c
5/6	Saugus to Castaic Ck.	X		X			X								Haglund 1989
5	I5 to Castaic Ck.	X		X											Aquatic Consulting Services 2002a
5	Old Road to VWRP	X	X												CDFW 2015
5	Old Road to VWRP	X	X	X			X								Pareti Pers. Comm. 2003
5	VWRP to Salt Ck.		X	X		X	X	X			X				Cardno 2015
5	VWRP to Salt Ck.	X	X	X											ENTRIX Inc. 2006a
5	Commerce Center Dr. to Salt Ck.	X	X	X	X	X					X				ENTRIX Inc. 2010
5	Commerce Center Dr. to Salt Ck.	X	X	X											Dudek 2010
5	Castaic Ck. to u.s. 7.2mi	X	X	X	X		X				X	X	X		Impact Sciences Inc. 2003b
5	Commerce Center Dr. to Castaic Ck.	X	X	X											Aquatic Consulting Services 2002b
5	Commerce Center Dr. to Co. Line	X		X			X				X				Aquatic Consulting Services 2002c
5	Castaic Ck. to d.s. 7mi	X	X	X	X		X				X				Impact Sciences Inc. 2003a
5	Castaic Creek to Long Cyn.	X	X	X			X								ENTRIX Inc. 2006b
5	Castaic Ck. to Long Cyn.	X	X	X											Impact Sciences Inc. 2010
5	u.s. of San Martinez Grande Cyn.	X													USFWS 1980
5	u.s. of San Martinez Grande Cyn.	X	X	X			X	X		X					USFWS 1985

NOTES:
Blue shading = Native species, native to Study Area
Green shading = Native to Southern California
No shading = Not native to California (introduced)
a. Reaches delineated according to LARWQCB water body names

Discussion

In review of the available information, no verifiable or concrete observations of native *O. mykiss* in the upper Santa Clara River watershed have been described or recorded historically or currently. Observations that potentially could have been native *O. mykiss* are described in Becker et al. 2009. However, observations of “some fish" or "some native fish" in Elizabeth Canyon and Fish Canyon do not specifically mention *O. mykiss.* The references could be to other native fish in the upper watershed such as threespine stickleback (*Gasterosteus williamsoni*) which were formerly more common in the upper headwater tributaries (Bell 1978). Titus et al. (*In preparation*) also notes San Francisquito Canyon and Soledad Canyon as two streams for which there are CDFW records for rainbow trout presence and/or stocking dating back to circa 1930.

These observations may all well have been planted trout. As described in Titus et al. (*In preparation*) above and in newspaper accounts (Bowers 2008), extensive stocking was occurring in the upper watershed as early as 1925, and it would have been impossible to distinguish native resident trout or steelhead from stocked trout.

Given these unreliable historic accounts and lack of any other verifiable observations, it is of concern that Becker et al. 2008 and Titus et al. (*In preparation*) appear to be the basis for some historic and current distribution maps for southern California steelhead in the upper Santa Clara River (e.g., Boughton et al. 2005, Trout Unlimited), particularly since Becker et al. 2008 itself shows occurrence maps in upper watershed tributaries where there are questionable fish observations as "unknown or insufficient data". It is also not apparent why the upper watershed is considered to have been historically occupied by experts for the U.C. Davis PISCES model, and historically and currently occupied in Figures 24 and 25 of in Becker et al. 2008 despite the absence of observations. Perhaps the underlying assumption is that because the lower Santa Clara River had a well-documented and robust steelhead run (Hubbs 1946, Stoecker and Kelley 2005, Bowers 2008), fish would have inevitably made their way all the way up the river to the upper basin headwaters. However, an examination of habitat conditions in this area suggests that the habitat in the upper basin may have precluded or greatly limited steelhead migration in most years, and that even in particularly wet years when migration was possible, available upstream spawning and over-summering habitat was and is extremely limited or of poor quality.

The Santa Clara River is a perennial stream from Interstate 5 downstream to just west of the Los Angeles - Ventura County line. Beginning about 3.5 river miles downstream of the county line the entire surface flow is infiltrated into the underlying eastern Piru groundwater basin. Surface flow reappears approximately 6 miles downstream, past the confluence of Piru Creek. The river is dry through this reach most of the year, with water present only when rainfall events create sufficient stormwater runoff into the river (GSI 2008, LARWQCB 2007). This dry ephemeral reach of the river is informally known as the "Piru dry gap" in the Santa Clara River. Flood flows in the Upper Santa Clara River increase, peak, and subside rapidly in response to high-intensity rainfall. The "flashy" hydrograph produced by these conditions shows a rapid increase in discharge over a short time period with a quickly developed peak discharge compared to normal baseflow (Kennedy/Jenks 2014). Thus, migration opportunities through the dry gap for upstream migrating steelhead adults and downstream migrating smolts would have historically been limited to typically brief high flow events. The same is true under current conditions, though flows through the dry gap may be artificially altered in duration due to releases from or withholding in upstream reservoirs (e.g., Castaic Lake).

Habitat conditions in the upper watershed tributaries are described in historic accounts as generally poor for *O. mykiss*. For example, field notes from US Forest Service staff from Elizabeth Lake Canyon Creek in 1952 note that the creek was unlikely to support fish throughout the year "presumably due to low flow", and in 1956 regarding Fish Canyon "This is definitely a marginal water…", and in Bouquet Canyon Creek, 1943, "Fishing maintained only by frequent plantings" (Becker et al. 2009). Boughton and Goslin (2006) acknowledge that the watershed between Newhall and Palmdale is subject to a rain-shadow effect from the San Gabriel Mountains and "probably did not contain potential habitat in reality". No current information or surveys reviewed suggest that suitable habitat for *O. mykiss* is extant in the upper basin tributaries. Becker et al. (2010) analyzed information on rearing habitat to identify regionally significant watersheds, which are those offering the greatest potential for producing steelhead smolts, including over-summering opportunities and conditions favoring high growth rates. Within these watersheds the report identifies "essential" streams or reaches that offer the best habitat resources. Within the upper Santa Clara River watershed, portions of the mainstem and several tributaries are identified as “essential” stream, but no waterbodies in the upper watershed are identified as “available” or “suitable” *O. mykiss* habitat (see Figure 14 in the report).

In conclusion, there is no record of current *O. mykiss* occupation in the upper Santa Clara River watershed (east of the Piru Creek confluence) on which to support any determination of species “presence”. Despite extensive fish sampling in the area over the last few decades, no *O. mykiss* have been encountered. Habitat conditions currently do not suggest suitable habitat is present for this species in the area.

There are no verifiable or concrete historical observations of native *O. mykiss* in the upper Santa Clara River watershed, and historical descriptions of habitat conditions do not suggest suitable, perennial habitat was present for *O. mykiss* in the area.

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From: Stephen Pang [redacted]
Sent: Thursday, April 4, 2024 1:23 PM
To: FGC <FGC@fgc.ca.gov>
Cc: [redacted]
Subject: ACWA Comment Letter - Southern California Steelhead Petition

Dear California Fish and Game Commission,

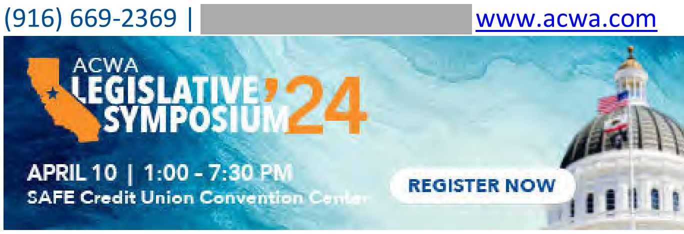
The Association of California Water Agencies (ACWA) appreciates the opportunity to provide written comments for consideration on the petition to list southern California steelhead (*Oncorhynchus mykiss*) as endangered. For your reference, you can access Cramer Fish Sciences' (Cramer) cohort-based life cycle simulation model (model) that is discussed in our comment letter here. Our comment letter includes two appendices: (1) a technical memorandum developed by Four Peaks Environmental Science & Data Solutions (Four Peaks) that evaluates Cramer's model and California Department of Fish and Wildlife's status review and (2) a technical memorandum developed by Cramer that discusses their model.

ACWA kindly requests that our comment letter, Cramer's model and technical memorandum, and Four Peaks' technical memorandum be shared with President Samantha Murray, Vice President Erika Zavaleta, and Commissioners Darius Anderson, Jacque Hostler-Carmesin, and Eric Sklar.

Please do not hesitate to contact me if you have any questions regarding our comments.

Thank you,

Stephen Pang
State Relations Advocate
Association of California Water Agencies
(916) 669-2369 | [redacted] www.acwa.com



Submitted via electronic mail to fgc@fgc.ca.gov

April 4, 2024

The Honorable Samantha Murray
President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

RE: California Department of Fish and Wildlife Southern California Steelhead (*Oncorhynchus mykiss*) Status Review Submission to Commission

Dear President Murray,

The Association of California Water Agencies (ACWA) appreciates the opportunity to provide public comments to the California Fish and Game Commission (Commission) related to the status review of southern California steelhead (*Oncorhynchus mykiss)* (Status Review) submitted by the California Department of Fish and Wildlife (Department)—pursuant to Fish and Game Code § 2074.6. ACWA represents more than 460 public water agencies that collectively deliver approximately 90 percent of the water in California for domestic, agricultural, and industrial uses. ACWA and its members are invested in healthy watersheds and habitats that support robust populations of native fish and wildlife. However, ACWA has significant concerns regarding both the scientific basis for a listing determination and the potential impacts on public water agencies' ability to reliably provide water if southern California steelhead are listed as endangered pursuant to the California Endangered Species Act (CESA). Section 3, below, elaborates on these concerns.

1. Background

On June 14, 2021, California Trout (CalTrout) submitted a petition to the Commission to list southern California steelhead as an endangered species under CESA. On June 23, 2021, the Commission referred the petition to the Department for evaluation. On October 29, 2021, the Department submitted their evaluation report of the petition to the Commission. On April 21, 2022, the Commission accepted the petition for consideration. On May 13, 2022, the Commission provided public notice that southern California steelhead are a candidate species under CESA. On July 15, 2022, the Department noticed that it had initiated a 12-month Status Review of southern California steelhead and invited the public to submit comments, including data and other scientific information related to the species. In its Status Review, the Department was required to evaluate the breadth of available scientific literature and develop a summary of the status of southern California steelhead. The Department was also required to seek independent peer review of its Status Review. On October 12, 2022, the Commission granted a six-month extension to the Department for their Status Review. On January 18, 2024, the Department submitted its Status Review to the Commission.

ACWA and its member agencies have been actively engaged throughout this process, submitting multiple comment letters to both the Commission and Department in response to the CalTrout petition, evaluation report of the petition, and Status Review for southern California steelhead.

2. Standard for Determination

The standard for listing is whether the species' "continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) Present or threatened modification or destruction of its habitat; (2) Overexploitation; (3) Predation; (4) Competition; (5) Disease; or (6) Other natural occurrences or human-related activities"—pursuant to 14 CCR 670.1(i)(1)(A). The Department's Status Review must be "based on the best scientific information available" and the Commission's decision whether to list must be "based solely upon the best available scientific information" pursuant to Fish and Game Code § 2074.6 and Fish and Game Code § 2070, respectively.

3. ACWA Comments

ACWA appreciates the mission of the Commission, which is to ensure that California will have abundant, healthy, and diverse fish and wildlife that thrive within dynamic ecosystems. Public water agencies are intimately involved in the management of watersheds and wildlife habitats and ACWA member agencies have become increasingly involved in the proactive resolution of fishery and other aquatic species resource management issues. ACWA has the following significant concerns regarding the petition to list southern California steelhead pursuant to CESA.

a. <u>The Department's Status Review Does Not Incorporate the Best Available Science</u>

While the Status Review assesses the status and trends of southern California steelhead rainbow trout[1] (Southern SH/RT), the Department evaluates sympatric populations of anadromous and resident *O. mykiss* separately. Because of this

[1] In the Status Review, the Department defines southern California steelhead as "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories". To accurately capture this life history variability, the Department uses "southern California steelhead rainbow trout" to describe the proposed CESA listing unit.

separate treatment, the reproductive contributions of sympatric resident spawners to the production of smolts and anadromous *O. mykiss* are not accounted for in measures of population status or the evaluation of long-term viability of southern California steelhead. In addition, the Department does not consider the potential contributions from above-barrier populations of resident *O. mykiss* to Southern SH/RT populations, resulting from the downstream migration of juvenile rainbow trout over barriers. While above-barrier *O. mykiss* are not included in the petition, a subset of that population may increase the effective population size or rescue below-barrier populations from extirpation, therefore improving the viability and persistence of Southern SH/RT.

This interchange between resident and anadromous fish populations, and the associated "rescue effect", reduces the extinction risk of both groups and allows for recolonization should low steelhead abundance occur.[2] In their Viability Assessment for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Southwest, the National Marine Fisheries Service (NMFS) recognizes that "freshwater-resident (non-anadromous) forms of *O. mykiss* co-occur and appear to interbreed with the anadromous form in many populations" and concludes that "resident (nonanadromus) [sic] *O. mykiss* warrant consideration in managing for the anadromous life history."[3] Similarly, in October 2023, Judge James Chalfant expressed concerns during *United Water Conservation District v. California Fish and Game Commission*, acknowledging that "it may be true that an evaluation of rainbow trout [abundance and] its ability to produce [smolts] is required before [southern California steelhead] can be the subject of stage 2 protection as an endangered species."[4]

The Population Trends and Abundance analysis in Chapter 4 of the Status Review also presents several flaws. First, it utilizes problematic trap data which (1) only account for individuals that are migrating or biologically motivated to move within the watershed (e.g., due to resource availability), (2) are limited to periods when flows allow for the installation and operation of traps—that is, high flow conditions may preclude trap operation <u>when migration is most likely to occur</u>, and (3) are not representative of the trapped portion of *O. mykiss* without a trap efficiency study. Trap efficiency studies are required to develop accurate population estimates from numbers of trapped fish. Unfortunately, the Status Review does not disclose or describe whether trap efficiency studies are available in connection with the different datasets.

Second, while the Status Review acknowledges additional data sources (e.g., snorkel surveys, video-based and surveillance system fish counts), which in some watersheds

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[2] Boughton, D.A., et al. 2007. Viability criteria for steelhead of the South-Central and Southern California coast. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-407.
[3] NMFS. 2023. Viability assessment for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-686. Page 155.
[4] Case No. 22STCP02661. Page 9.

may more accurately characterize the overall *O. mykiss* population, they appear not to have been incorporated into the Population Trends and Abundance analysis consistently.

In addition to statistically inappropriate treatment of the trap data, many of the data presented in the Status Review were not analyzed appropriately. In Section 4.1, the evaluation erroneously compared trap data directly with snorkel survey/bankside observation data (instead of evaluating the different types of survey data separately), evaluated total fish counts per year (instead of fish counts per number of days of trap operation or per distances visually surveyed), and included zero values in some years when monitoring did not occur (instead of consistently excluding all years when monitoring did not occur). Furthermore, in Section 4.3's trend analysis, annual fish count data from the Santa Ynez, Ventura, and Santa Clara Rivers were inappropriately evaluated across the c. 1994 to c. 2021 timeseries without considering methodological changes that occurred within those years—which the Department noted in Appendix C of the Status Review.[5]

Finally, the Department's focus on a 5-year timeframe (i.e., 2013 to 2018) when discussing productivity in the Population Trends and Abundance analysis in Section 4.5 is non-representative and skews their conclusions. This timeframe coincides with the most recent extreme drought period and conditions associated with the loss of suitable spawning and rearing habitat, insufficient instream flows required for migration, diminished water quality, reductions in available food supply, and increases in direct mortality. While most populations do not have enough data available following the drought to determine if rebounding has occurred, the Department does note potential post-drought rebounding in the only population (i.e., Santa Ynez River) with a dataset through 2021. In NMFS' Southern California Steelhead Recovery Plan, Dr. David A. Boughton explains that "steelhead recovery as a form of human stewardship has to be judged over a broader timeline, with multi-year setbacks in population size considered to be a normal and expected event, and progress judged at the scale of multiple decades and even multiple human generations."[6]

b. <u>Consider Information and Data That Use the Best Available Science to Assess the Viability of the Distinct Population Segment (DPS) in the Context of Threats to the DPS</u>

Consistent with the Department's July 15, 2022, solicitation, various water agencies have shared information for the Department's Status Review. The information

[5] Cramer, S.P. and Caldwell, L. 2020. Bias and consequences in attempts to estimate historic salmon abundance. *Canadian Journal of Fisheries and Aquatic Sciences*, 77(1):132-145.
[6] National Marine Fisheries Service. 2012. Southern California Steelhead Recovery Plan. Southwest Region, Protected Resources Division, Long Beach, California. Page 5-1.

submitted contributes to the best available science and highlights the basis for ACWA's concerns with the potential listing of Southern SH/RT.

A new cohort-based life cycle simulation model (model), developed by Cramer Fish Sciences in collaboration with ACWA member agencies, includes the diverse and interrelated life history variants of *O. mykiss*. The model incorporates anadromous, below-barrier resident, and above-barrier resident sub-populations to evaluate population dynamics and assess extinction risk when resident *O. mykiss* are available to contribute to anadromous populations. When appropriately structured and parameterized, the model is a tool for evaluating these contributions and determining whether sympatric resident populations support long-term viability of southern California steelhead populations. The model demonstrates that the contribution of anadromous and resident (below- and above-barrier) life history variants and their connectivity can affect a population's trajectory, and that omitting them may not fully capture the DPS's long-term resiliency. Cramer Fish Sciences, ACWA, and collaborating member agencies met with the Department on December 12, 2023, to discuss and review the model, prior to the Department's submittal of the Status Review to the Commission.

Cramer Fish Sciences' model reflects existing literature indicating freshwater populations of both below- and above-barrier resident *O. Mykiss* improve the viability of the anadromous life history and contribute to the long-term persistence of the overall *O. Mykiss* population across the range of life histories it exhibits. Although anadromous spawners alone could support the DPS, the model predicted that southern California steelhead are always at or close to collapse without reproductive contributions from below- and above-barrier resident spawners under all conditions but the highest ocean survival scenarios. Depending on contributions to anadromous spawning populations in wet years, the resident life histories provide additional population stability and reduced extinction risk that should be accounted for when making regulatory determinations and setting recovery targets.

The model is supported by the extensive research conducted by ACWA member agencies, survey data, and the available scientific literature and fills a key data gap highlighted by water agencies in past comments and information submittals to the Commission and the Department throughout the petition process. The model is formulated using sound logic and consistent with prevailing practices, with its structure and default parameterization informed by the empirical data that align with the current scientific understanding. Therefore, the model—when combined with other data, analyses, and tools—constitutes the best available scientific information. As a consequence, the Department is obliged to utilize the model and model results to inform its Status Review, and the Commission is obliged to consider the model and model results to inform its ultimate listing decision.

c. <u>Consider Ongoing Restoration and Recovery Activities That Contribute to Conservation and Reduce Threats to the Species</u>

The Department, California Department of Transportation, California State Parks, U.S. Forest Service, County of Ventura, City of San Buenaventura, City of Santa Barbara, City of Carpinteria, City of Malibu, Cachuma Operation and Maintenance Board, Casitas Municipal Water District, United Water Conservation District, Santa Monica Mountains Resource Conservation District, South Coast Habitat Restoration, CalTrout, and many other organizations are currently engaged in significant ongoing restoration and recovery work throughout the DPS. Numerous small- and large-scale recovery actions have already been implemented by the agencies listed above while other actions are in the advanced planning phases. These actions include, but are not limited to:

- Robles Fish Passage Facility modifications on the Ventura River
- Matilija Dam Ecosystem Restoration Project on Matilija Creek
- Foster Park Fish Passage Improvement Projects on the Ventura River
- San Antonio Creek fish passage barrier removal
- Freeman Diversion Habitat Conservation Plan and fish passage improvements on the Santa Clara River
- VenturaWaterPure Program for Santa Clara River Estuary habitat improvements
- Rindge Dam decommissioning on Malibu Creek
- Hilton Creek fish passage barrier removal
- Quiota Creek fish passage barrier removals
- Salsipuedes Creek and El Jaro Creek Fish passage barrier structures
- Gaviota Creek fish passage barrier removal
- Tajiguas Creek fish passage barrier removals
- Arryo Burro fish passage barrier removal and Mesa creek restoration project
- Mission Creek fish passage barrier removals
- Carpinteria Creek fish passage barrier removals
- Maria Ignacio Creek fish passage barrier removal
- Arroyo Hondo Creek Fish Passage Project
- Solstice Creek Fish Passage Restoration
- Malibu Creek fish passage barrier removal project and Malibu Lagoon restoration project
- San Juan Creek dams and fish passage barrier removals
- Trabuco Creek Fish Passage Project

These current and anticipated restoration and recovery actions are consistent with NMFS' Southern California Steelhead Recovery Plan and are anticipated to result in a measurable increase in *O. mykiss* abundance within the southern California DPS over a reasonable timeframe.[7] Large-scale recovery actions are underway or have already occurred in the neighboring south-central steelhead DPS (e.g., San Clemente Dam decommissioning, Los Padres dam fish passage design, Arroyo Grande Creek and watershed improvement projects) that may also aid in the recovery of the southern California steelhead DPS.

Some of these restoration and recovery actions have taken, and will continue to take, years to permit and implement. Some of these completed projects may take years to realize population recovery due to the natural stochasticity of populations and the complex chain of effects between the action and the population-level response. Consequently, prematurely dismissing the efficacy of restoration efforts resulting from the federal listing and NMFS' Southern California Steelhead Recovery Plan is unwarranted. Evaluating the success of this work will likely require a decades-long perspective because of the time required for planning and executing recovery projects, as well as realizing their benefits for the species. In addition, external factors such as precipitation patterns, ocean conditions, and stochastic events may cause annual fluctuations in *O. mykiss* abundance, even if the population experiences a positive growth rate over longer timescales. It is a disconcerting reality that a state listing of the population is likely to increase the time and cost incurred to implement restoration and recovery actions to benefit the population.

d. Consider That a State Listing Would Not Trigger Additional California Environmental Quality Act (CEQA) Evaluations or Afford Additional Protection Beyond that Provided by the Federal Endangered Species Act (FESA)

FESA already prohibits steelhead "take" by law, and the federal definition is wider ranging than the "take" definition under the Fish and Game Code (§ 86), and includes "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct," 16 U.S.C. 1532(19), and "harm" is further defined as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering," 50 C.F.R. 17.3.

Effects to all special-status species and designated critical habitat are evaluated under CEQA. The Status Review, in Section 7.1.1, fails to explain that CEQA is already triggered if a project would affect southern California steelhead because the species is federally listed. In Section 11, the Status Review erroneously claims that: "Additional protection of Southern SH/RT following listing would also occur during required state and local agency environmental review under CEQA. CEQA requires affected public agencies to analyze and disclose project-related environmental effects, including

[7] National Marine Fisheries Service. 2012. Southern California Steelhead Recovery Plan. Southwest Region, Protected Resources Division, Long Beach, California.

potentially significant impacts on endangered, threatened, and rare special status species. Under CEQA's "substantive mandate," state and local agencies in California must avoid or substantially lessen significant environmental effects to the extent feasible. With that mandate, and the Department's regulatory jurisdiction generally, the Department expects related CEQA review will likely result in increased information regarding the status of Southern SH/RT in California as a result of pre-project biological surveys."[8] Because the species is already listed under FESA and it is presumed that "all juvenile *O. mykiss* in streams where listed steelhead occur are listed juvenile steelhead", there would be no additional CEQA reviews or collection of biological information on the species' status due to listing southern California steelhead under CESA.[9]

The Department is typically already included in interagency coordination and project evaluations through the Lake and Streambed Alteration Program, Fish and Game Code § 1600. Section 7(a)(2) of FESA, 16 U.S.C. 1536(a)(2), requires federal agencies to ensure actions are not likely to jeopardize the continued existence of a species or adversely modify its designated critical habitat. The Status Review claims that application of this section of FESA is limited in scope because it applies only to federal actions and areas under federal ownership; however, most or all projects physically affecting streams that support *O. Mykiss* require permitting and approval by the U.S. Army Corp of Engineers, which would trigger Section 7(a)(2). In addition, the take prohibition under FESA applies irrespective of whether there is a federal nexus.

Under FESA, for incidental take to be authorized, impacts to endangered species must be minimized and jeopardy of the species and/or adverse modification of critical habitat must be avoided. The only additional protection afforded by listing the species under CESA would be that impacts and take must be minimized or "fully mitigated"; however, this standard is tempered by the CESA requirement that the mitigation must be "roughly proportional" to the impact of the take, Fish and Game Code § 2081(b)(2). In sum, there is no evidence that CESA would provide additional protections for *O. mykiss* above and beyond that provided by FESA.

e. <u>Minimize Impacts on Water Management and Programs That Benefit Southern California Steelhead</u>

Designation of southern California steelhead as an endangered species could have significant impacts on water management operations in the region that are critical to public health and safety. Long-term water resilience and the successful

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[8] California Department of Fish and Wildlife. 2024. Report to the California Fish and Game Commission. California Endangered Species Act Status Review for Southern California Steelhead (*Oncorhynchus mykiss*). Sacramento, California. Page 142.

[9] National Oceanic and Atmospheric Administration. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead, 71 Fed. Reg. Jan. 5, 2006. Page 841.

implementation of CESA requires that regulatory agencies collaborate with interested parties to develop an approach that accounts for the various and unique needs of the region and balances water supply reliability and ecosystem enhancement.

Steelhead listings under FESA, which already provides protection to the species as a matter of federal law, have resulted in substantial curtailments of water diversions and extractions in southern California coastal streams. A CESA listing could result in infeasible avoidance and minimization measures for water management and water facility operation activities occurring in streams populated or potentially suitable for future population by *O. mykiss*. In addition, instream flow mandates have the potential to diminish local water supplies at the same time the State is requiring local water agencies to reduce reliance on water supplies that flow through the Sacramento-San Joaquin Delta or are derived from the Colorado River. Regionally, this reduction in available water supply would have significant impacts including, but not limited to, increased overdraft of groundwater basins; reductions in water for municipal, agricultural, and industrial users; water quality degradation detrimental to human health (e.g., increased nitrate concentrations); reductions in agricultural production; job losses; and financial stress to disadvantaged communities and their water systems. More broadly, reductions in available water supply from local sources would place added stress on the State Water Project and other regional and state-level water infrastructure. A CESA listing would have significant impacts to water management, water agencies, and water users throughout the region.

These regulatory effects would impact ongoing or planned projects intended to protect and contribute to recovery of the DPS—such as fish passage projects, habitat restoration projects, and multi-benefit water supply projects designed to meet the state's resiliency and sustainability goals. If the Commission decides to designate *O. mykiss* as an endangered species, water agencies will be subject to additional permitting that could delay projects, increase costs, and generate redundancies given that the species is already listed under federal law and given other federal, state, and local environmental protections. The Department is already a partner in federal consultation and recovery efforts and has developed site-specific protection measures through individual permits and agreements in collaboration with NMFS. In addition, a CESA listing could have unanticipated detrimental effects on southern California steelhead if water agencies are reluctant to implement watershed projects with the potential to benefit anadromous *O. mykiss* because of the possibility of incidental take. For example, the planned removal of the Matilija Dam in Ventura County has been delayed, in part, because of concerns over inadvertent take caused by the mass release of sediment into the Ventura River system as a result of the project.

Moreover, in order to allow the Department and other resource agencies to focus their efforts on the recovery of southern California steelhead, and to allow ACWA member agencies to commit resources to meaningful watershed projects that contribute to the recovery of the DPS, it would be prudent for the Commission to exclude from the proposed listing coastal watersheds where the Department had previously identified concrete-lined flood control channels that present hydraulic (i.e., velocity) barriers to steelhead passage. These structures can extend many miles inland from the river mouth and have been recognized throughout California as barriers to successful upstream migration.

Public water agencies in the impacted central and southern coastal watersheds are working diligently to effectively manage limited water supplies and continue efforts to conserve the species, and they are doing so per the existing federal listing of *O. mykiss*. ACWA member agencies should be allowed to continue their work without an additional layer of regulations and prohibitions in watersheds that are not anticipated to ever provide passage for southern California steelhead. Great care should be taken during the listing process to ensure that existing watershed projects, that will ultimately benefit anadromous *O. mykiss* and other riparian species, are not frustrated by a CESA listing—which is indicated herein does not appear to be supported by the best available science. Managing drought emergencies and long-term climate change impacts requires close collaboration between local and state agencies to continue to provide safe, affordable, and reliable water to southern Californians, and the listing in its current form has the potential to frustrate required coordination.

Conclusion

ACWA appreciates the responsibility currently before the Commission in evaluating the petition and Status Review. There are many factors that will determine the current status of southern California steelhead and a thorough review and analysis of the best available science is needed. ACWA's members along California's South Coast are closely following this effort as the Commission's ultimate decision could have significant impacts on water management operations throughout the region and hinder their ability to provide water supplies to their diverse customers in one of the most densely populated parts of the country.

ACWA appreciates the opportunity to comment and the collaboration of Department and Commission staff. If you have any questions regarding these comments, please contact me at StephenP@acwa.com or (916) 669-2369.

Sincerely,

Stephen Pang
State Relations Advocate
Association of California Water Agencies

Cc: The Honorable Erika Zavaleta, Vice President, California Fish and Game Commission
The Honorable Darius Anderson, Member, California Fish and Game Commission
The Honorable Jacque Hostler-Carmesin, Member, California Fish and Game Commission
The Honorable Eric Sklar, Member, California Fish and Game Commission
Ms. Melissa Miller-Henson, Executive Director, California Fish and Game Commission
Mr. Scott Gardner, Wildlife Branch Chief, California Department of Fish and Wildlife
Mr. Dave Eggerton, Executive Director, Association of California Water Agencies
Ms. Cindy Tuck, Deputy Executive Director, Association of California Water Agencies

Appendix 1

Four Peaks Environmental Science & Data Solutions' Technical Memorandum

FOUR PEAKS ENVIRONMENTAL
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TECHNICAL MEMORANDUM

04/03/2024

TO: Stephen Pang, Association of California Water Agencies
FROM: Lucius Caldwell, Elizabeth Ng, and Grant Woodard, Four Peaks Environmental Science & Data Solutions
SUBJECT: Review of Cramer Fish Sciences Southern California Steelhead Life Cycle Model

Executive Summary

The distinct population segment of Southern California steelhead (*Oncorhynchus mykiss*) below impassible migration barriers is currently listed as Endangered under the federal Endangered Species Act (ESA). This federal ESA-listed population, which is managed by the National Marine Fisheries Service (NMFS), includes only anadromous *O. mykiss* and does not protect freshwater resident life histories. However, the interdependencies of sympatric resident and anadromous life histories was acknowledged by NMFS in their 2006 listing determination, and in 1997 NMFS had defined Southern California steelhead to include resident fish.

In 2021, California Trout petitioned the California Fish and Game Commission to list Southern California steelhead (including all *O. mykiss* below impassible barriers to migration) as an endangered species under the California Endangered Species Act. In an evaluation of this petition published in 2021, the California Department of Fish and Wildlife (CDFW) determined listing may be warranted. This prompted a full evaluation of the status of Southern California steelhead populations by CDFW in a January 2024 report.

The Association of California Water Agencies contracted with Four Peaks Environmental Science & Data Solutions (Four Peaks) to provide a critical review and evaluation of the 2024 CDFW Southern California Steelhead Status Report delivered to the California Fish and Game Commission (CDFW Report), as well as a Southern California steelhead life cycle model developed by Cramer Fish Services (CFS LCM). The CFS LCM was designed to address deficiencies in the current population viability assessments by CDFW and NFMS that only include anadromous spawners. The CFS LCM aims to estimate anadromous and freshwater resident Southern California *O. mykiss* dynamics more accurately by including the effects of both resident and anadromous life histories on anadromous population dynamics.

The CDFW Report provides a relatively comprehensive review of the current status of Southern California steelhead but has some key flaws. First, the underlying data used for some of the analyses in the CDFW Report are limited in terms of their duration, spatial extent, and completeness. These data gaps limit the quality of inferences that can be drawn from the resulting analyses. This issue of limited data availability is heightened by the omission of some key sources of available data. Additionally, some of the data presented in the report are not analyzed correctly. Specifically, some count data—which are indices of population abundance and not abundance estimates themselves—are presented as abundance data, resulting in an inaccurate estimate of abundance. Finally, the CDFW Report analyzes the freshwater resident and anadromous life histories separately, despite their documented interbreeding and ability to give rise to one another, raising questions about the validity of their population viability assessment.

The initial draft of the CFS LCM provides a mechanism for assessing population dynamics when including the interrelated life histories of anadromous and freshwater resident *O. mykiss* populations both above and below barriers to migration. The structure of this model is logical, and the initial default parameterization is defensible and based on empirical data. However, it does have limitations that need to be addressed before it can be used to rigorously evaluate Southern California steelhead population dynamics. Notably, key life stage transition rates such as smolt rates and ocean survival are not parameterizable for individual life histories (anadromous versus resident). This does not allow for these rates to vary, as would be expected due to underlying genetic differences between the two life histories. Additionally, the fecundity parameter is not age-specific, even though fecundity tends to be highly correlated with fish size.

To evaluate the influence of certain key parameters, a sensitivity analysis of the CFS LCM was conducted by Four Peaks. The purpose of this effort was to determine the effects on population dynamics that may propagate through the model from inaccuracies around starting values for population size, fecundity rates, smolt rates, and ocean survival rates. Results from this effort indicated that population dynamics were relatively robust to the starting population size; however, fecundity, smolt rate, and ocean survival rates substantially influenced population dynamics, with higher values of the parameters increasing the long-term viability of the anadromous population. In general, anadromous spawners contributed more to the long-term viability of the anadromous population than resident spawners, though the extent was influenced by environmental conditions.

1 Introduction

1.1 Context

The Association of California Water Agencies has contracted with Four Peaks Environmental Science & Data Solutions (Four Peaks) to provide a critical review of documents related to a petition from California Trout (CalTrout) to list Southern California steelhead (*Oncorhynchus mykiss*) as an endangered species under the California Endangered Species Act (CESA) (CalTrout 2021). The petition notably includes freshwater resident *O. mykiss* (rainbow trout) below impassable barriers. In November 2021, the California Department of Fish and Wildlife (CDFW) published their evaluation of the petition to list Southern California steelhead/rainbow trout[1] (Southern SH/RT), which concluded that, "the petition action may be warranted," (CDFW 2021). In May 2022, the California Fish and Game Commission (Commission) published a Notification of Findings indicating they accepted the petition for consideration (CFGC 2022), prompting CDFW to compile a Southern SH/RT status review to determine if the petition action is warranted.

In October 2023, United Water Conservation District (UCWD) challenged the Commission's decision in court (UCWD v. California Fish and Game 2023). During this hearing, Hon. James C. Chalfant, Judge, stated that an evaluation of freshwater resident rainbow trout abundance and the ability of these

[1] To disambiguate the intended treatment of resident fish within the population proposed for listing under the CESA, CDFW refers to the population as Southern California steelhead rainbow trout.

freshwater resident fish to produce smolts (anadromous individuals) would be required to support a decision to protect Southern SH/RT as an endangered species. Chalfant also raised questions about the rate of smolting among freshwater resident rainbow trout and about precise estimates of rainbow trout population[2] abundance that would be needed before listing. These questions about abundance of freshwater resident fish, ability of freshwater resident fish to smolt, and the rate at which freshwater resident fish smolt are pertinent to the ongoing deliberations regarding Southern SH/RT listing.

In January 2024, CDFW published their status review, in which they stated, "The Department recommends that the Commission find the petitioned action to list Southern SH/RT as an endangered species to be warranted," (CDFW 2024). This memorandum provides a review and evaluation of CDFW's Southern California steelhead status review report (2024) and a review of a technical memorandum prepared by Cramer Fish Science describing a life cycle model (CFS LCM) developed to evaluate Southern California steelhead population viability (CFS 2024).[3] The following specific objectives were defined to support this goal:

1. Summarize the key regulatory issues related to CESA-listing of Southern California steelhead
2. Review and critique the CDFW status report
3. Review, summarize, and critique the CFS technical memorandum

The remainder of this technical memorandum presents the following components:

- A summary of the current regulatory status of Southern California steelhead (Section 1.2)
- A summary of the petition to list (Section 1.3)
- Four Peaks' review and evaluation of the CDFW Report (Section 2)
- Four Peaks' review and evaluation of the CFS technical memorandum (Section 3), which includes an Executive Summary of this technical memorandum suitable for dissemination as a standalone document to brief interested parties in advance of future discussions (Section 3.1)
- Results from Four Peaks' sensitivity analysis of the CFS LCM to evaluate the relative influence of model parameter assumptions on model predicted population dynamics for Southern California steelhead (Section 4)

1.2 Current Regulatory Status of Southern California Steelhead

The Southern California steelhead evolutionarily significant unit (ESU) was initially listed as endangered under the federal Endangered Species Act (ESA) in 1997 (NMFS 1997). At that time, the National Marine Fisheries Service (NMFS) listed only the anadromous form of *O. mykiss* within the stated range of Southern California steelhead (NMFS 1997, pg. 43938). In 2002, the southern range limit of Southern California steelhead was extended under the ESA listing (NMFS 2002). The initial 1997 decision by NMFS to list only anadromous *O. mykiss* has been followed in each subsequent listing: in 2006, the ESA listing

[2] Note that the term "population" is used throughout this document to refer to groups of individuals that, in some cases, exist at different hierarchical levels. For example, there is the worldwide population of steelhead, the Southern California steelhead population, populations of Southern California steelhead that exist within each basin, and populations of anadromous and resident fish within those populations of Southern California steelhead within each basin. To maintain readability and avoid introducing excessive terminology, no effort has been made throughout this document to disambiguate these groups except for cases in which a subpopulation is referred to in direct reference to its parent population.
[3] "Viability" in this context implies less than 5% extinction risk over the next 100 years (see NMFS 2023b, pg. 16).

was further modified to relist the Southern California steelhead ESU as a distinct population segment (DPS), further distinguishing between the anadromous and resident forms of *O. mykiss* (NMFS 2006). In the 2006 listing, NMFS reiterated, "Within these geographic boundaries, we further conclude that the anadromous life form is markedly separate from the resident life form… We therefore are delineating… steelhead-only DPSs," (NMFS 2006, pg. 848). In summarizing their status assessment leading to this 2006 listing, NMFS stated, "the BRT [*an expert panel of scientists from several Federal agencies including NMFS, FWS, and the U.S. Geological Survey*] concluded that the contribution of the resident life-history form to the viability of an *O. mykiss* ESU in-total is unknown and may not substantially reduce extinction risks to an ESU in-total," (NMFS 2006, pg. 851). The current understanding, summarized in NMFS's most recent Status Review, is that individuals of the resident life history do contribute to anadromous populations, although the degree to which this affects population dynamics remains unquantified (NMFS 2023a).

1.3 California Trout Petition to List Southern California Steelhead

On June 7, 2021, CalTrout submitted a Petition to the Commission to list Southern California steelhead, including both anadromous and freshwater resident life histories of *O. mykiss*, as endangered under CESA (CalTrout 2021). In their petition, CalTrout states their position as follows,

> *"CalTrout supports following the federal ESA listing coverage for below barrier steelhead, while keeping the above-barrier resident rainbow trout outside the ESA listing coverage."*

However, the CalTrout Petition deviates from the ESA listing by including freshwater resident fish below barriers within the listed steelhead distinct population segment (DPS).

On June 23, 2021, the petition to list Southern California steelhead under CESA was referred to CDFW for an evaluation of the scientific information presented therein and a recommendation whether to list, which was published in November 2021 (CDFW 2021). In their evaluation, CDFW (2021) notes that CalTrout (2021) defined Southern California steelhead as, "all *O. mykiss*, including anadromous and freshwater resident life histories, below manmade and natural complete barriers to anadromy" (CDFW 2021).

CDFW highlighted the fact that this proposed state designation differs from the ESA listing of a DPS of steelhead with the same geographic range that includes, "only naturally spawned anadromous *O. mykiss*," (CDFW 2021), referring to NMFS's 2006 listing of Southern California steelhead cited above. This deviation in the treatment of freshwater resident fish under the proposed state designation and existing federal designation raised uncertainty regarding the intent of the initial CalTrout Petition, which was resolved in a series of unpublished emails between CDFW and CalTrout in October 2021 confirming,

> *"CalTrout defines Southern California steelhead as all Oncorhynchus mykiss, including anadromous and resident life histories, below manmade and natural complete barriers to anadromy… with the understanding that anadromous (adult southern steelhead) arise from anadromous and resident naturally spawning adults," (as quoted in CDFW 2021).*

At the heart of this confusion between CalTrout—the listing organization—and CDFW—the regulatory agency tasked with providing the best scientific information to inform CESA listing by the Commission—is the issue of appropriate treatment of freshwater resident *O. mykiss* in an evaluation of sympatric (occupying the same geographic areas) anadromous *O. mykiss*. That keystone issue led to the development of the CFS LCM reviewed here, to address NMFS's and CDFW's lack of inclusion of the effects of freshwater life histories on anadromous Southern California steelhead population dynamics.

2 Review of California Department of Fish and Wildlife Status Report

2.1 Summary

2.1.1 Purpose and Context

CDFW's Status Review (CDFW 2024) evaluates whether there is sufficient scientific information to indicate that the continued existence of Southern SH/RT, throughout all or a significant portion of its range, is endangered or threatened. Although the federal ESA listing for the Southern California steelhead DPS includes only the anadromous life-history component, CDFW recommends the Commission list Southern SH/RT, which includes freshwater resident fish below barriers, under CESA. CDFW asserts legal authority to interpret what constitutes a species, justifying their departure from the federal listing.

2.1.2 Life History Considerations

Southern SH/RT enacts both freshwater and ocean migratory (anadromous) life history forms. The enacted life history depends on genetic factors, as well as environmental conditions such as freshwater rearing habitat availability, hydrologic conditions, and ocean access. CDFW provides evidence that the preservation of existing life history diversity within Southern SH/RT is important to foster long-term population stability, as this diversity provides a measure of redundancy that distributes risk, buffering populations from local extirpation or population-level extinction (collapse). They summarize their position regarding the importance of this life history diversity as follows:

> *"Ideally, all three Southern SH/RT life-history types (i.e., fluvial-anadromous, freshwater-resident, lagoon-anadromous) would be expressed within a single population, or the population would harbor the underlying genetic variation to express those life-history types when environmental conditions allow,"*
> *(CDFW 2024, pg. 80).*

CDFW states that, "it is unclear that the resident component can reliably produce anadromous fish after prolonged periods of unfavorable conditions in the long term."[4] A recent viability assessment includes the statements of NMFS's understanding regarding the contributions of resident *O. mykiss* to steelhead populations:

- "We recognize that there may be situations where reproductive contributions from non-anadromous *O. mykiss* may mitigate short-term extinction risk for some steelhead DPSs," (NMFS 2023b, pg. 5).
- "Freshwater-resident (non-anadromous) forms of O*. mykiss* co-occur and appear to interbreed with the anadromous form in many populations, and new research has improved our understanding of the genetic architecture of the populations exhibiting both nonanadromous and anadromous forms (Pearse et al. 2014, Pearse et al. 2019). Thus, while not formally considered part of the DPS, resident

[4] In support of this statement, CDFW cites "Boughton et al. 2022a," which is listed in their references as Boughton 2022. The Boughton or Boughton et al. 2022 document listed in the references of CDFW 2024 could not be located. It appears the correct citation for this statement is NMFS (2023): "Viability Assessment for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Southwest."

(nonanadromous) *O. mykiss* warrant consideration in managing for the anadromous life history" (NMFS 2023b, pg. 155).
- "To meet criteria for life-history expression, viable populations would need to consistently exhibit both the resident and anadromous life history, as well as a third life history of anadromous fish that rear in estuaries for a significant time prior to smolting," (NMFS 2023b, pg. 176).

2.1.3 Life Histories Included in the Proposed Listing and Associated Assessments

CDFW states that,

> *"Non-anadromous resident O. mykiss… reside in many of these same streams and interbreed with anadromous adults, contributing to the overall abundance and resilience of the populations. Southern SH/RT as defined in the Petition include both anadromous (ocean-going) and resident (stream-dwelling) forms of O. mykiss below complete barriers to anadromy in these streams," (CDFW 2024, pg. 139).*

In fact, this proposition to include freshwater resident fish harkens back to NMFS's initial position of including this life history within the listed DPS,[5] which was retracted only after considering the substantial comments advocating against this approach, including comments from the U.S. Fish and Wildlife Service (FWS).[6] Although the freshwater resident form is not considered in NMFS's ESA listing, NMFS did include co-occurring freshwater resident *O. mykiss* in population assessments, where data were available. An expert panel of scientists from several federal agencies initially concluded the contribution of the freshwater resident life-history form to the viability of an *O. mykiss* ESU in-total is unknown and may not substantially reduce extinction risks to an ESU in-total (NMFS 2006). However, more recent science indicates that these resident life histories are likely to provide some mitigation to anadromous population viability, but the extent remains unquantified (NMFS 2023a).

2.1.4 Population Status and Trends

CDFW states that populations of freshwater resident and anadromous *O. mykiss* have both experienced drastic reductions in their abundances and ranges since the early 20th century, with declines in anadromous returns estimated to be over 90%. They further assert that available data indicate that populations of both the anadromous and nonmigratory life histories have remained critically low in the 21st century and have not recovered since listing under the ESA.

2.1.5 Departmental Position on Listing

Given the continued low abundances of freshwater resident and steelhead *O. mykiss* populations, CDFW believes consideration for CESA listing is justified. CDFW identifies multiple primary actions for protecting and restoring Southern SH/RT populations.

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[5] "While conclusive evidence does not yet exist regarding the relationship of resident and anadromous *O. mykiss*, NMFS believes available evidence suggests that resident rainbow trout should be included in listed steelhead ESUs in certain cases," (NMFS 1997, pg. 43941).

[6] "However, the FWS, which has ESA authority for resident fish, maintains that behavioral forms can be regarded as separate DPSs… and that absent evidence suggesting resident rainbow trout need ESA protection, the FWS concludes that only the anadromous forms of each ESU should be listed under the ESA," (*ibid*).

2.2 Critical Evaluation of California Department of Fish and Wildlife Findings

The CDFW report provides an assessment of the status and trends of Southern California SH/RT, as well as the probable reasons for their decline and current obstacles to recovery. However, this assessment is based on limited data that may be incomplete and appear to have been inappropriately analyzed in certain cases. Moreover, while CDFW acknowledges interbreeding between sympatric populations of anadromous adult steelhead and freshwater resident rainbow trout, the populations are evaluated separately, with no accounting for the contributions of freshwater resident fish to steelhead population viability.

2.2.1 Data That Were Omitted from Analysis

Although a complete review of available data was beyond the scope of this evaluation, information provided by UCWD indicates that CDFW (2024) may have omitted important *O. mykiss* monitoring data from their assessment. For example, camera data from a diversion on the Santa Clara (Booth 2016) are mentioned by CDFW (2024) in Section 7.5.2 of their report (Other Monitoring Programs), but apparently not included in their analysis of steelhead population status and trends. Additional sources of data are mentioned in Section 7.5.2 of CDFW's report that appear not to have been incorporated into their status and trends analyses include snorkel surveys of fish abundance in the Santa Ynez River and video-based fish counts in the Ventura River.

2.2.2 Data That Were Inappropriately Analyzed

To paraphrase John G. Sheperd, Emeritus Professor at University of Southampton and former principal scientific adviser to the UK government on marine fisheries management, counting fish is like counting trees, except that you cannot see them and they keep moving around.[7] Observed counts of a sample of animals or plants do not provide accurate estimates of population abundance unless they are statistically analyzed to account for the methods under which these data were collected (Cormack 1964; Jolly 1965; Seber and Le Cren 1967). Such treatment is needed to expand count data into an accurate estimate of population size. Abundance estimations derived from appropriate statistical treatment are less affected by the inevitable undercounting and double counting that occurs when counting individuals. Without this treatment, count data are observations that, at best, provide an index of total population abundance, but do not provide a robust estimate or quantify uncertain around that estimate.

However, count data from fish passage monitoring on the Santa Clara River (Booth 2016) are presented in CDFW's report as an estimate of *O. mykiss* abundance in the Santa Clara system. These observations of juvenile and adult *O. mykiss* presented in the Booth (2016) report have not been statistically analyzed to derive a robust estimate of overall population size (e.g., see Carlson et al. 1998; Macdonald and Smith 1980). Such analyses are required to account for trap efficiency, periods when gear was not operational, and differences in the overall level of effort associated with gear deployment.

After reviewing Section 4.2 (Sources of Information) in CDFW's report, it is not clear if any trap data or other fish enumeration data were treated statistically to develop the estimates of population size used in their Abundance and Trends Section (4.4).

[7] The original quote is, "Managing fisheries is hard: it's like managing a forest, in which the trees are invisible and keep moving around," – John G Sheperd. Source: https://jgshepherd.com/thoughts/.

2.2.3 No Acknowledgment of Interbreeding

Within the CDFW (2024) report, abundance and trend data are presented separately for anadromous adults and "other" *O mykiss* (i.e., freshwater resident forms). Because of this separate treatment, the reproductive contributions of sympatric freshwater adult spawners to the production of smolts and future adult steelhead are not accounted for in measures of population status or the evaluation of long-term viability of Southern California steelhead.

Similarly, CDFW does not consider the potential contributions from above barrier populations of rainbow trout to the number of smolts resulting from downstream migration over barriers that can occur in some systems:

> *"The Department also considers Southern SH/RT to be markedly separate from above-barrier populations of O. mykiss in watersheds that are within the geographic scope of the proposed listing unit, because these above-barrier populations do not contribute substantially to the below-barrier populations of Southern SH/RT," (CDFW 2024, pg. 37).*

A more specific definition of what CDFW considers to be an "impassable" barrier would enable a more thorough evaluation of CDFW's approach. Depending on the level of contribution from above barrier populations to smolt production and anadromous adult spawners via downstream migration, these above barrier populations might also merit inclusion and protection under the CESA if they are measurably contributing to the anadromous populations.

3 Cramer Fish Sciences Life Cycle Model Technical Memorandum Review

3.1 Executive Summary

Cramer Fish Sciences (CFS) developed a technical memorandum in which they present a mathematical model (CFS LCM) for evaluating Southern California steelhead viability (CFS 2024). The CFS LCM was developed to address the California Department of Fish and Wildlife's lack of inclusion of the effects of freshwater resident life histories on anadromous Southern California steelhead population dynamics in their assessment of overall Southern California steelhead population viability, by accounting for freshwater resident contributions to the anadromous population. The model was constructed to accommodate variable environmental conditions and population demographics, enabling the exploratory evaluation of alternative scenarios.

3.1.1 Background

Within the petition to list under the California Endangered Species Act, Southern California steelhead is defined to include, "all *O. mykiss* below manmade and natural complete barriers to anadromy, including anadromous and resident life histories," from five biogeographical population groups.

The National Marine Fisheries Service (NMFS) has established a recovery goal for Southern California steelhead based on the number of adult anadromous spawners. NMFS acknowledges that freshwater resident trout and anadromous steelhead interbreed, but NMFS has not accounted for contributions to anadromous spawners from offspring of freshwater resident parents in the development of their recovery goal. Accounting for these contributions may change conclusions about population viability, as viability is assessed in relation to a recovery goal stated in terms of anadromous spawners.

To evaluate this possibility, CFS developed the CFS LCM, which is a "cohort-based life cycle simulation model" that includes both freshwater resident and anadromous life histories. The purpose of the CFS LCM is to simulate population dynamics (changes in abundance over time) and thereby evaluate extinction risk when freshwater life histories are available to contribute to anadromous populations.

3.1.2 Model Approach and Overview

The CFS LCM includes freshwater resident and anadromous populations and evaluates the effects of reproductive contributions from freshwater residents on the overall population viability of Southern California steelhead. The model has been initially parameterized using data compiled from a literature review and from a similar model developed by CFS for the Central California Coast steelhead DPS (the "Suisun Creek LCM").

The structure of the CFS LCM draws from the following simulation models developed for salmonids:

- NOAA's Habitat Restoration Planning (HARP) model (Jorgensen et al. 2021)
- The Shiraz model, developed collaboratively by researchers from NOAA, the University of Washington, Snohomish County Public Utility District, and the Tulalip Tribe (Scheuerell et al. 2006)
- CFS's Nooksack and Suisun Creek models

The CFS LCM simulates population dynamics over a modifiable time period (default of 125 years) for ten subpopulations of Southern California steelhead. The dynamics of all ten subpopulations are then aggregated to estimate overall Southern California steelhead DPS population dynamics.

The CFS LCM includes the following three life histories for each modeled subpopulation of Southern California steelhead:

1. Below-barrier anadromous populations
2. Below-barrier freshwater resident populations[8]
3. Above-barrier (perched) freshwater resident populations

The number of adults within each life history group are modeled separately, but the number of juveniles is modeled collectively for life history groups that are connected, with connection being based on environmental conditions. Offspring both from anadromous adults and from below-barrier freshwater resident adults always contribute to a collective pool of juveniles that either "smolt" in preparation for an anadromous life cycle or develop into freshwater resident adults (rainbow trout). Depending on the annual hydrologic regime (wet, average, or dry), offspring from perched freshwater resident adults may also contribute to this collective pool of juveniles that can smolt. Annual environmental conditions also affect juvenile survival and the proportion of below barrier juveniles that smolt. The CFS LCM follows cohorts of each life history group as they develop through distinct life stages (e.g., eggs, fry, smolts). The model accounts for survival associated with the transitions between these life stages and among the three modeled life history groups (Table 1). The default model settings for these transition rates are informed by empirical data that align with the current scientific understanding, but they can be adjusted individually by the user, for example, to simulate environmental scenarios.

Table 1. List of life stages and transitions included in the Cramer Fish Sciences life cycle model for Southern California steelhead

Life Stage or Transition Process	Description and Notes
Returns to Spawners	Determines the number of spawners for each life history group
Spawners to Eggs	Determines the number of eggs produced by adult females of each group
Egg to Fry	Determines the number of early-stage juvenile fish (fry)
Fry Rearing and Colonization (Survival)	An estimate of fry survival to the point of their initial winter
Winter Rearing Capacity and Survival	A density-dependent function for imposing fry mortality during winter
Summer Rearing Capacity and Survival	A density-dependent function for imposing parr mortality during summer
Smolt Rate	Rate that freshwater fish convert to anadromous life strategies.
Lagoon Rearing	Rate at which lagoon rearing occurs for smolts; alternative to estuary/ocean rearing
Estuary Survival	Rate at which anadromous smolts survive during estuary phase; default conditions for anadromous smolt rearing
Ocean Survival	Rate at which anadromous smolts survive during ocean phase; default conditions for anadromous smolt rearing
Maturation	Rate at which fish mature to spawners
Iteroparity	Rate at which spawners return and spawn again next year

[8] CFS refers to this population as "Resident."

3.1.3 Impact of Environmental Conditions on Model Rates

The model includes three types of annual hydrological conditions: wet, regular[9], and dry. The reference condition is regular water availability, which is based on an average of historical records of the last 40 years of streamflow data.

During regular years, anadromous connection is maintained so that smolts can emigrate and anadromous adults can return to spawn. Perched populations do not contribute to below-barrier freshwater resident populations, and thus cannot contribute to anadromous populations through smolts.

During dry years, several adjustments are made to the regular year baseline. Perched and below-barrier freshwater resident populations experience reduced carrying capacity, smolt rate is reduced, and stray rate is increased. Perched populations do not contribute to below barrier freshwater populations.

During wet years, several adjustments are made to the regular year baseline. In wet years during which the perched freshwater resident population exceeds its carrying capacity, perched freshwater resident fish contribute to downstream (below-barrier) freshwater resident populations. These below-barrier freshwater residents can then contribute to the anadromous population by smolting.

The model also allows parameterization of a reduction event, which simulates a catastrophic die-off. This can be used to model a decrease in the number of spawners that can be applied for a set number of years to simulate drastic negative environmental impacts to the populations.

3.1.4 Four Peaks' Assessment of the Value of the Cramer Fish Sciences Life Cycle Model

When appropriately structured and parameterized, the CFS LCM will provide a tool for evaluating contributions from freshwater resident fish to the anadromous adult population. The model provides a logical mechanism for evaluating whether sympatric freshwater rainbow trout populations can support long-term viability of steelhead populations.

3.2 Critical Evaluation

3.2.1 Model Summary

The CFS LCM simulates transition rates among a set of model states to represent the transitions among various life stages of a developing fish (Table 2). The model simulates how eggs and parr mature and smolt to capture the interplay between anadromous and resident populations. Adults from the below-barrier freshwater resident group (referred to by CFS simply as the "Resident" group in the model framework and associated Shiny application) can contribute to anadromous adult returns, because all below barrier juveniles are "available" for smolting. Adults from the perched freshwater resident fish (referred to by CFS simply as the "Perched" group in the model framework and associated Shiny application) can contribute to below-barrier freshwater resident populations in wet years when the perched population density exceeds carrying capacity. The simulation-based framework allows users to account for uncertainty by entering different values for certain parameters (e.g., sequence of wet and dry years, survival rates).

[9] CFS alternatively refers to average, medium, and normal environmental conditions. For the purposes of this evaluation, these three terms are assumed to refer to the same "Regular Years" condition described in CFS's technical memorandum.

Table 2. Description of life stages and transitions included in the CFS LCM for Southern California steelhead

Life Stage or Transition Process	Description and Notes
Returns to Spawners	• Determines the number of spawners for each life history group • Estimated as the total number of spawners within each group, multiplied by pre-spawn mortality and harvest rates for that group • Parameterizable for each of the three life histories
Spawners to Eggs	• Determines the number of eggs produced by adult females of each group • Estimated as 50% of the total number of spawners (assuming half are female) times the fecundity value (the average number of eggs produced per female), which is parameterizable for each of the three life histories
Egg to Fry	• Determines the number of early-stage juvenile fish (fry) • Estimated by multiplying the number of eggs times the egg to fry survival parameter • Egg to fry survival is parameterizable for both above- and below-barrier freshwater populations
Fry Rearing and Colonization (Survival)	• An estimate of fry survival to the point of their initial winter • Estimated by multiplying the number of fry times the fry survival rate parameter • Separate estimates for perched and below barrier resident populations • Reduced in dry years
Winter Rearing Capacity and Survival	• A density-dependent function for imposing mortality during winter • This is parameterizable for each of the two freshwater life histories. • Uses a Beverton-Holt function (density dependent asymptotic function) so that incremental increases in rearing capacity/survival approach 0 as fry density increases • The Beverton-Holt function is dependent on habitat capacity and productivity, which differ among watersheds • This function assumes capacities by age account for effects of other age classes
Summer Rearing Capacity and Survival	• A density-dependent function for imposing mortality during summer • Otherwise, as above for Winter Rearing Capacity and Survival
Smolt Rate	• Rate that freshwater fish convert to anadromous life strategies • Each freshwater juvenile age class has an associated smolt rate that determines the proportion of that age class that will migrate to the ocean • Age and watershed dependent, only juveniles up to age 4 have the capacity to smolt, individuals older than this enact a fully freshwater life history
Lagoon Rearing	• Rate at which lagoon rearing occurs for smolts • Accounts for a strategy of anadromous smolts that provides greater survival for individuals rearing in lagoons compared to estuary and nearshore rearing • Density dependent function calculating amount of smolts that can rear in the lagoon, with the others being relegated to the estuary
Estuary Survival	• Default conditions for anadromous smolt rearing • Age specific survival rate times the number of estuary rearing smolts
Ocean Survival	• Default conditions for anadromous smolt rearing • Age-specific survival rate times the number of estuary rearing smolts
Maturation	• Rate at which fish mature to spawners • Separate rates for each life history group and age • Estimates of spawners within each life history group determined by multiplying age specific maturation rates times the number of fish in each age class for each life history and watershed • Also, anadromous spawners may stray to neighboring watersheds and contribute to the number of spawners via a straying rate
Iteroparity	• Rate at which spawners return and spawn again next year • Determines the number of adults that will repeat-spawn • Number of repeat spawners is calculated by multiplying number of spawners times the proportion of fish that respawn (iteroparity rate) and their probability of surviving spawning (respawn survival rate) • Assumes fish cannot change life histories once it is determined • Separate value for each life history

CFS has developed a reasonable and logically sound foundation for a cohort-based LCM to assess the role of environmental conditions and freshwater resident trout contributions on anadromous steelhead population dynamics. The CFS LCM was developed to address CDFW's lack of inclusion of the effects of freshwater life histories on anadromous Southern California steelhead population dynamics. If freshwater resident contributions to anadromous returns change population dynamics enough to affect viability, population recovery targets may benefit from a reevaluation. The modular nature of the cohort-based model provides a high degree of flexibility. Individual parameters can be used for different life stages, life histories, age classes, watersheds, and sub-watersheds. This means the CFS LCM can be used to evaluate knowledge gaps, test the effects of environmental and demographic conditions, and be updated as more information becomes available.

The CFS LCM is designed to evaluate relative differences in population outcomes as a consequence of changes to environmental or life history parameters relative to some baseline, providing guidance for future management and research actions. It is not designed to forecast accurate population abundances or develop recovery targets. However, it can be used to evaluate the assumptions used to determine recovery targets. While the basic model structure is adequate for examining Southern California steelhead population dynamics, key additions to the model structure are needed for the model to adequately address the questions posed by Association of California Water Agencies regarding current population abundance and the rate at which freshwater resident fish contribute to the anadromous population.

3.2.2 Strengths

- The CFS LCM is built on a flexible framework that incorporates relevant, recent, empirical data and information about Southern California steelhead.
- The CFS LCM includes components for resident and perched life history types, whose impacts were not included previously in CDFW's and NMFS's minimum viable population size assessments.
- The interactive GUI facilitates exploratory analyses and simple simulations.
- The model provides a framework for evaluating complex population dynamics that emerge from the interaction of freshwater resident, anadromous, and perched populations. The model incorporates effects of environmental variability, for example by modifying the contribution of perched fish and fry survival under different hydrologic conditions (i.e., "wet year" versus "dry year").
- Perched *O. mykiss* may contribute to below barrier populations and provide a buffering effect. Including a model structure with this phenomenon allows users to parameterize the magnitude of this effect based on professional opinion or emerging empirical data.
- Systematic simulations (e.g., sensitivity analyses) can be used to explore the ramifications of variance in these biological factors (see Section 4 for results from a set of these simulations).
- Other environmental factors that vary across years (e.g., ocean survival) are included in the model, but cannot be parameterized dynamically, to allow for differences among years.
- Systematic simulations can be used to explore the ramifications of variance in these environmental factors (see Section 4 for results from a set of these simulations).

3.2.3 Limitations

3.2.3.1 Summary of Limitations

While the current iteration of the CFS LCM uses sound logic and science, it does have several key flaws and limitations. One potentially important limitation of the model is that two key transition rates—the smolting rate and the ocean survival rate—are not life history specific. Offspring from anadromous parents and those from below-barrier freshwater resident parents are grouped together and share one set of transition rates between successive juvenile life stages (i.e., egg, fry, parr, smolt). While the framework accounts for contributions from freshwater resident adults to the number of returning anadromous adults, it does not support individually setting model parameters for these groups separately. This omission limits the range of simulations that can be analyzed and has implications for the accuracy of model output. Also, the fecundity rate for anadromous adults does not vary with age, to reflect the fact that older fish are larger and produce more eggs.

These flaws and other minor additional limitations are discussed in the following sections. These flaws and limitations should be addressed before the model is used in scientifically rigorous assessments of Southern California steelhead population dynamics and viability. However, upon incorporation of the revisions suggested below, the model would likely be an appropriate model of potential Southern California steelhead population dynamics.

3.2.3.2 Key Transition Rates Are Shared Between Life History Groups

The smolt rate is not individually parameterizable for offspring of each life history group. Smolt rate determines the relative occurrence of anadromy within the population being modeled, and thus the number of anadromous adult returns in the model's next step. In some ways, grouping all below-barrier juveniles is a strength of the model, as it considers all these fish to be freshwater residents, until they smolt. This approach enables a comprehensive Southern SH/RT viability assessment based on abundance of all juveniles, regardless of parentage. However, this identical treatment of all juveniles does not accurately reflect current scientific understanding.

Substantial evidence indicates that there are important genetic differences between populations of anadromous, below-barrier freshwater resident, and perched freshwater resident *O. mykiss*. A review of this evidence is presented in CDFW's recent Southern California steelhead Status Review (CDFW 2024). Key for this critical evaluation of the CFS LCM, the relative contributions to returning anadromous spawners differ among the different life histories, with anadromous spawners producing the highest proportion of future anadromous spawners (Abadía-Cardoso et al. 2019; Fraik et al. 2021). Thus, one set of smolt rates for all life histories is not appropriate in modeling the effects of these different life histories on anadromous steelhead abundance. The structure of the CFS LCM does not capture any reproductive isolation or reflect the genetic underpinnings of smoltification that may lead to different smolt rates between offspring of freshwater resident rainbow trout parents and those of steelhead parents.

The model also lacks the ability to set different rates of ocean survival for offspring of freshwater resident parents and those of anadromous parents. The size at which fish within a population smolt (size threshold) differs among life history groups, reflecting a heritable genetic component to smoltification (Phillis et al. 2016). Different size thresholds for smolting may translate into differences in size at ocean entry among smolts that originate from parents with different life histories. Size at ocean entry has been shown to be affect marine growth rate—and, importantly, ocean survival—of smolts (Weitkamp 2015). Different ocean survival rates can contribute to differences in smolt-to-adult return ratios between life history groups, which would affect their respective ability to meaningfully contribute to returning adult steelhead abundance.

While this structure does not represent a "fatal flaw" in the CFS LCM, the model could be improved by including age-specific smolt rates for each life history, with a default parameterization that established offspring of anadromous fish having higher smolt rates than offspring of non-anadromous fish.

3.2.3.3 Fecundity of Anadromous Adults Does Not Vary Among Ages

The fecundity parameter within the model appears to be an average value (numbers of eggs) per female. All salmonids exhibit "size dependent fecundity," meaning larger females produce more eggs (Fleming 1998), and *O. mykiss* are no exception (Jenkins et al. 2018; Schill et al. 2010). *O. mykiss* spawn at different ages and are capable of repeat-spawning over a range of ages, a process called kelting among steelhead that do so. Salmonids also exhibit "indeterminate growth," meaning they continue to grow throughout their lifespan, and older fish are larger than younger fish (Mommsen 2001). Taken together this means that older *O. mykiss* are larger and produce more eggs than younger *O. mykiss*.

The range of size variation across age classes, and therefore fecundity, may not be very large in spawning female freshwater resident *O. mykiss* (Schill et al. 2010). However, the range in size at spawning for anadromous steelhead can be very large, leading to dramatic differences in fecundity (Jenkins et al. 2018). For example, adult steelhead kelts continue to grow after their first spawning, which has been shown to lead to an approximately 10% increase in fecundity between subsequent spawning events (Seamons and Quinn 2010). The CFS LCM could be improved by including an age-dependent fecundity parameter for all life history groups, especially the anadromous life history.

3.2.3.4 Additional Considerations

In addition to the model limitations described in Sections 3.2.3.2 and 3.2.3.3, the CFS technical memorandum could be improved by addressing the following concerns. These are less critical but addressing them would enable a more thorough evaluation of the mechanics of the model.

First, mathematical equations are not included in the memorandum or on the Shiny application. Equations should be included in all modeling efforts to enable evaluation of model assumptions. Similarly, the baseline parameterization of density dependent relationships is unclear. In several places (e.g., spawner to egg, winter rearing, summer rearing), baseline transition rates are unclear.

The choice of functional relationships and rationale for selection are not explained. Decisions regarding the type of functional relationships may be appropriate, but these are difficult to evaluate without an explanation of the rationale. Density dependent relationships can have strong effects on simulation trajectories. It is unclear why the "hockey stick" function is used to calculate egg production from spawners, but the Beverton-Holt function is used to calculate other metrics of density dependence such as winter rearing capacity and summer rearing capacity, and the lack of consistency was not explained.

Parameterization of Beverton-Holt and other density-dependent functions is not documented or described in the technical memorandum. These parameters of the density dependent relationships should be modifiable within the CFS LCM to best suit the system and population, as the level of density dependence could have a strong impact on simulation results. Additionally, the fry rearing calculations do not appear to incorporate any density dependent dynamics. This is odd, because fry should also be subjected to similar density dependent phenomena as the other juvenile rearing populations. Further, while the lagoon rearing dynamics mention they are subject to density dependence, the memorandum does not indicate what mathematical function is being used (i.e., Beverton-Holt, hockey stick, or something else).

CFS's intention to publish the model in peer-reviewed scientific literature would provide an opportunity to subject the details of the model's structure, parameterization, and justification to a high level of scientific rigor. These details could also be included in an appendix to the Shiny application, but must be available somewhere, whether in peer-reviewed literature or the Shiny application for reference and evaluation.

3.3 Conclusions from Review of Life Cycle Model

Depending on contributions to anadromous spawning populations by below barrier freshwater resident populations and above barrier freshwater resident populations in wet years, the freshwater life histories may provide additional population stability and reduced extinction risk that should be accounted for when setting recovery targets. When appropriately structured and parameterized by addressing the aforementioned limitations, the CFS LCM will provide a tool for evaluating these contributions and determining whether sympatric freshwater rainbow trout populations support long-term viability of steelhead populations.

4 Cramer Fish Sciences Life Cycle Model Sensitivity Analysis for Southern California Steelhead

4.1 Sensitivity Analysis Introduction

Sensitivity analysis is a technique used to evaluate the performance of complex models and to understand the relative effect that individual model inputs or assumptions (parameters) exert on determining model outputs (predictions). In sensitivity analysis, critical parameters are identified and then varied systematically. The robustness of model predictions is evaluated by observing the change in model output that results from adjusting each parameter. Insights can be gleaned about the relative importance of each parameter by evaluating the range and distribution of outcomes.

In this way, the model's overall "sensitivity" to the value of individual parameters (sometimes referred to as parameterization, or parameter settings) can be evaluated, to identify the parameters that have the greatest effects on model results. The model is understood to be "sensitive" to the values of those parameters, which are thus considered important in determining the accuracy of model predictions. Those important parameters to which the model is highly sensitive then become a research priority to improve the accuracy of model predictions. This is particularly important for model parameters with high uncertainty. Highly uncertain parameters that strongly influence model results provide important caveats for model interpretation, and these should be prioritized when developing future research.

Four Peaks conducted a sensitivity analysis to test the influence of both basic model assumptions (robustness to starting population size) and uncertainty in important life history parameters including smolt rate, fecundity, and ocean survival. The following sections present a summary approach for the analyses, the results from these simulations, and finally a discussion of the implications of the findings. Of note, as it constitutes a point of departure from language used in the preceding sections, CFS's terminology regarding life history groups has been retained. Thus, in the subsections that follow, "Resident" refers specifically to the below-barrier freshwater resident group, while "Perched" refers to the above-barrier freshwater resident group.

4.1.1 General Approach

To evaluate the CFS LCM's sensitivity to individual parameters, a series of scenarios were constructed by systematically varying individual parameters while holding others constant. The parameters that were varied included initial abundance, fecundity, smolt rate, and ocean survival rate. This approach enabled an assessment of the differences in population trajectories under different values of that specific parameter.

Because the CFS LCM depends on the sequence of annual environmental conditions (wet, dry, or normal), Four Peaks ran all simulation scenarios under the following four different sets of environmental conditions:

1. All dry years
2. All normal years
3. Normal and dry (repeating sequence of normal, dry, dry, dry, normal)
4. Normal, wet, and dry (repeating sequence of normal, wet, dry, dry, normal)

These environmental conditions were chosen to represent potential proportions of wet, dry, and average moisture years. Table 3 presents a summary of the default conditions used for the eight model scenarios (varying initial abundance, varying fecundity, varying smolt rate, varying ocean survival).

Table 3. Default parameter values used in the eight model scenarios

Scenario	Life History	Initial Abundance (Number of Spawners)	Fecundity (Number of Eggs)	Smolt Rate	Ocean Survival
Default	Perched, resident, and anadromous	1,000 for all life histories	2,000 for anadromous populations 1,000 for freshwater populations	0.15, 0.5, 0.25, and 0.25 for ages 0 through 3 respectively	0.6, 0.36, 0.3, 0.3, 0.3, and 0.4 for ages 1 through 7 respectively
Vary starting abundance	All life histories simultaneously	0,500, 1000, 1500, 2000 for all life histories	Default Parameter Setting	Default Parameter Setting	Default Parameter Setting
Vary fecundity	All life histories simultaneously	Default Parameter Setting	0, 500, 1,000, 1,500, 2,000 for freshwater life histories 0, 1,000, 2,000, 3,000, 4,000 for anadromous life history	Default Parameter Setting	Default Parameter Setting
Vary fecundity	Resident/perched spawners only	1,000 for freshwater life histories, 0 for the anadromous life history	0, 500, 1,000, 1,500, 2,000 for freshwater life histories 0 for the anadromous life history	Default Parameter Setting	Default Parameter Setting
Vary fecundity	Anadromous spawners only	1,000 for anadromous life histories, 0 for the freshwater life history	0, 1,000, 2,000, 3,000, 4,000 for the anadromous life history 0 for freshwater life histories	Default Parameter Setting	Default Parameter Setting
Vary smolt rate	Resident/perched spawners only	1,000 for freshwater life histories, 0 for anadromous life history	1,000 for freshwater life histories 0 for anadromous life history	Defaults times factors of between 0 and 2	Default Parameter Setting
Vary smolt rate	Anadromous spawners only	1,000 for anadromous life history, 0 for freshwater life history	1,000 for anadromous life history 0 for freshwater life histories	Defaults times factors of between 0 and 2	Default Parameter Setting
Vary ocean survival	Resident/perched spawners only	1,000 for freshwater life histories, 0 for the anadromous life history	1,000 for the freshwater life histories 0 for the anadromous life history	Default Parameter Setting	Defaults times factors of between 0 and 2
Vary ocean survival	Anadromous spawners only	1,000 for anadromous life histories, 0 for the freshwater life history	2,000 for the anadromous life history 1,000 for the freshwater life histories	Default Parameter Setting	Defaults times factors of between 0 and 2

4.1.2 Vary Initial Abundance Simulations

A basic assumption of the CFS LCM is that the model's final population abundance estimates (and thus, the overall assessment of population viability) are robust to small differences in starting abundance. This assumption has implications regarding the importance of accurate estimates of current population size. To evaluate this assumption, Four Peaks ran scenarios that varied initial population abundances from the default of 1,000 spawners for each life history type by a factor from 0 to 2, in increments of 0.5 (e.g., [0, 1,000, 2,000, 3,000, 4,000] for anadromous spawners and [0, 500, 1,000, 1,500, 2,000] for freshwater spawners). The population trajectories for the 150-year time series were then averaged across all watersheds. Varying the initial population sizes was not expected to substantially affect model results because of the relative predictive nature of the model.

4.1.3 Vary Fecundity Simulations

Typically, age and life stage-structured models are sensitive to fecundity and other state transition rates. These parameters may also have the highest uncertainty. Simulations were constructed to evaluate variance in the fecundity parameter. Four Peaks ran scenarios that used the default initial population sizes for all life history groups, and varied fecundity estimates from the default of 1,000 eggs per spawner for resident fish and 2,000 eggs per spawner for anadromous fish, by a factor from 0 to 2, in increments of 0.5. The population trajectories for the 150-year time series were then averaged across all watersheds. Varying fecundity was expected to affect model results because fecundity has a direct impact on the number of progeny produced by spawners in each generation, which can affect the minimum number of spawners required to prevent population collapse (minimum viable population), a common recovery target that has been applied to Southern California steelhead.

4.1.4 Anadromous Contribution Simulations (Vary Smolt Rate and Vary Ocean Survival)

One of the major questions regarding the anadromous steelhead recovery target—quantified as the minimum viable population—is the degree to which resident and perched freshwater populations contribute to the anadromous spawning population. As discussed in Section 3.2.3.1, anadromous spawners have a higher probability than resident spawners of producing future returning anadromous adults. Two potential mechanisms of action for this have been identified: 1) a difference in smolt rates between the two life histories, or 2) a difference in ocean survival between the two life histories. Differences in smolting and other behavioral and physiological aspects of an anadromous life history are determined in part by genetics (Pearse et al. 2014). Survival after smolting is greater among larger sized smolts (Tatara et al. 2017), and anadromous parents generally give rise to larger offspring (Kendall et al. 2015). As currently formulated, the CFS LCM does not allow life history specific smolt rates (to specify a higher probability of smolting for offspring of anadromous parents) or ocean survival rates (to specify a higher probability of surviving in the ocean for offspring of anadromous parents).

To evaluate freshwater parent contributions to the anadromous population within the current structure of the CFS LCM, Four Peaks ran a scenario that set the anadromous starting population size and fecundity to 0, while maintaining the resident and perched starting population sizes and fecundities at the defaults (1,000 for both parameters). In this scenario, anadromous fish must arise from offspring of freshwater parents, so this tests the ability of the combined resident population to wholly support an anadromous population without any reproductive contributions from those anadromous adults.

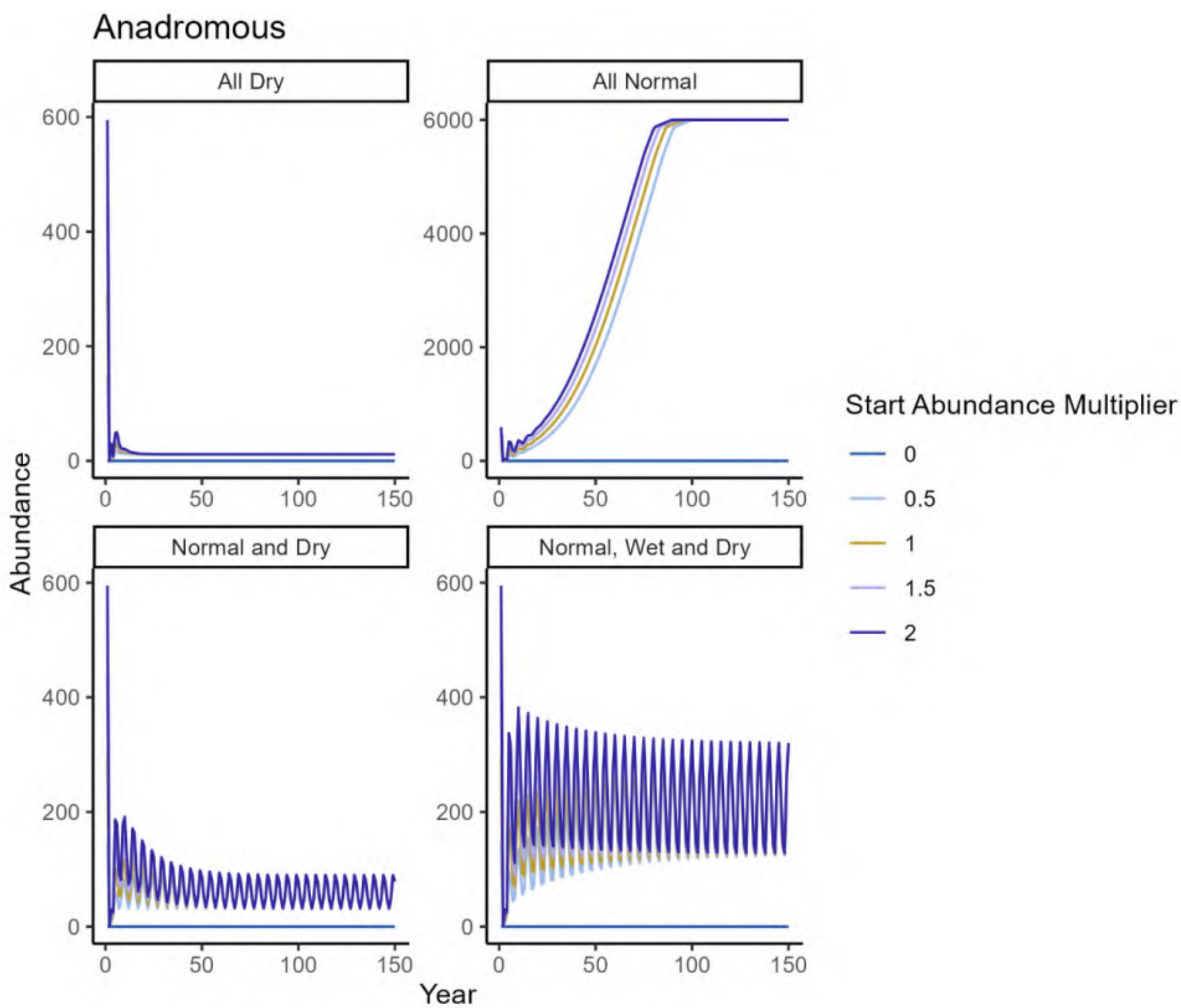
The converse of this scenario was also run, setting freshwater fecundities and starting populations at 0, the anadromous population fecundity at the default 2,000, and anadromous population size at the default 1,000. This scenario tests the ability of the anadromous population to support itself without any reproductive contributions from the resident adults.

Two sets of these scenarios were run: one that varied the smolt rate and one that varied ocean survival. These two parameter sets were varied from the default by factors between 0 and 2 with a step size of 0.5. Default smolt rates were 0.15, 0.5, 0.25, and 0.25 for ages 0 through 3, respectively. Default ocean survival rates from one age class to the next (starting at age 1 and ending at age 7) were 0.6, 0.36, 0.3, 0.3, 0.3, and 0.4, respectively. This allowed an assessment of the consequences of overestimation or underestimation of the unknown true parameter value.

4.2 Sensitivity Analysis Results

4.2.1 Vary Starting Abundance Simulations

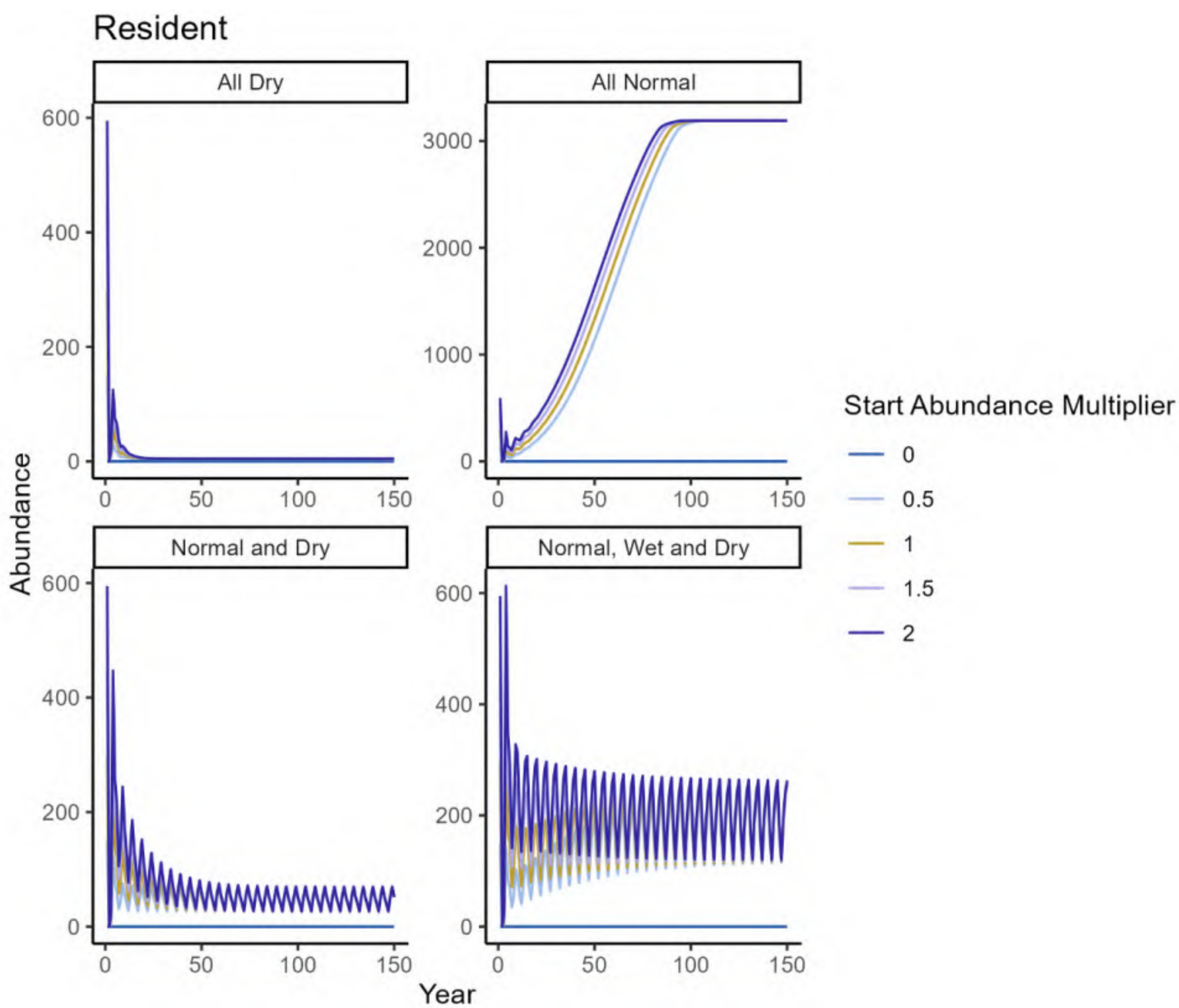
As expected, model results (i.e., ending abundance estimates and overall conclusions about population viability) were robust to starting population abundances (Figure 1 through Figure 3). Abundances towards the ends of the time series were similar among different starting abundances, provided the starting abundances were not extremely small. Only when wet years were included did the starting abundance make a noticeable but small difference in the average ending population abundances. Under scenarios with wet years and higher starting abundance, ending populations sizes were also slightly larger.



Notes:

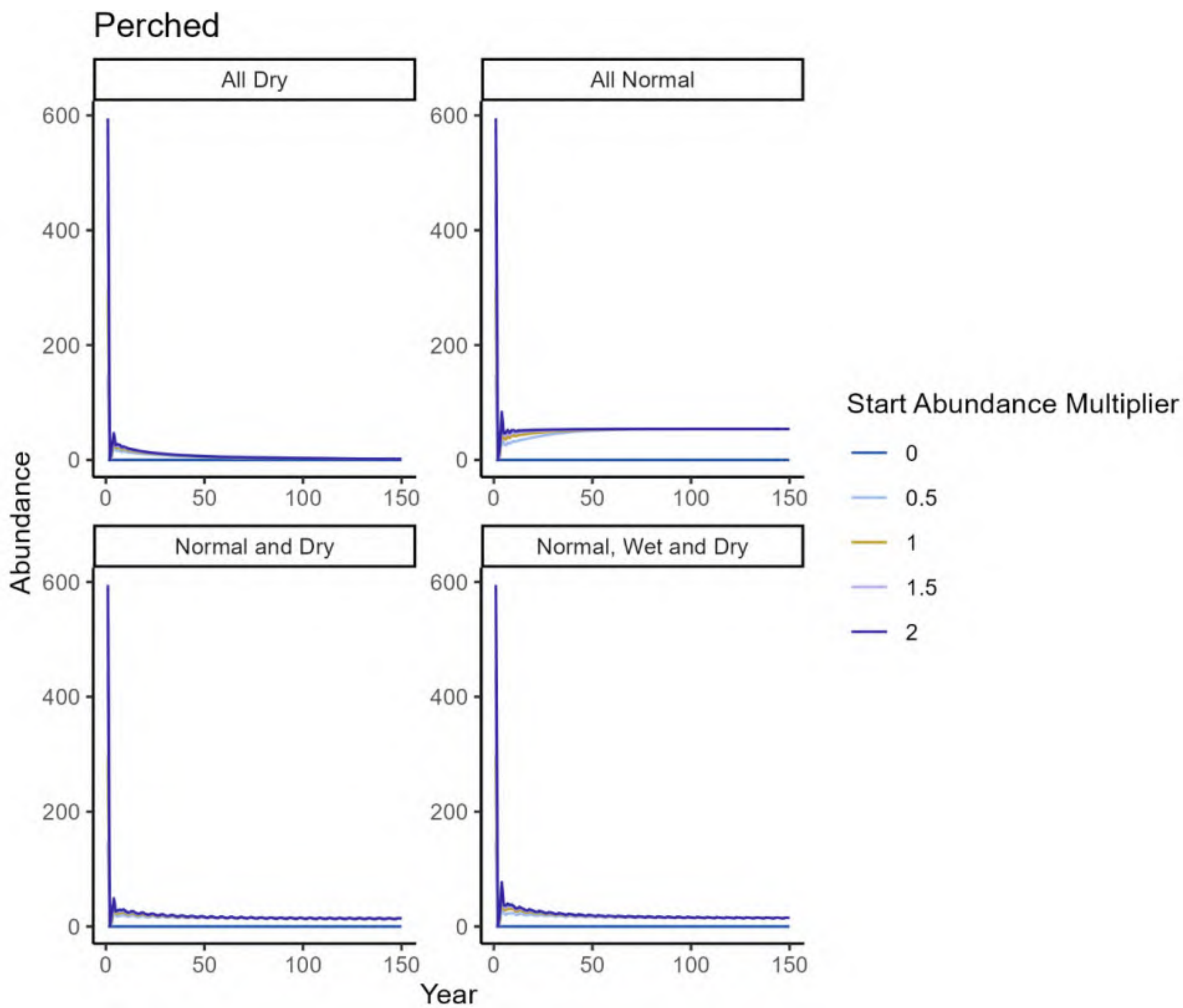
- Multiplier 0: Anadromous Start Abundance = 0, Resident and Perched Start Abundance = 0
- Multiplier 0.5: Anadromous Start Abundance = 500, Resident and Perched Start Abundance = 500
- Multiplier 1: Anadromous Start Abundance = 1000, Resident and Perched Start Abundance = 1000
- Multiplier 1.5: Anadromous Start Abundance = 1500, Resident and Perched Start Abundance = 1500
- Multiplier 2: Anadromous Start Abundance = 2000, Resident and Perched Start Abundance = 2000

Figure 1. Vary starting abundances, all life histories simulation: anadromous population trajectory using default fecundities of 1,000 eggs for resident and perched life histories and 2,000 eggs for anadromous life histories



Notes: See Figure 1 notes for multiplier ranges.

Figure 2. Vary starting abundances, all life histories simulation: resident population trajectory using default fecundities of 1,000 eggs for resident and perched life histories and 2,000 eggs for anadromous life histories



Notes: See Figure 1 notes for multiplier ranges.

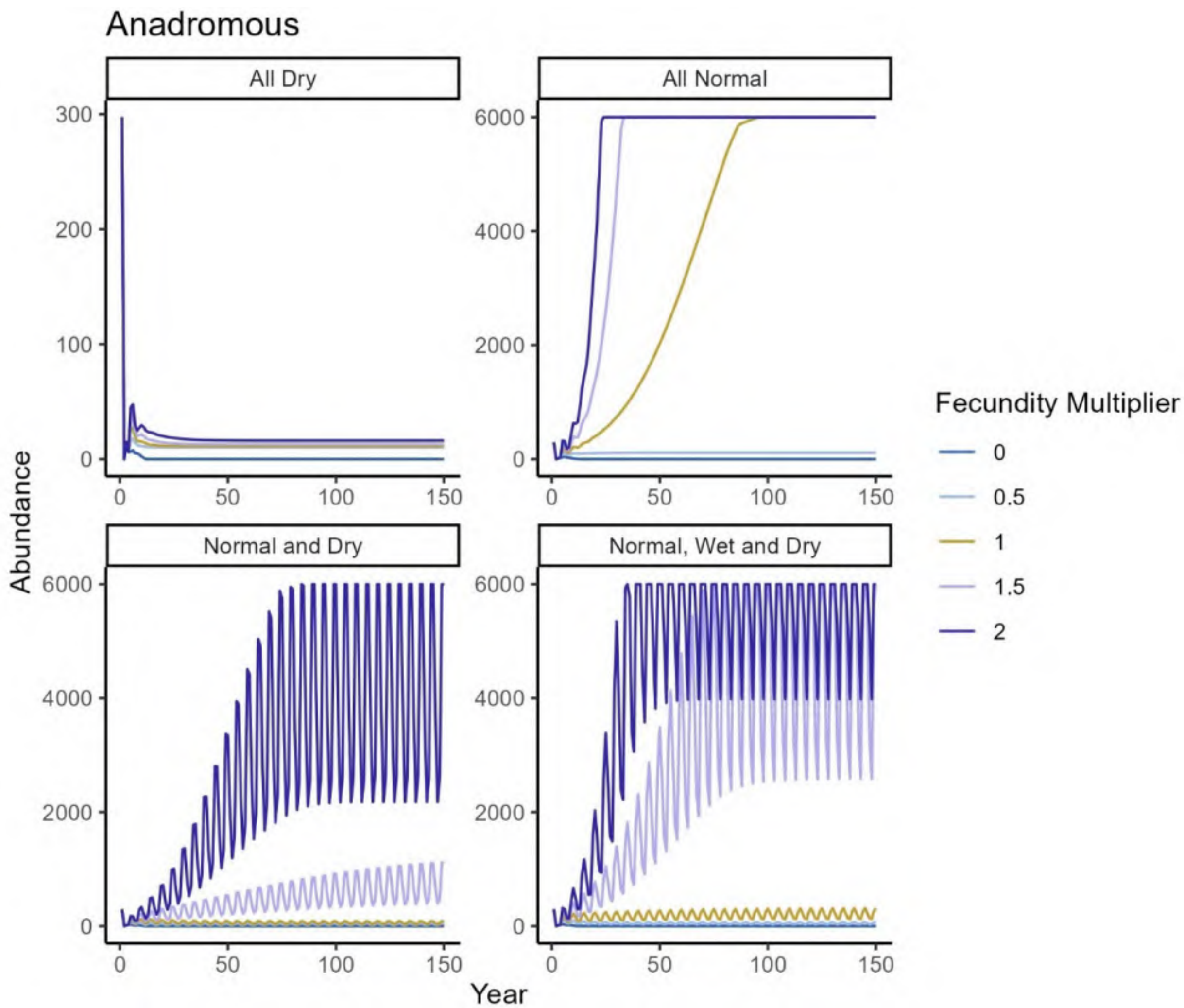
Figure 3. Vary starting abundances, all life histories simulation: perched population trajectory using default fecundities of 1,000 eggs for resident and perched life histories and 2,000 eggs for anadromous life histories

4.2.2 Vary Fecundity Simulations

4.2.2.1 Varying Fecundity for All Life History Groups

4.2.2.1.1 Effect on Anadromous Abundance

The effect of varying fecundity on model predicted ending abundance of anadromous adults depended on the environmental conditions of that model run (Figure 4). Under all dry conditions (top left panel in Figure 4), over- or under-estimation of the fecundity parameters for all three life histories had a relatively small impact on the model predicted average anadromous population abundance, because the model predicted average abundance is small regardless of fecundity. Under normal conditions (top right panel in Figure 4), overestimating the fecundity parameters increases the rate of population increase but has no impact on model predicted ending abundance, because abundance is limited by the carrying capacity parameter. However, underestimating anadromous fecundity resulted in sharp reductions in model predicted ending abundance. Under normal and dry conditions (bottom left panel in Figure 4), if the default fecundity parameter estimate is an overestimate for each of the life history groups, it will have little impact because the model predicted ending abundances are already so low. However, if the current fecundity parameter estimate is below the true value, the model substantially underestimates the population abundance. Under normal, wet, and dry conditions (bottom right panel in Figure 4), if the current fecundity value is overestimated it will have little impact (populations are already very small), but if it is underestimated, the model may severely underpredict anadromous population abundances.



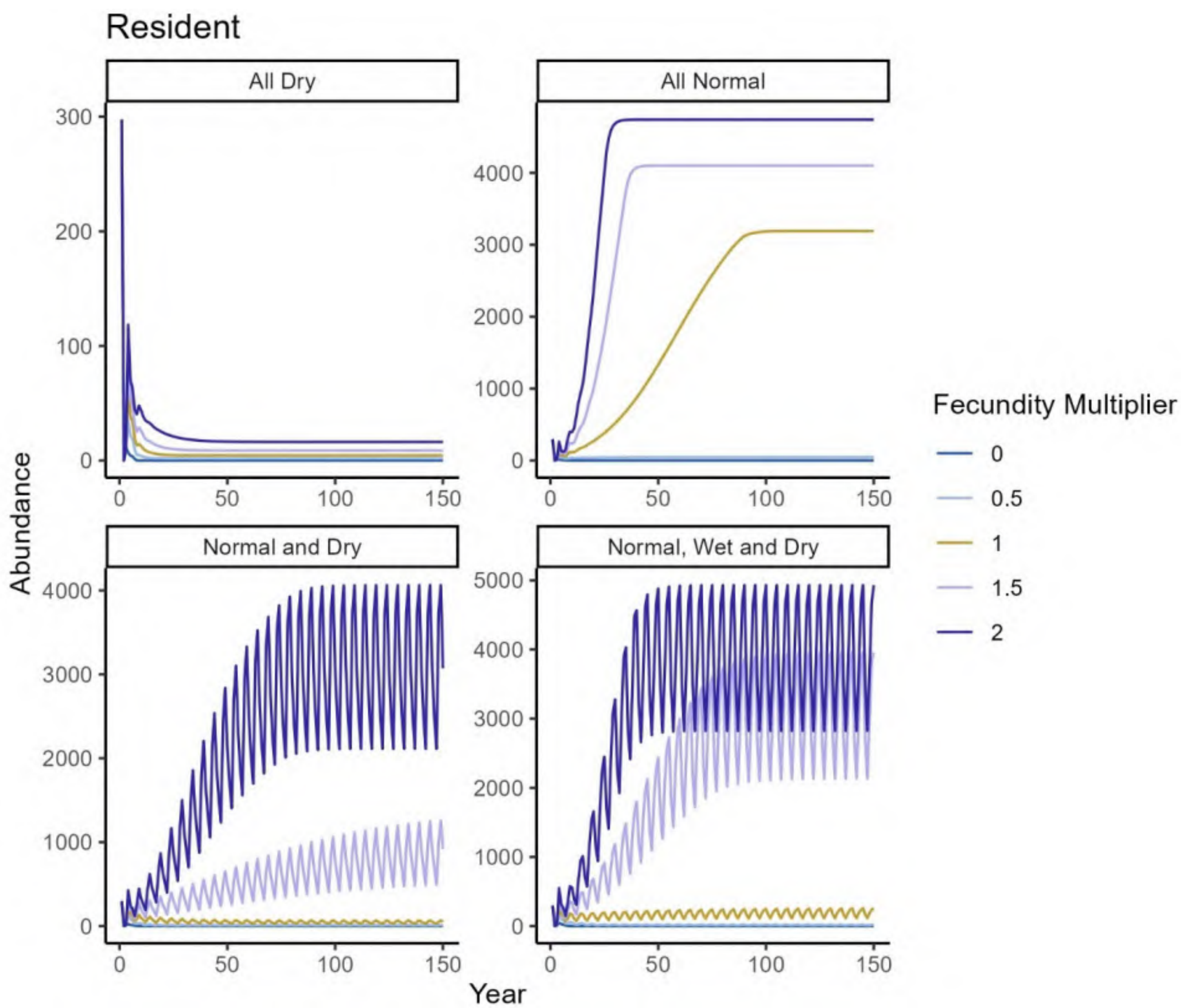
Notes: Starting population abundances were 1,000 for all life histories.

- Multiplier 0: Anadromous Fecundity = 0, Resident and Perched Fecundity = 0
- Multiplier 0.5: Anadromous Fecundity = 1000, Resident and Perched Fecundity = 500
- Multiplier 1: Anadromous Fecundity = 2000, Resident and Perched Fecundity = 1000
- Multiplier 1.5: Anadromous Fecundity = 3000, Resident and Perched Fecundity = 1500
- Multiplier 2: Anadromous Fecundity = 4000, Resident and Perched Fecundity = 2000

Figure 4. Vary Fecundity, all life histories simulation: anadromous population trajectory (averaged across watersheds) when varying fecundity for each life history group relative to the default of 2,000 for the anadromous population and 1,000 for the freshwater populations

4.2.2.1.2 Effect on Resident Abundance

The effect of varying fecundity on model predicted ending abundance of resident adults also depended on the environmental conditions of that model run (Figure 5). Under all dry conditions (top left panel in Figure 5), bias in the estimate of population fecundity would minimally impact model predicted ending freshwater population abundance. Under these conditions, extremely low population abundance reduces the potential variation in population abundance overall, and all scenarios result in near population collapse.



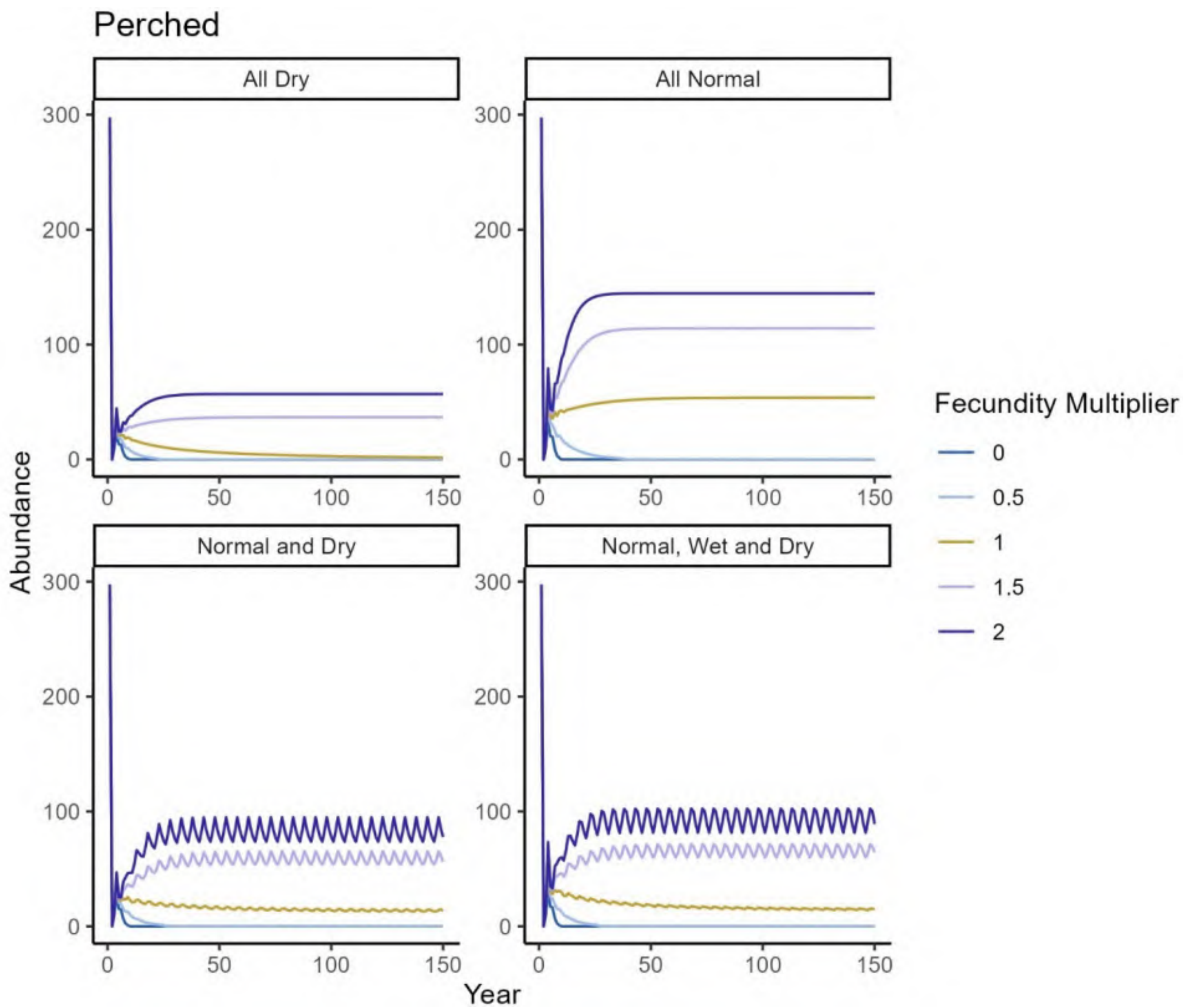
Notes: Starting population abundances were 1,000 for all life histories. See Figure 4 notes for multiplier ranges.

Figure 5. Vary fecundity, all life histories simulations: resident population trajectory (averaged across watersheds) when varying fecundity relative to the default of 1,000 for freshwater life histories and 2,000 for anadromous life histories

Under all normal conditions (top right panel in Figure 5), if current fecundity parameters are overestimated, the model would severely overestimate the model predicted ending population abundance. If the model's default fecundity is an underestimate, the model would only moderately underestimate the model predicted ending population abundance. Under normal and dry conditions (bottom left panel in Figure 5) or normal, wet, and dry conditions (bottom right panel in Figure 5), if the current fecundity value is an overestimate it would have little impact, but if the current fecundity estimate is an underestimate the model could be drastically underestimating the model predicted ending abundance of the freshwater below barrier populations.

4.2.2.1.3 Effect on Perched Abundance

The effect of varying fecundity on model predicted ending abundance of perched adults was similar regardless of the environmental conditions of that model run (Figure 6). Generally, if the current perched fecundity is an underestimate, the impacts are more substantial on the average model predicted ending perched population abundance than if it is an overestimate. If the default perched population fecundity is overestimated, these populations are already relatively low, so the difference is small. If it is an underestimate, the model will underestimate the perched population size potentially substantially (though at a declining rate as the degree of underestimation increases).

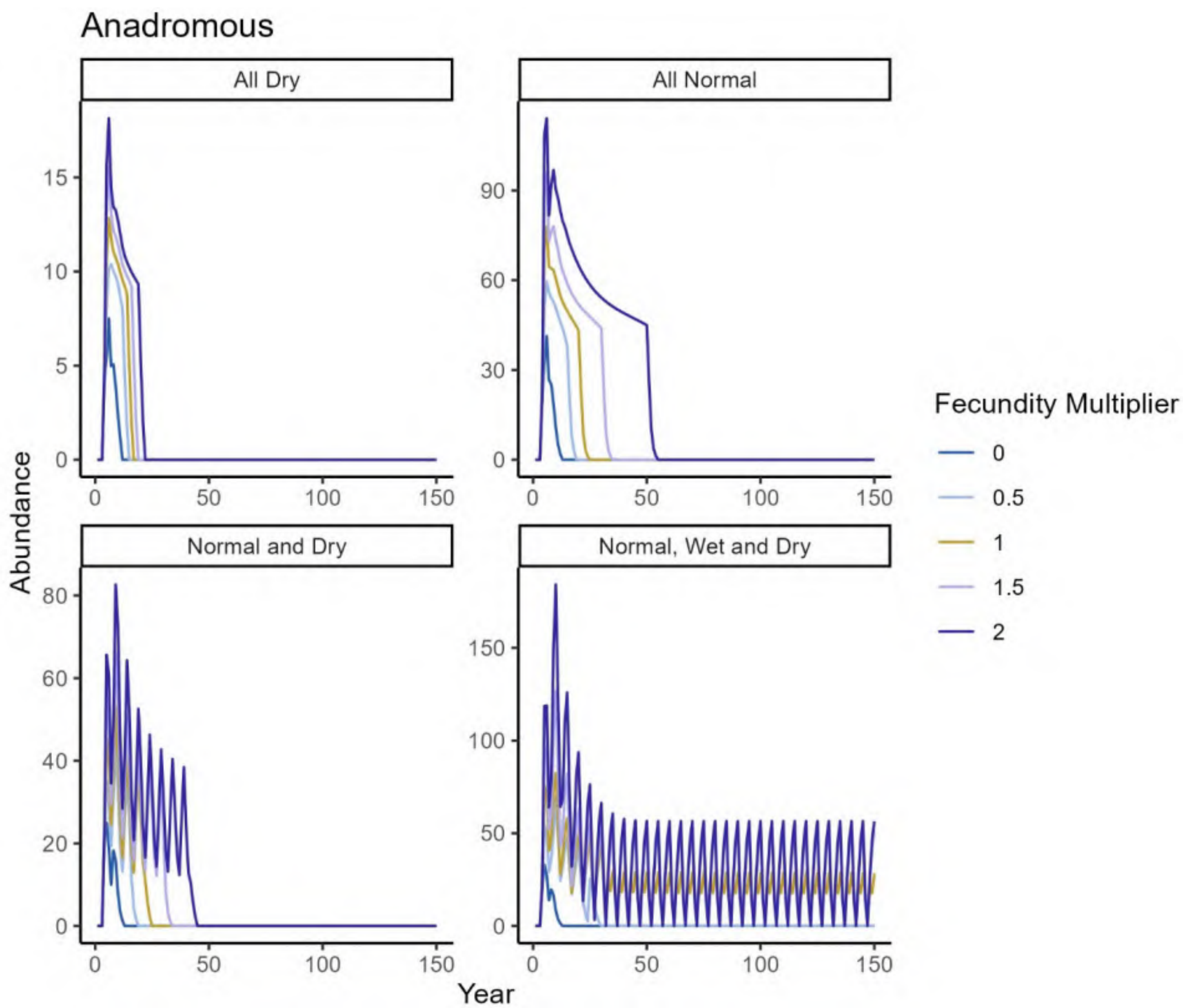


Note: Starting population abundances were 1,000 for all life histories. See Figure 4 notes for multiplier ranges.

Figure 6. Vary fecundity, all life histories simulations: perched population trajectories (averaged across watersheds) when varying fecundity relative to the default of 1,000 eggs for freshwater life histories and 2,000 eggs for anadromous life histories

4.2.2.2 Varying Fecundity for Resident and Perched Life History Groups Only

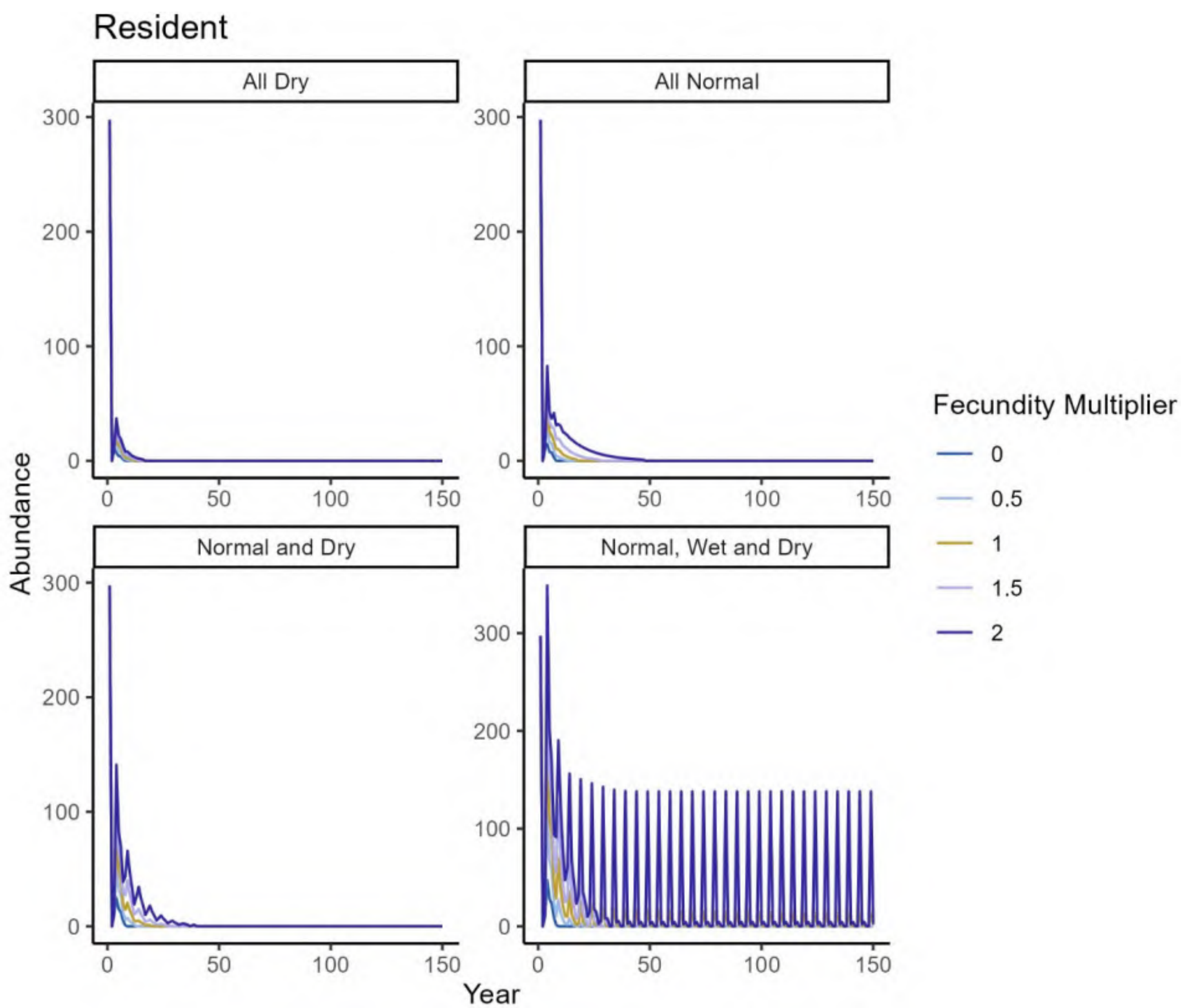
When anadromous adults are prevented from reproducing (i.e., fecundity is set to zero), under all dry, all normal, and normal and dry conditions, the anadromous population collapses (Figure 7). The freshwater populations are only capable of supporting the anadromous population when wet years are included, highlighting the importance of contributions from the perched population to downstream migrants in wet years (lower right panel in Figure 7). Even under these conditions, the model predicted average abundance is low at the end of the time series for the anadromous population.



Notes: See Figure 4 notes for multiplier ranges.

Figure 7. Vary fecundity, resident and perched spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting anadromous fecundity contributions and varying perched and below barrier freshwater fecundity relative to the default of 1,000 for all populations

As the anadromous population declines, so too does the below barrier freshwater population (Figure 8), which eventually collapses unless wet years that allow support from the perched population are included (bottom right panel in Figure 8). This is an indicator that the below barrier freshwater and anadromous populations appear to be supporting each other. A collapse in one facilitates a collapse in the other under climatic conditions that do not include wet years. Thus, only under the most optimistic conditions can freshwater populations maintain steelhead populations by themselves.



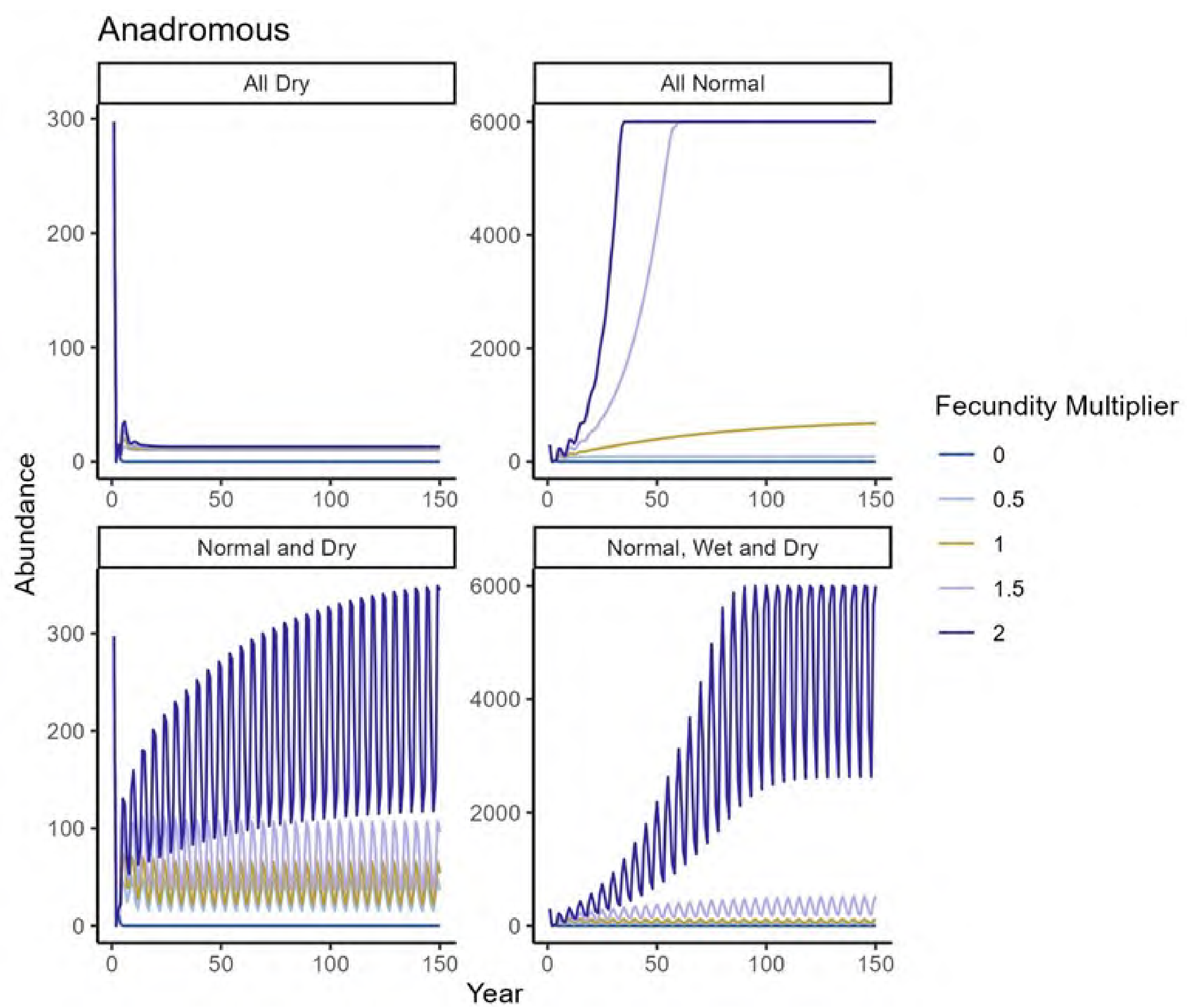
Notes:

- Multiplier 0: Anadromous Fecundity = 0, Resident and Perched Fecundity = 0
- Multiplier 0.5: Anadromous Fecundity = 0, Resident and Perched Fecundity = 500
- Multiplier 1: Anadromous Fecundity = 0, Resident and Perched Fecundity = 1000
- Multiplier 1.5: Anadromous Fecundity = 0, Resident and Perched Fecundity = 1500
- Multiplier 2: Anadromous Fecundity = 0, Resident and Perched Fecundity = 2000

Figure 8. Vary fecundity, resident and perched spawners only simulation: below barrier freshwater population trajectory (averaged across watersheds) when omitting anadromous fecundity contributions and varying perched and below barrier freshwater fecundity relative to the default of 1,000 for all populations

Varying Fecundity for Anadromous Life History Groups Only

Anadromous populations are capable of preventing their population's collapse without reproductive contributions from freshwater populations in all but the most adverse all dry scenario, but maintaining a robust population size required fecundity to be higher than the default model setting (Figure 9).



Notes:

- Multiplier 0: Anadromous Fecundity = 0, Resident and Perched Fecundity = 0
- Multiplier 0.5: Anadromous Fecundity = 1000, Resident and Perched Fecundity = 0
- Multiplier 1: Anadromous Fecundity = 2000, Resident and Perched Fecundity = 0
- Multiplier 1.5: Anadromous Fecundity = 3000, Resident and Perched Fecundity = 0
- Multiplier 2: Anadromous Fecundity = 4000, Resident and Perched Fecundity = 0

Figure 9. Vary fecundity, anadromous spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting resident and perched spawner fecundity contributions and varying anadromous fecundity relative to the default of 2,000 for all populations

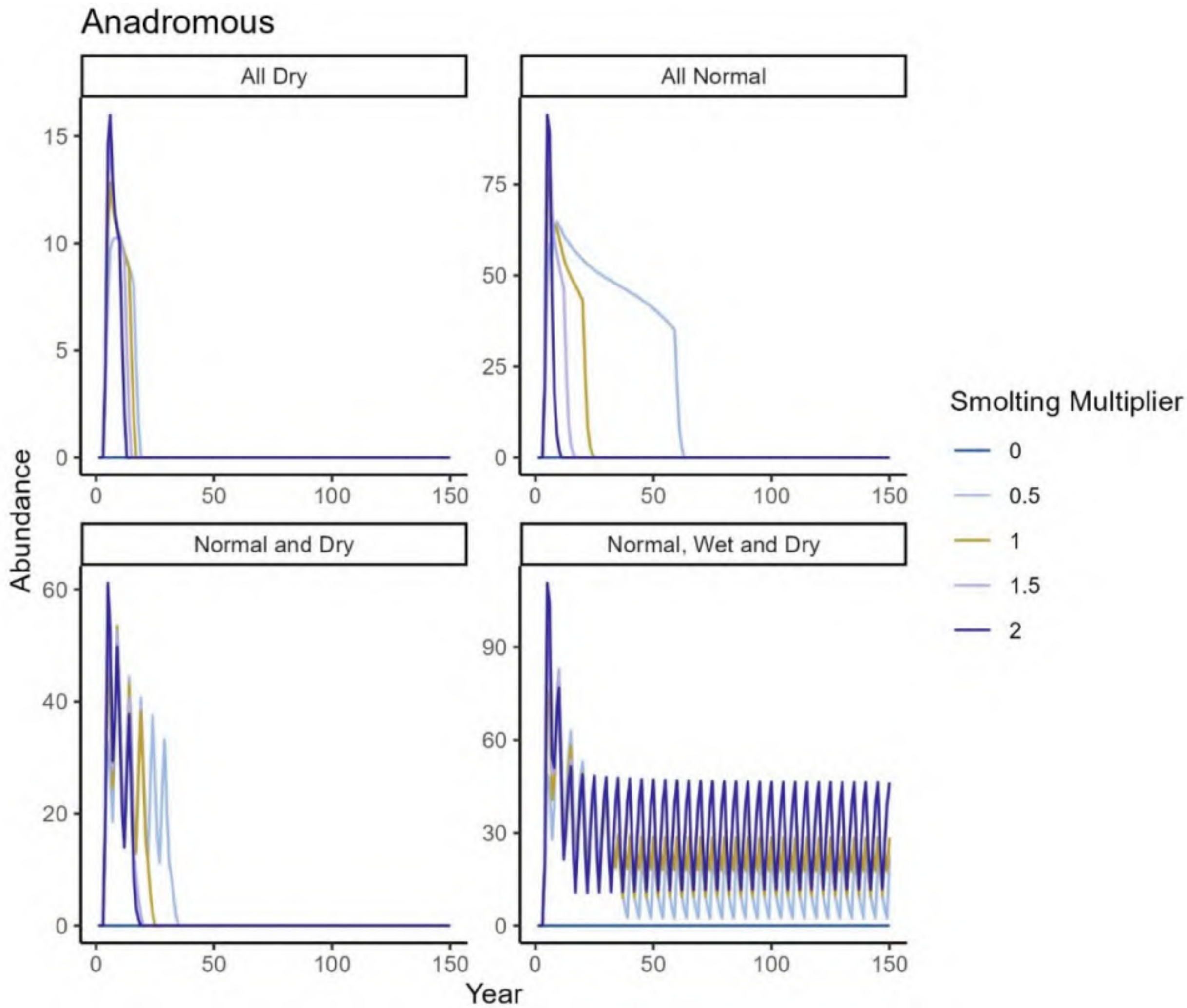
4.2.3 Anadromous Contribution Simulations (Vary Smolt Rate and Vary Ocean Survival)

4.2.3.1 Vary Smolt Rate

4.2.3.1.1 Resident and Perched Life History Groups Only

When anadromous fish starting population abundance and fecundity are set to 0, meaning all juvenile fish are offspring of resident adults, varying the smolt rate did not prevent the anadromous population from collapsing under all environmental conditions except the normal, wet, and dry conditions scenario

(Figure 10). Under these conditions, varying the smolt rate leads to a proportional difference in the model predicted ending abundance of anadromous adults. Regardless, even under these improbable future environmental conditions, the average anadromous population abundance is extremely low.



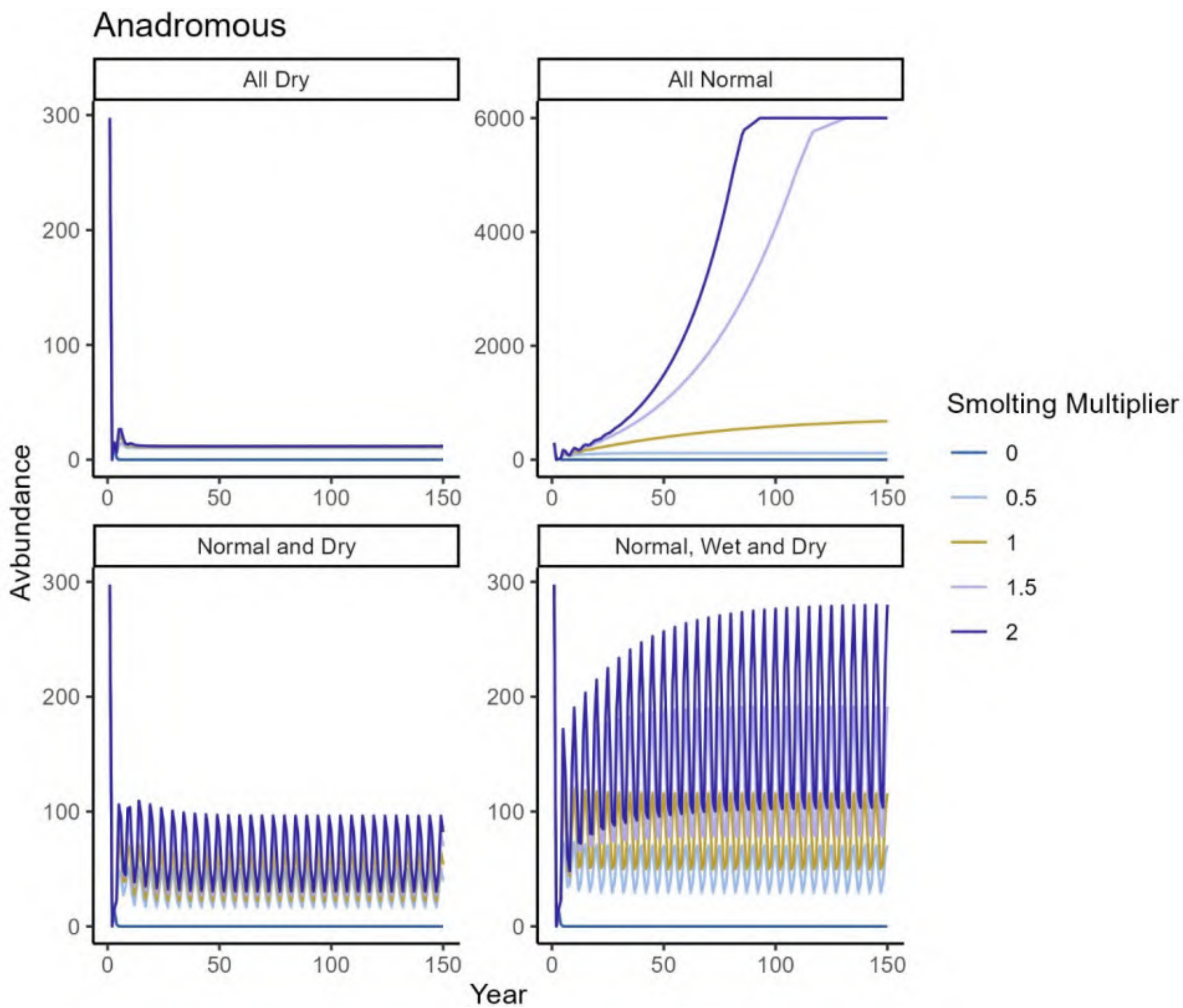
Notes:

- Multiplier 0: Smolt Rates (Ages 0 through 3) = 0
- Multiplier 0.5: Smolt Rates (Ages 0 through 3) = 0.075, 0.250, 0.125, and 0.125
- Multiplier 1: Smolt Rates (Ages 0 through 3) = 0.15, 0.5, 0.25, and 0.25
- Multiplier 1.5: Smolt Rates (Ages 0 through 3) = 0.225, 0.750, 0.375, and 0.375
- Multiplier 2: Smolt Rates (Ages 0 through 3) = 0.3, 1.0, 0.5, and 0.5

Figure 10. Vary smolt rates, resident and perched spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting anadromous fecundity contributions and varying smolt rates relative to the defaults of 0.15, 0.5, 0.25, and 0.25 for ages 0 through 3

4.2.3.1.2 Anadromous Spawners Only

Conversely, the anadromous population can maintain itself and avoid collapse without reproductive contributions from freshwater spawners in most environmental conditions, depending on the rate of smolting (Figure 11). Based on current default smolting estimates, the anadromous population is able to maintain itself in all tested environmental sequences except the all dry sequence (top left panel in Figure 11). If smolt rates are higher than the default estimate, they are able to maintain a small population even in all dry years. Under other environmental conditions, the model predicted ending abundance varies with smolt rate. This effect is greatest under all normal year conditions (top right panel in Figure 11) and least under normal and dry year conditions (bottom left panel in Figure 11).



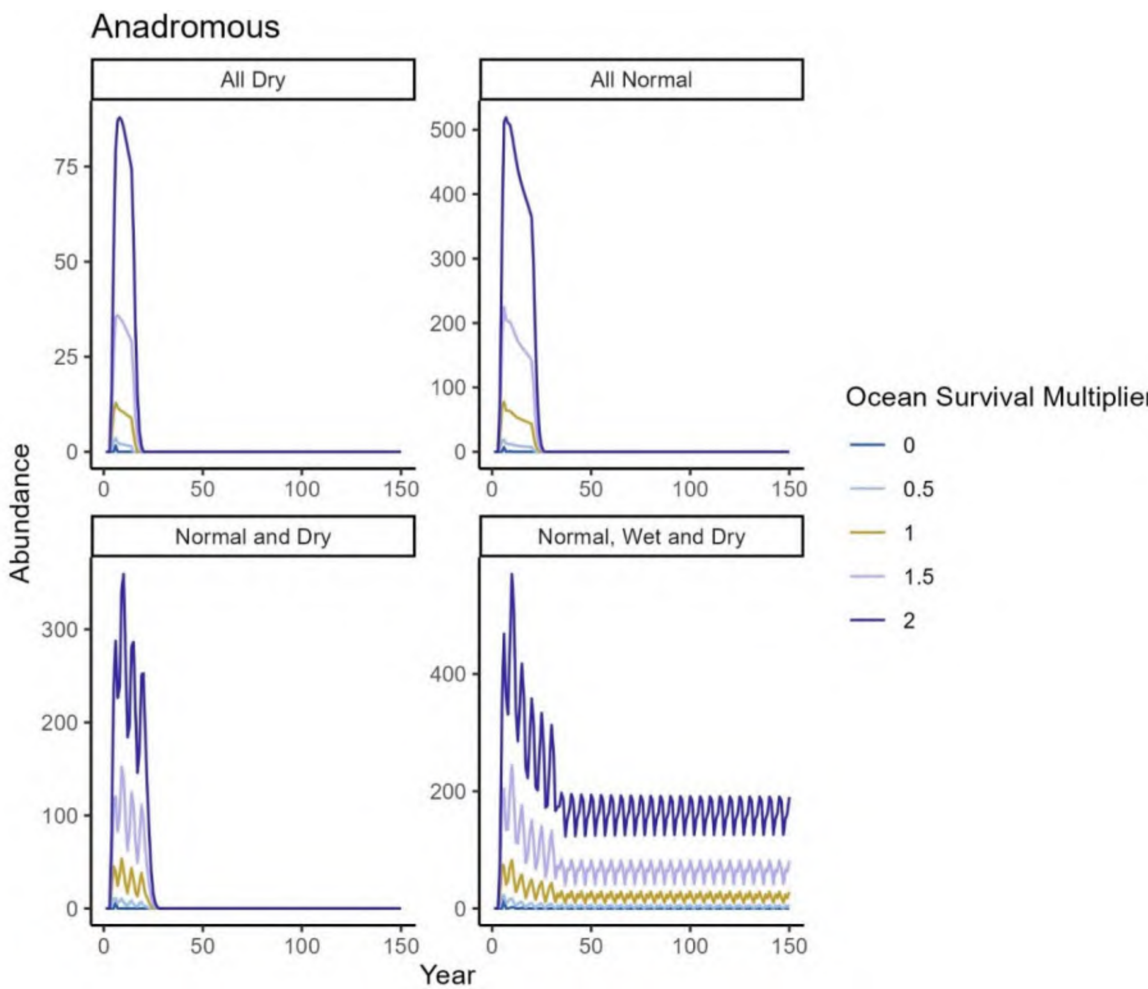
Notes: See Figure 10 notes for multiplier ranges.

Figure 11. Vary smolt rates, anadromous spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting freshwater fecundity contributions and varying smolt rates relative to the defaults of 0.15, 0.5, 0.25, and 0.25 for ages 0 through 3

4.2.3.2 Vary Ocean Survival

4.2.3.2.1 Resident and Perched Life History Groups Only

When excluding anadromous reproductive contributions, and only freshwater perched and below barrier fish are allowed to contribute to the population, varying ocean survival had a substantial impact on model predicted ending anadromous abundance in years and under conditions when the population did not collapse (Figure 12). However, the anadromous population collapsed within the first 25 years (essentially, during model burn-in) under all tested environmental conditions except under the normal, wet, and dry sequence (lower right panel in Figure 12). Under this scenario, if the current ocean survival estimate is an overestimate, the impact on model predicted average anadromous abundance is minimal because the population is already so low. However, if the current ocean survival parameter estimate is an underestimate, it would severely underestimate the true anadromous population abundance. This scenario of 1 in every 5 years being wetter than average is improbable when most climate change projections predict the drier environmental condition to become more common. Given that the resident and perched populations could not support an anadromous population under the less favorable drier scenarios (and even under all normal years), it is unlikely the resident and perched populations alone will be able to contribute meaningfully to anadromous spawner populations in the future.



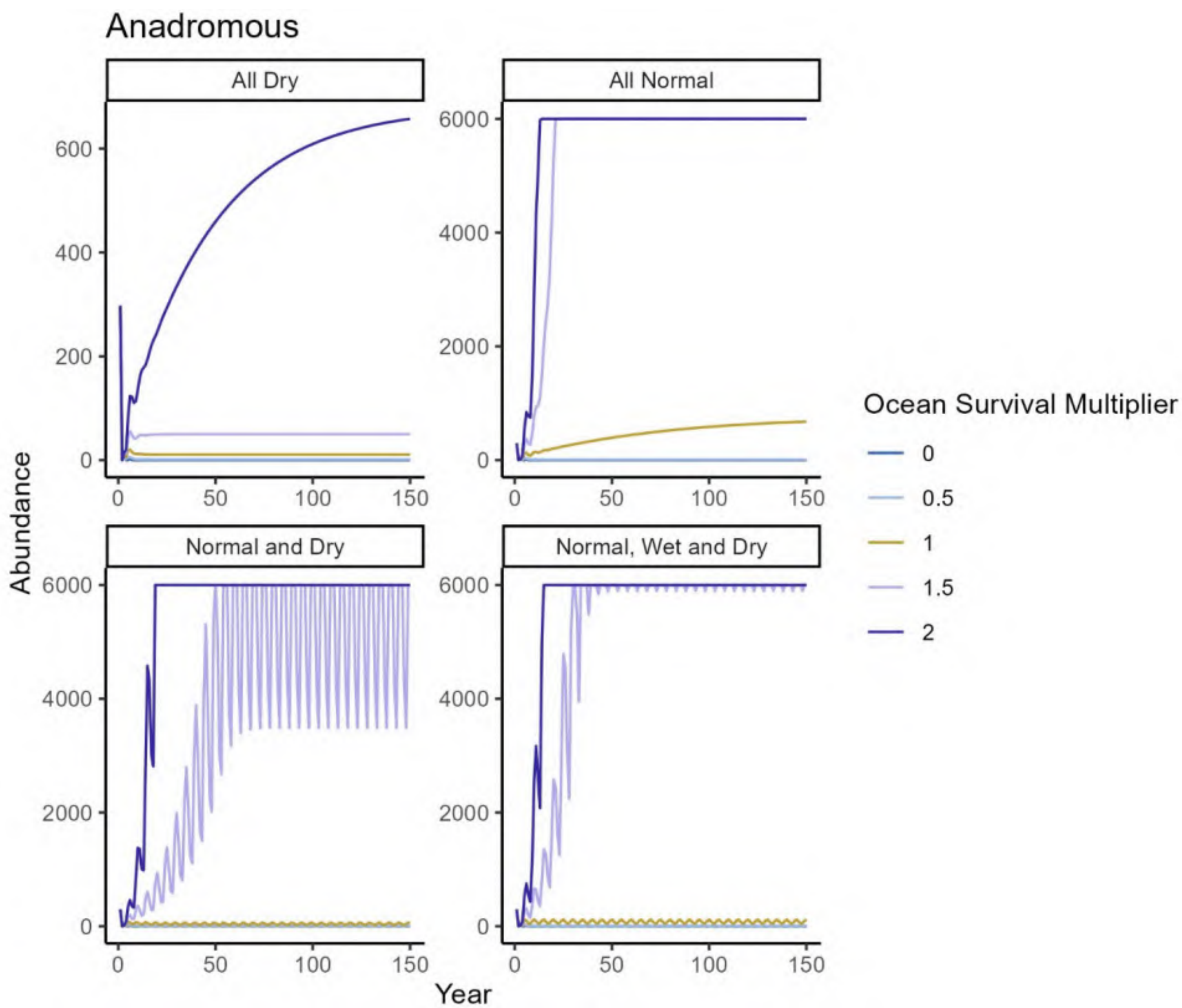
Notes:

- Multiplier 0: Smolt Rates (Ages 1 through 7) = 0
- Multiplier 0.5: Smolt Rates (Ages 1 through 7) = 0.30 0.18 0.15 0.15 0.15, and 0.20
- Multiplier 1: Smolt Rates (Ages 1 through 7) = 0.6, 0.36, 0.3, 0.3, 0.3, and 0.4
- Multiplier 1.5: Smolt Rates (Ages 1 through 7) = 0.90 0.54 0.45 0.45 0.45, and 0.60
- Multiplier 2: Smolt Rates (Ages 1 through 7) = 1.20 0.72 0.60 0.60 0.60, and 0.80

Figure 12. Vary ocean survival, resident and perched spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting anadromous fecundity contributions and varying ocean survival relative to the age specific defaults 0.6, 0.36, 0.3, 0.3, 0.3, and 0.4 for ages 1 through 7

4.2.3.2.2 Anadromous Spawners Only

Once again, the anadromous population can maintain itself without perched and resident reproductive contributions under all four tested environmental sequences depending on the ocean survival rate (Figure 13). However, under all environmental conditions, when ocean survival is at or below current default estimates, the population is frequently at or close to collapse without reproductive contributions from resident and perched spawners. Only if ocean survival rates are higher than the current default estimate, would anadromous populations alone be capable of supporting themselves without perched and resident reproductive contributions.



Notes: See Figure 12 notes for multiplier ranges.

Figure 13. Vary ocean survival, anadromous spawners only simulation: anadromous population trajectory (averaged across watersheds) when omitting resident and perched fecundity contributions and varying ocean survival relative to the age specific defaults 0.6, 0.36, 0.3, 0.3, 0.3, and 0.4 for ages 1 through 7

4.3 Conclusions from Model Sensitivity Analysis

- Importance of Starting Abundances
  - The CFS LCM is robust to starting abundances, provided they are not extremely small (less than 50% of default starting abundance estimates).
  - Populations fared better with more normal or wet years compared to more dry years.
- Importance of Fecundity
  - Model results are sensitive to fecundity estimates, particularly if fecundity is truly higher than the current default estimate.
  - If only resident and perched populations contribute to reproduction—even if the fecundity for these freshwater life history groups was set to be double the default model value—the anadromous population is predicted to collapse or to oscillate near collapse, and the freshwater life history groups also decline, due to less support from the alternate life history groups.
  - Only if anadromous fecundity was 50-100% greater than the default model estimate could anadromous spawning support a robust anadromous population without reproductive support from resident and perched spawners.
  - Model simulations lend support for the conclusion that maintaining robust populations of both anadromous steelhead and freshwater populations of both resident and perched fish will be important to maintaining viability of the anadromous life history.
  - Fecundity is an influential model parameter that is sensitive to parameterization
  - Four Peaks recommends that future model iterations prioritize accurate estimation of fecundity, particularly for anadromous spawners, to minimize uncertainty around this parameter; this may include age-specific fecundity rates that account for different numbers of year spent maturing in the ocean and kelting.
- Importance of Smolt Rates
  - If relying solely on resident contributions, the anadromous population persisted only in the presence of wet years with moderate to high smolt rates; even under these conditions, ending anadromous population abundances were still low.
  - However, under most environmental conditions, the anadromous population could sustain itself without reproductive support from resident and perched spawners, provided smolt rate is moderate to high.
  - Smolt rates were less influential than ocean survival rates on model predicted ending abundance.
- Importance of Ocean Survival
  - Resident and perched spawners alone (i.e., assuming no anadromous spawners) could support an anadromous population only under the improbable future scenario of high ocean survival and an environmental regime that included 1 of every 5 years being wetter than average.
  - Similarly, although anadromous spawners alone could support an anadromous population, under all conditions but the highest ocean survival scenarios, the model predicted ending anadromous population abundances were low if resident and perched spawners did not contribute to reproduction.

- Thus, high ocean survival could contribute to population viability regardless of the mixture of adult spawner life histories, but maintaining spawner populations of all life histories will provide the best chance of maintaining a robust population of the anadromous life history over the long term.
- Ocean survival was an influential parameter that is sensitive to parameterization.
- Four Peaks recommends that future research prioritize accurate estimation of age specific ocean survival to minimize uncertainty around this parameter, despite its difficulty.

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Appendix 2

Cramer Fish Sciences’ Technical Memorandum

Southern California Steelhead Lifecycle Model

Draft technical memo on the lifecycle model developed by Cramer Fish Sciences for Association of California Water Agencies

Background

California Trout petitioned the California Fish and Game Commission (Commission) to list Southern California steelhead (*Oncorhynchus mykiss*; SCS) as endangered under the California Endangered Species Act (CESA). The petitioner defined SCS as all *O. mykiss*, including anadromous and resident life histories, below artificial and natural complete barriers to anadromy from the Santa Maria River, San Luis Obispo County (inclusive) to the United States-Mexico Border. The petition states that remaining SCS populations are in danger of extinction within the next 25-50 years. It also states that based on available abundance estimates, presence/absence data, and various threats within SCS range, populations appear extremely depressed or extirpated, and remaining populations are likely in immediate danger of extirpation. Therefore, the petitioner requested the Commission list SCS as endangered under the CESA. The Commission found that the petition contains sufficient scientific information to indicate action may be warranted.

The current National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) recovery population viability goal for SCS is 4,150 spawners per year on average, based on a "random walk with drift" model (Lindley 2003) and parameterized using Central Valley field data (Boughton et al. 2007; Williams et al. 2016).The NMFS report acknowledges interchange between the anadromous and resident populations, but does not include these effects in their viability goal. Viability studies recognize that genetic exchange between resident and anadromous groups would lower extinction risks of both groups and interchange between resident and anadromous forms could have consequences when determining extinction risk. In fact, the recovery plan for SCS (NMFS 2012) specifically states that recovery of the distinct population segment (DPS) will require "…protection, restoration, and maintenance of habitats of sufficient quantity, quality, and natural complexity throughout the SCS Recovery Planning Area so that the full range of all life history forms of *O. mykiss* (e.g., switching between resident and anadromous forms, timing and frequency of anadromous runs, and dispersal rates between watersheds) are able to successfully use a wide variety of habitats in order to overcome the natural challenges of a highly variable physical and biological environment."
Therefore, it is important to assess if SCS extinction risk is sensitive to the details of the exchange between resident and anadromous life histories.

Model Purpose

The purpose of this work was to develop an adaptive lifecycle model that incorporates the proposed SCS listing population goals and allows for assessment of listing proposal improvements to better protect and manage SCS into the future. We developed and enhanced this model to simulate various recovery goals, strategies, and what-if scenarios that also allow managers to manipulate specific portfolio parameters to understand how changes to key vital rates might influence population trajectories, under explicit model assumptions. Specifically, this model can be employed to understand how strengthening or weakening portfolios, including residency in the proposed goals, or inclusion of above barrier populations, influences the implied probability of future SCS extinction risk.

A goal of the Southern California steelhead life-cycle model (SCS LCM) is to better understand the influence of source-sink dynamics between resident and anadromous *O. mykiss* on population viability (i.e., the 100-year extinction risk) for Southern California DPS populations, as well as the potential for long-term Southern California DPS persistence as a whole. The model is meant to simulate various strategies including ratios of anadromy and residency, and various migration strategies that support each *O. mykiss* life stage along entire watershed corridors accessible to anadromous fish (including assumption of fish passage at artificial barriers). This exercise facilitates identification of key strategy alternative(s), and combinations thereof, and how they might best be implemented to support viable SCS population goals over various time periods (e.g., 20, 50, 100 years). To support this endeavor, this model was developed to simulate population trajectories under various SCS life history strategies (e.g., anadromy, residency, potamodromy, etc.), including management of a healthy SCS population into the future. This undertaking follows a general process for determining what combination of resident and anadromous strategies may support viable SCS population goals.

This lifecycle modeling effort incorporates well accepted modeling components to test key hypotheses and assumptions related to the proposed listing unit for SCS. It includes components of the Lindley (2003) and other models, such as the NOAA Habitat Assessment and Restoration Planning model (Jorgensen et al. 2021) or the Shiraz model (Scheuerell et al. 2006) which both rely on a multistage Beverton-Holt function to model production across the entire salmonid life cycle under a unified conceptual framework. In addition, the model is fully transparent, and is linked to well accepted functional relationships from population dynamics theory with the best available data to drive model outcomes. The model is also adaptable, so that as new data are available or outcomes from future hypotheses tests are received, they can be incorporated into the model. To facilitate collaborative stakeholder engagement in exploring model scenarios, we developed a user-friendly dashboard (or graphical user interface). By linking a state-of-the-science modeling framework with a user-friendly front-end, this effort provides a fully transparent, accessible modeling tool for assessing the conservation status of SCS and offers sound scientific guidance to discuss strategies and scenarios for future SCS population viability. This graphical user interface (GUI) provides a transparent tool with the ability to easily adjust parameters relevant to conservation.

Model Development Methods

Task 1: Gather and review background information

The goal of Task 1 was to gather and review background information relevant to the construction of a life cycle model (LCM) for Southern California steelhead (SCS). A literature search (e.g., Google Scholar, Web of Science) was used to identify, screen, and compile relevant biological information to inform and parameterize the life cycle model with empirical data where available. The following keywords were used to conduct the initial literature search:

> Steelhead **OR** *Oncorhynchus mykiss* **OR** *O. mykiss* **OR** Rainbow trout
> **AND** California **OR** Southern California **OR** Santa Maria **OR** Santa Ynez **OR** Santa Clara **OR** San Gabriel **OR** Santa Ana **OR** San Luis Rey **OR** San Diego **OR** Piru Creek **OR** Sisquoc River **OR** Cuyama River **OR** Ventura River **OR** San Mateo Creek **OR** Los Angeles River
>
> **AND** Egg **OR** egg-to-fry **OR** larval **OR** emergent fry **OR** fry **OR** parr **OR** smolt **OR** adult **OR** spawning **OR** spawner **OR** half-pounder **OR** resident **OR** resident life history **OR** life history
>
> **AND** freshwater **OR** delta-bay **OR** delta **OR** estuary **OR** lagoon **OR** ocean **OR** marine
>
> **AND** survival **OR** mortality **OR** smolt-to-adult ratio **OR** SAR **OR** escapement
> **AND** Reproduction **OR** fecundity **OR** fertility **OR** spawning success **OR** eggs **OR** stock-recruit **OR** redd **OR** redd size **OR** redd distribution **OR** recruits per spawner **OR** spawners per recruit
>
> **AND** iteroparity **OR** iteroparous **OR** semelparity **OR** semelparous
>
> **AND** Migration **OR** immigration **OR** emigration **OR** straying **OR** residency
>
> **AND** Rate **OR** speed **OR** proportion **OR** probability
>
> **AND** temperature **OR** drought **OR** flow **OR** instream flow **OR** El Niño **OR** La Niña **OR** Pacific Decadal Oscillation **OR** PDO **OR** North Pacific Gyre Oscillation **OR** NPGO **OR** upwelling **OR** sea surface temperature **OR** SST

Objective 1.1 Quantify minimum viable steelhead population

Source-sink dynamics is an established ecological theory which describes how dispersal between habitats of variable quality and connectivity can explain patterns in population viability and persistence (i.e., long-term viability) over large spatial or temporal scales (Pulliam 1988; Dias 1996). In source-sink theory, population viability can be maintained via the exchange of organisms between geographically separate meta-populations in a network of “source” populations (exhibiting positive population growth rates), and “sink” populations (exhibiting negative population growth rates). Habitat fragmentation, in part due to installation of dams and diversions, has blocked upstream migration in much of Southern California and has geographically divided *O. mykiss* spawning populations by life-history types (Boughton et al. 2015; Fejtek 2017; Abadía-Cardosa et al. 2016). Non-anadromous *O. mykiss* frequently co-occur with anadromous *O. mykiss* within the same watersheds in Southern California and can co-occur within the same below-barrier stream reaches, but are often geographically separated where fish passage barriers block migration, thus forming potential source (above barrier) and sink (below barrier) populations. Genetic analyses of microsatellite data have concluded that geographically separated *O. mykiss* populations within the same watersheds (above and below barriers) are closer relatives than populations between watersheds (Clemento et al. 2009; Leitwein et al. 2017). Closer genetic distance and potential for population spillover implies that resident populations above barriers could mediate population viability and long-term persistence.

A viable individual population is defined in the 2012 Southern California Steelhead Recovery Plan (hereafter; the SCS Recovery Plan) as having less than a 5% risk of extinction due to threats from demographic, environmental, and genetic variation over the next 100 years (NMFS 2012). Similarly, a viable distinct population segment (DPS) is defined by a sufficient number of **spatially dispersed**, yet **genetically connected** populations to maintain long-term (1000+ years) persistence and evolutionary potential (McElhany et al. 2000; NMFS 2012). A "random-walk-with-drift" model was used in the SCS Recovery Plan to determine population-level biological recovery criteria based on a minimum viable population (MVP) size of individual populations for SCS steelhead, as well as DPS-level recovery criteria based on viable individual minimum populations within each Biogeographic Population Group, and other considerations (Lindley 2003; Boughton et al. 2007; NMFS 2012). This approach recommended an MVP of 4,150 annual anadromous spawners, on average, for an individual population. However, the approach assumed no empirical data were available for specific local populations, thus it is highly generalized and may not be well suited for every watershed (Boughton et al. 2007). A NMFS (2016) report also proposes using a 20-year window to evaluate the population, as opposed to simple annual check (Figure 1). Further, due to a lack of data on life history polymorphism and inability to estimate the magnitude of a "rescue effect" between resident and anadromous populations, the prescriptive criteria assumed that such a rescue effect is negligible; a 100 percent anadromous fraction was required of the mean annual run size criterion, and resident spawner life history variants (i.e., Rainbow Trout) were not considered in the MVP size criteria developed by NMFS (Boughton et al. 2007).

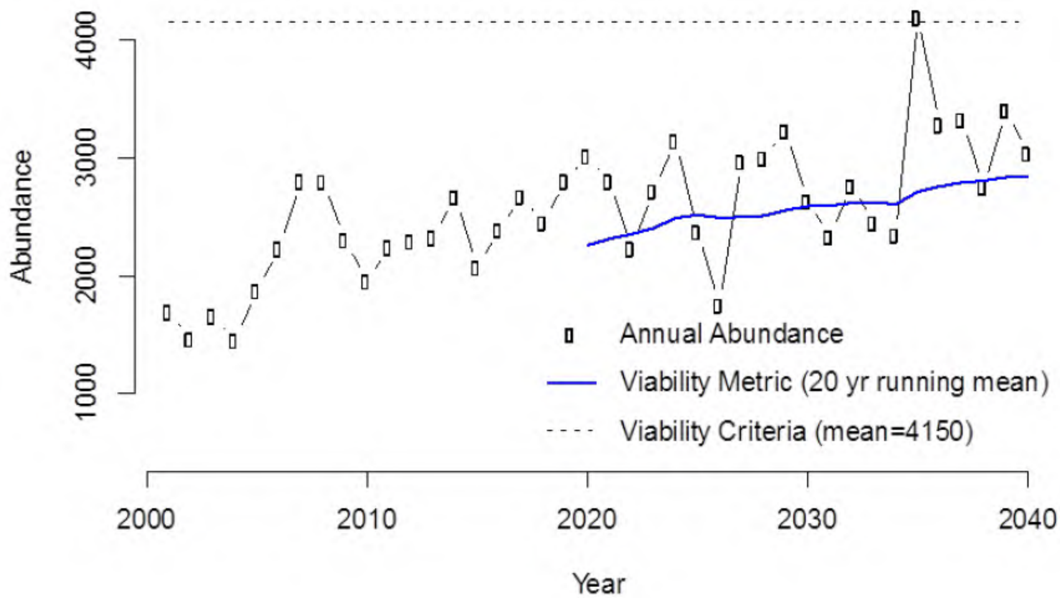

Figure 1. Concept of viability metric and a viability criterion applied to a hypothetical population. Figure 2 in NMFS 2016.

Objective 1.2 Identify population goals and dispersal amongst key watersheds

There is limited data to speak to potential and historical population demographics of steelhead in each watershed and basin. The literature has provided wide variations in estimated contributions to the population between basins. For example, Titus et al. (2002) estimated historical capacity of 20,000 for the Santa Ynez, but only 4,000 for the Ventura. Henke (1994) proposed between 7,000—9,000 for the Santa Clara, while Clanton and Jarvis (1946) only estimated 2,000—2,500 for the Matilija. Similarly, we have observed that smolt rates differ between basins, which again emphasizes the need to model the resident life history simultaneously to the anadromous population (Sogard et al. 2012). Although the SCS population is currently thought to be under capacity, these estimates help us determine the potential watershed population goals, the allocations that could contribute to the spawners needed for a MVP, if 4,150 anadromous spawners are appropriate and how resident spawners should be accounted for (e.g., less than a 100 percent anadromous fraction recovery criterion).

Objective 1.3 Southern California steelhead life history

Cramer Fish Sciences previously compiled data on 92 steelhead population parameters across 10 categories from 23 unique sources for the Suisun Creek LCM (Central California Coast DPS). Where data and parameter estimates from the Southern California DPS were not available, we used the information compiled for the Suisun Creek LCM to help inform parameterization. The following information on life histories, periodicity, and other demographic parameters from the literature review were completed as part of this project.

Migration and Spawning

Migration and spawn timing data from the Mokelumne River (California Central Valley DPS) shows entry into freshwater beginning in October and extending through April the following year, and spawning ranging from December to April (Figure 2) (East Bay Municipal Utility District, unpublished data).

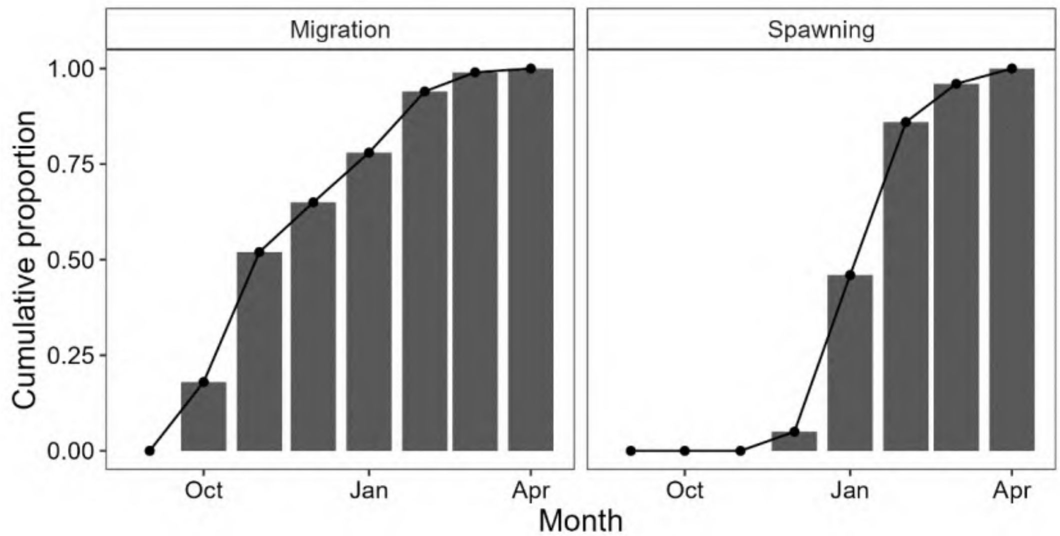

Figure 2. Cumulative proportion curves for migrating and spawning steelhead adults from the Mokelumne River (East Bay Municipal Utility District, unpublished data).

We assumed a 1:1 spawner sex ratio (Shapovalov and Taft 1954). Egg deposition assumes an average of 1,000 eggs per female, an optimistic estimate determined through a power-law relationship with fork length (Figure 3) (Shapovalov and Taft 1954).

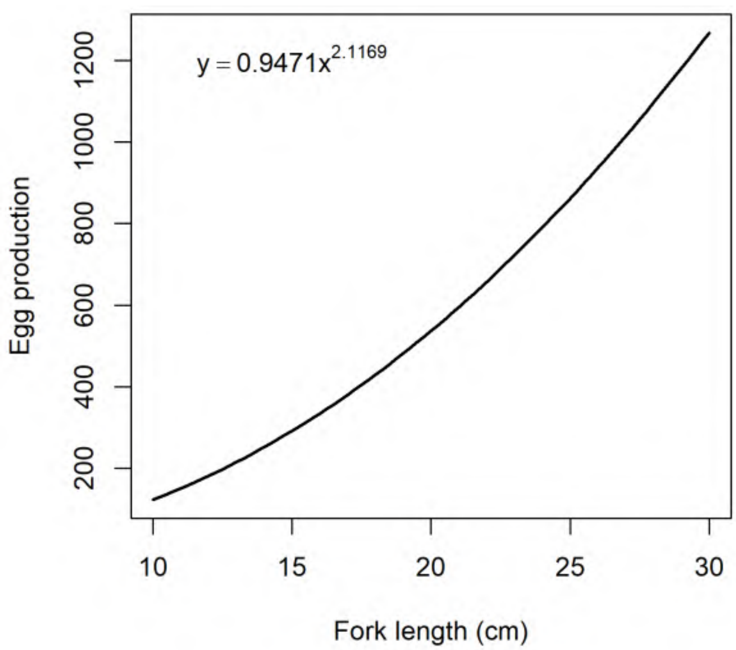

Figure 3. Relationship between female fork length and egg production from Scott Creek, CA (Shapovalov and Taft 1954).

The model assumes 1 redd per female spawner at an average size of 1.78 m^2 (SE = 0.14) (Gallagher and Gallagher 2005). Total spawning capacity is calculated within the model using a spawning habitat ratio requirement of 4:1 (Burner 1951); however, this calculation will assume uniform distribution of suitable spawning habitat within streams. We applied a hockey-stick function to limit spawners to spawning capacity and omit superposition or competition for spawning habitat.

Straying

According to Thorpe (1994), salmonids are famous for their homing precision and straying is usually regarded as a failure of individuals to achieve the population norm. However, without straying there would be no salmonid populations throughout much of their present range, as much of that area has been colonized by modern salmonids over the past 8000–15000 years (Thorpe 1994). Straying not only occurs in episodic pulses but also at relatively low and steady levels. Straying is important because it enables salmonids to colonize new areas over a relatively short time frame (Hendry et al. 2004; Quinn 2005), and is the behavior that has allowed salmonid populations over the course of thousands of years to colonize their existing habitats (Quinn 1984; Hendry et al., 2004), including establishing themselves within decades of glacial retreat (Milner and Bailey 1989; Milner and York 2001). Homing and straying are typically viewed as population-scale phenomena. According to Sandercock (1991), a return to the parental spawning ground provides a mechanism for enhancing survival by the repeat usage of good sites. Straying can also be a survival mechanism in that it may protect against the loss of an entire stock due to some environmental catastrophe in the home stream (Lieder 1989). It is clear that straying buffers against spatial and temporal variation in habitat quality and allows colonization of new habitats (Milner and Bailey 1989; Burger et al. 1997; Quinn et al. 2001; Stephenson 2006). Adults generally return to their natal streams to spawn, and stray rates are low in steelhead compared to other *Oncorhynchus* spp. (Westley et al. 2013). Straying rate estimates range from 1.2% to 11% in the Columbia River Basin and along the Oregon Coast (Keefer et al. 2005; Westley et al. 2013). The majority of straying occurs in non-natal tributaries within natal watersheds, however long-distance straying events (100 – 650km) can occur (Schroeder et al. 2001; Donohoe et al. 2021). Annual straying rates for the model were set to 5% (2.5% in either direction along the coast) with options to select values between 0% and 10%. For more detailed straying information, see the Natal Straying section withing Task 3.

Incubation

An estimated 97.5% of deposited eggs are successfully fertilized (Briggs 1953; Shapovalov and Taft 1954). Egg-to-fry survival estimates have ranged from 30% to 90% under controlled laboratory conditions (Shapovalov 1937; Shapovalov and Taft 1954) and 15% to 100% for steelhead in an in-river study of Central Valley steelhead (Merz et al. 2004); however, *in situ* estimates have been observed as low as 12% (Bley and Moring 1988). By default, egg-to-fry survival was set to 65%, based on populations in Humboldt County, CA (Briggs 1953), with options to reduce the survival to as low as 15% or as high as 90%.

Juvenile Rearing, Growth, and Outmigration

Juvenile steelhead typically rear in freshwater for 1 to 3 years after emergence (Shapovalov and Taft 1954). Estimated spring (February – April) growth for age-0 steelhead in Topanga Creek, CA is at least 24 mm and annually 61mm average (0.17 mm/day; Bell et al. 2011). These results are similar to estimates from the California Central Coast (Scott and Soquel creeks; Sogard et al. 2012) and but less than observed in the California Central Valley (Mokelumne and American rivers) (Sogard et al. 2012; Merz et al. 2016). Inhospitable conditions (e.g., low flows, high temperatures) in southern California can force early outmigration or encourage greater dependence on coastal lagoons or nearshore rearing (Moyle et al. 2008). Higher productivity in lagoons often leads to more rapid growth and increased survival (Smith 1990; Bond 2006; Hayes et al. 2008, 2011). A tagging study and analysis of scale morphology of returning adult steelhead in Scott Creek, CA showed that between 87% and 95.5% returning adults had reared in the lagoon, despite comprising less than half of the initial downstream outmigrants (Bond et al. 2008). For watersheds that form seasonal freshwater lagoons, an estimated 20% of fish are trapped when lagoons form and experience higher growth for an additional ~6 months, or until sandbars erode reconnecting the stream to the ocean (Smith 1990; Bond 2006; Hayes et al. 2008, 2011). Higher growth rates confer a survival advantage onto lagoon-reared fish by increasing their size at ocean entry (Bond 2006). Specific daily growth rates (% change in FL/day) for steelhead in Scott Creek, CA was 0.36 (SD = 0.20) in the lagoon compared to 0.06 (SD = 0.09) in riverine only individuals (Figure 4).

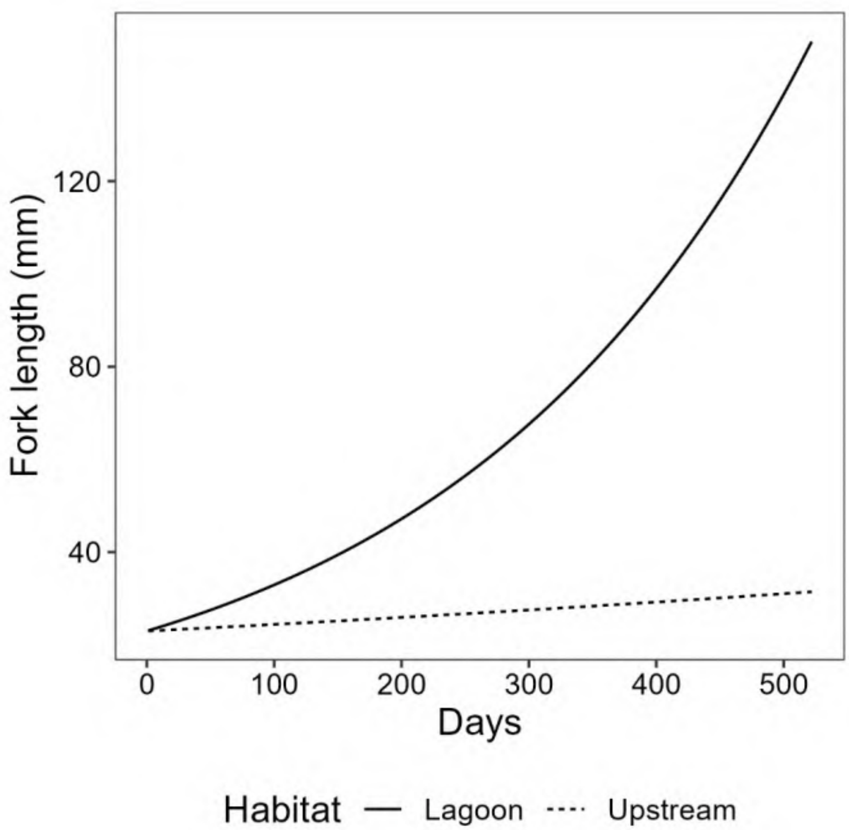

Figure 4. Simulated growth curves for juvenile steelhead rearing in lagoon and upstream habitats in Scott Creek, CA based on specific daily growth rates (Lagoon = 0.36 %FL/day, Upstream = 0.06%FL/day) presented in Bond (2006).

Data from an Above-Barrier Perched Resident population (see model framework for description) in middle Piru Creek also suggests populations dominated by younger age classes, with more than 90% of observations consisting of year-0 and year-1 juveniles and virtually no observations of age-5 or older individuals (Figure 5).

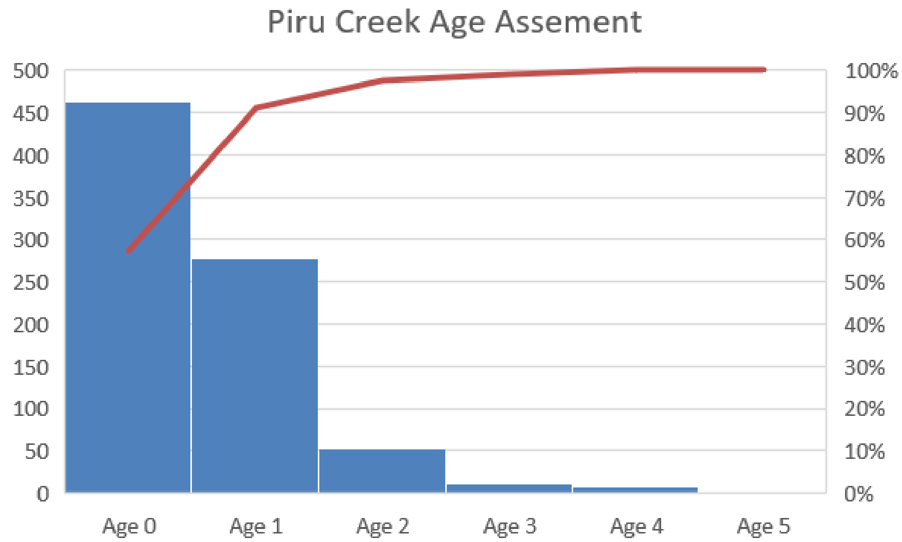

Figure 5. Age distribution of sampled fish at Piru Creek. United unpublished data from pre-implementation study.

Task 2: Identify and review available relevant models

Cramer Fish Sciences reviewed existing salmonid life cycle modeling frameworks to prepare for the development of the SCS Life Cycle Model. The purpose of reviewing existing modeling frameworks was to ensure the SCS LCM would be on par with the current existing life cycle modeling methods for Pacific salmonids. We drew heavily on examples from the Pacific Northwestern United States, where Chinook and steelhead life cycle models feature prominently in state and federal population management programs. The following sections summarize each of the different life cycle models we considered during development of the SCS Life Cycle Model.

Objective 2.1: Summarize/Evaluate general strengths and weaknesses

We identified four models previously built to evaluate salmonid population responses to management actions. Except for the Suisun Creek LCM, the models we reviewed were built specifically for Pacific Northwest rivers. Nonetheless, these LCMs provide a good general framework considering salmonid life cycle modeling.

Random Walk with Drift Model (Lindley, 2003)

The “random walk with drift” model (hereafter: the “Lindley model”), based on Lindley (2003) and parameterized with Central Valley field data for the 2007 and 2016 NMFS population viability criteria analyses (Boughton et al. 2007; Williams et al. 2016), is essentially a state-space model based on a simple exponential growth function (Equation 1).

Equation 1

$$N_t = N_{t-1}e^{r+\epsilon_t}$$

Where the number of individuals at time (N_t) is a function of the number of individuals in the previous time step (N_{t-1}) and the mean population growth rate (r). Random deviates (ϵ_t) in the mean population growth rate are added in each time step to create the "random walk" effect in population growth trajectories to represent process variance. The model can be modified (see Boughton et al. 2007) to simulate density-dependent growth.

State-space models are powerful modeling frameworks in ecology which link one or more mechanistic models (the process model) to an observation model (Patterson et al. 2008). The process model is usually some deterministic process which predicts the future state of some variable based on its current state. The predictions from the process model are then weighted by the likelihood of some observed data. Because the observation model essentially estimates the probability of observing some state, conditional on the 'true' state determined by the process model, state-space models offer a powerful way to handle uncertainty. Additionally, the process model can be parameterized with environmental data, providing an avenue for encoding realistic biological relationships into the model.

The Lindley model is broadly applicable; however, there are several drawbacks to the model and to the state-space modeling approach that should be considered. First, its process model (Equation 1) is fairly simple and assumes that population growth is not sensitive to age or stage-structure (Lindley 2003). Furthermore, the Lindley model does not consider alternative life history strategies (e.g., resident Rainbow Trout) or environmental influences. The Lindley model is capable of being expanded to include additional states and covariates; however, such an endeavor would require an advanced modeling approach and may include nested models. The parameters in state-space models (and in nested models generally) can be difficult to estimate, requiring maximum likelihood estimation (MLE) or a Bayesian Markov Chain Monte Carlo (MCMC) sampler (Patterson et al. 2008). Building the SCS LCM as a state-space model would provide a powerful tool for interrogating SCS population dynamics while explicitly incorporating uncertainty into the model; however, the current template (Lindley model) needs to be modified considerably to be able to incorporate all the desired life history stages, stage-transition processes, and environmental covariates. Thus, the model is liable to increase in complexity quickly and require advanced parameter estimation techniques (e.g., Kalman filtering, Bayesian MCMC).

Shiraz Model

The Shiraz model is based on a Beverton-Holt mortality function which adjusts life stage survival depending on life-stage specific relationships with environmental parameters. Movement between life stages can either follow an ideal free distribution to maximize fitness in the population, based on relative survival rates in different habitats, or occur in fixed fractions of the population. The Shiraz model also simulates hatchery operations and harvest policy and provides estimates of four important population criteria: abundance, productivity, spatial structure, and life-history diversity. Furthermore, it provides a general modeling framework upon which many subsequent life cycle models have been at least partially based, including the NOAA HARP model and the CFS Nooksack LCM. The Shiraz model has several limitations, some of which have been addressed in subsequent modeling efforts, including a limited ability to model restoration actions, inability to predict increases in habitat quality as a consequence of increased habitat quantity, and reliance on fixed values for several model parameters. The Shiraz model therefore provides a foundation for model conceptualization, particularly in ensuring that the SCS LCM will be capable of properly assessing steelhead population viability.

NOAA Habitat Restoration Planning Model

The NOAA Habitat Restoration Planning (HARP) model is a multistage population dynamics model developed for Chinook, Coho, and steelhead in Pacific Northwest rivers that includes spatial, habitat, and life history components (Jorgensen et al. 2021). The NOAA HARP model receives spatial data as input, which are processed into habitat data layers to inform salmonid life-stage capacity and productivity relationships. Capacity is defined as the number of individuals a given habitat can support while productivity refers to population growth parameters such as fecundity and survival. Life-stage specific capacities and productivities depend on the habitat conditions present within the study system and may take on either fixed values or adjust dynamically according to either statistical or theoretical relationships to habitat-related variables (e.g., temperature, flow, fine sediments). The ensemble of data and functional relationships are then used to simulate cohort-based population growth on an annual time-step.

The model tracks annual cohorts as they move through individual subbasins and transition through various life-stages. The freshwater component of the model included nine life-stages: upstream migration, spawning, egg incubation, and age-0+ through age-2+ summer and winter rearing (Figure 6). Alternative pathways for smoltification occur within the model at age-1, age-2, or age-3 at which point smolts are subject to a delta-bay survival multiplier. Delta-bay survival is difficult to estimate *in situ*. Therefore, delta-bay productivity was back-calculated from smolt-to-adult return (SAR) rates reported in the literature by dividing the SAR by the age-weighted average ocean survival estimate.

Iteroparity in steelhead is handled in the NOAA HARP model by determining the cumulative respawn rate, determined by the product of the kelt rate, the ocean reconditioning rate, and the return rate.

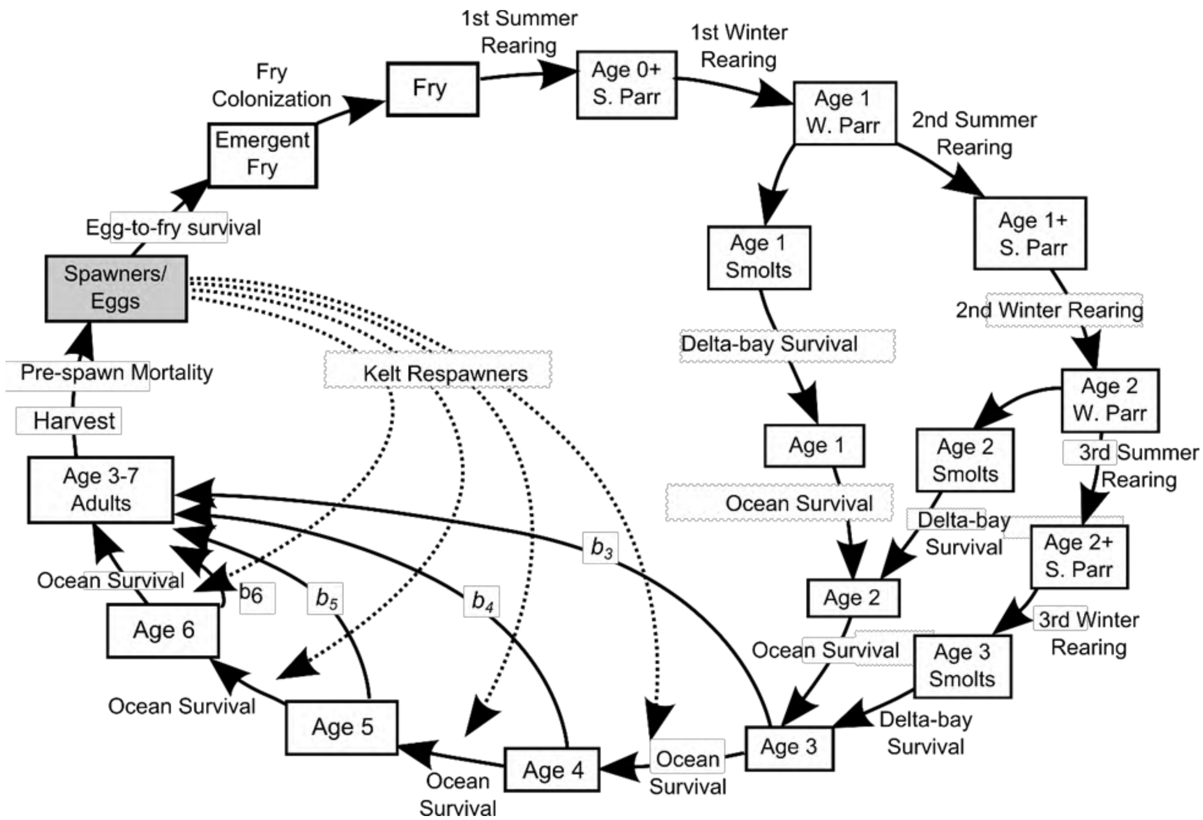

Figure 6. Steelhead life-cycle diagram developed for the Chehalis River basin (Jorgensen et al. 2021).

The NOAA HARP Model does not include a resident life history component and the capacities and productivities are tuned to reflect Pacific Northwest stream conditions. Nonetheless, it is one of the most comprehensive and transparent steelhead life cycle models and offers a solid frame upon which to base the SCS LCM.

CFS Nooksack Life Cycle Model

The CFS Nooksack LCM is largely based on the NOAA HARP model but includes several unique features. First, it utilizes a weighted connectivity matrix to account for spatial variation among populations and life stages, which allows for variable outmigration speeds in juveniles. Second, the CFS Nooksack LCM incorporates a highly detailed spatial layer of its watershed delineated at the reach scale for freshwater, estuary, and nearshore habitats. The CFS Nooksack LCM differs from the NOAA HARP model in the level of spatially explicit habitat detail built into the model, which allows for precise evaluation of life-stage specific population dynamics in response to habitat management scenarios and allows for complex population behaviors like straying. It is worth noting that this functionality was added to address specific issues observed within the Nooksack system that had previously been identified by regional experts and those familiar with the system.

CFS Suisun Creek Life Cycle Model

The CFS Suisun Creek Life Cycle Model is a cohort-based Steelhead LCM parameterized for a central California watershed. The focus was to determine the minimum spawning and rearing habitat requirements needed to support a viable steelhead population in using a life cycle model approach. The model was parameterized with data from nearby central California watersheds whenever possible, and helped to highlight data gaps that would limit / improve the modeling effort over time. The LCM was automated as both a workbook model in MS Excel, as well as an R Shiny application to facilitate use, and help highlight model behaviors (E.g., loss of a population cohort). The model is simplified, and lacks spatial components for spawning, incubation etc. and relies on coarse assumptions, omitting flow, season, and habitat quality. That being said, the components are well described and identify areas of potential enhancement. This model serves as a good example of a focused LCM used to explore specific questions about known (potential) limiting factors, like available habitat, and provides many data sources that will be relevant for this work.

Objective 2.2: Pull together useful pieces into the best model framework

Models are most useful when they are developed to address specific questions (Rose et al. 2011). It follows that the technical details of modeling (e.g., scale and complexity) must be informed by the question(s) being asked. To that end, the SCS LCM is being developed to shed light on two key questions; the first question is asked at a population scale, the second at the watershed or subbasin scale:

1. How much does freshwater residency (e.g., Rainbow Trout) contribute to the overall population dynamics of SCS?
2. How does connectivity and/or drought affect population dynamics?

Here, it is important to distinguish between **prediction** and **forecast** modeling and between **relative** and **absolute** results (see Rose et al. 2011 for detailed discussion). **Prediction** models are used to determine some expectation under a specific set of conditions, which can be modified and compared across alternative scenarios. The results of such models are typically interpreted **relative** to a null model or some baseline modeling results. By contrast, **forecast** models are used to obtain the “best guess” results, and may be extrapolated beyond the range of observed data in an anticipatory manner. Such results can be considered **absolute** because they are supposed to represent an actual expected value. Because the two key questions posed are primarily concerned with understanding the relative contributions of freshwater residency and connectivity/drought to SCS population dynamics and not with estimating actual population abundances, prediction modeling is the most appropriate path forward.

We recommended that the SCS LCM be developed at the finest level of detail necessary to fully address the questions posed, but we caution against excessive complexity where it is unwarranted. The Lindley modeling framework is somewhat general, aimed at setting minimum viable population targets for the entire region, is not age- or stage-specific, and does not explicitly model life cycle processes. Furthermore, the Lindley model is more well suited for forecasting population abundances than it is for addressing the influence of life history and environmental factors on population dynamics. By contrast, the conceptual foundation established by the Shiraz model and adopted by the NOAA HARP and CFS Nooksack LCMs (from here forward, we refer to this suite of models as the “cohort-based life cycle simulation models") provides a flexible modeling approach well suited for addressing the key questions posed. The cohort-based simulation LCM approach merely requires a set of well defined, connected functional relationships and some initial conditions. Model results can be generated under alternative scenarios, potentially representing competing hypotheses, and compared relative to one another. An additional advantage of cohort-based simulation LCMs is that that they require less empirical data to produce useful results. Data-poor watersheds may produce imprecise or biased results; however, if the model and all its components are properly specified, its results can nonetheless provide valuable insights into the question being asked when interpreted properly (i.e., relative to a baseline). The Suisun Creek LCM serves as a good example of the application of a cohort-based simulation LCM.

We recommended adopting a modeling approach similar to that used in the Shiraz, NOAA HARP model, and CFS Nooksack LCM, all of which provide an appropriate scaffolding upon which to build the SCS LCM. The modular nature of cohort-based simulation LCMs means that model components can be easily tuned to specific study systems by incorporating data and parameter estimates from regional monitoring and/or studies. Further, the cohort-based simulation LCM framework allows for flexibility in spatial scale, which will enable us to build the model at the appropriate level of detail required to address the key questions without introducing unnecessary complexity. For example, the CFS Nooksack LCM incorporates a very fine level of habitat detail (reach-scale) beyond what is necessary given the purpose of this modeling study; however, the backbone of the model, and others like it, are its functional relationships representing the various life history stages and transitions which typically do not have any influence on scale. Because each process in a cohort-based simulation LCM runs in isolation, functional relationships can be easily added or removed representing productivity and survival at specific life histories and stages, and data can be leveraged from disparate sources to parameterize those relationships. Furthermore, existing code from the CFS Nooksack LCM, while currently built for Pacific Northwest Chinook, can be easily adapted, modified, and expanded in order to satisfy the goals and objectives of this study.

Task 3. Quantitative Life Cycle Model

Model Framework:

The goal of the Southern California steelhead life-cycle model (SCS LCM) is to understand the influence of source-sink dynamics between resident and anadromous *O. mykiss* on population viability (i.e., the 100-year extinction risk) for Southern California DPS populations, as well as the potential for long-term Southern California DPS persistence as a whole. The SCS LCM links individual life-cycle sub-models parameterized for three distinct life-history variants (Figure 7), The Anadromous population (A), Below-Barrier Freshwater Resident (R), and Above-Barrier Perched Resident (P) *O. mykiss* to a state-space model simulating exchange between populations and life-history variants (see definitions below). Exchange is dependent on habitat connectivity determined by instream flow and fish passage barrier ratings. The potential for spillover between populations within and between watersheds, and between life-history variants, is an important life-cycle dynamic not reflected in current SCS MVP size estimates for individual watersheds (i.e., 4,150 anadromous spawners per year on average; NMFS 2012). Our model improves upon previous efforts to quantify the SCS MVP by considering the contributions of alternative life-history variants to the anadromous spawner population. By including a watershed scale spatial framework, MVP estimates can be obtained for individual watersheds to demonstrate their potential contributions to the population as a whole.

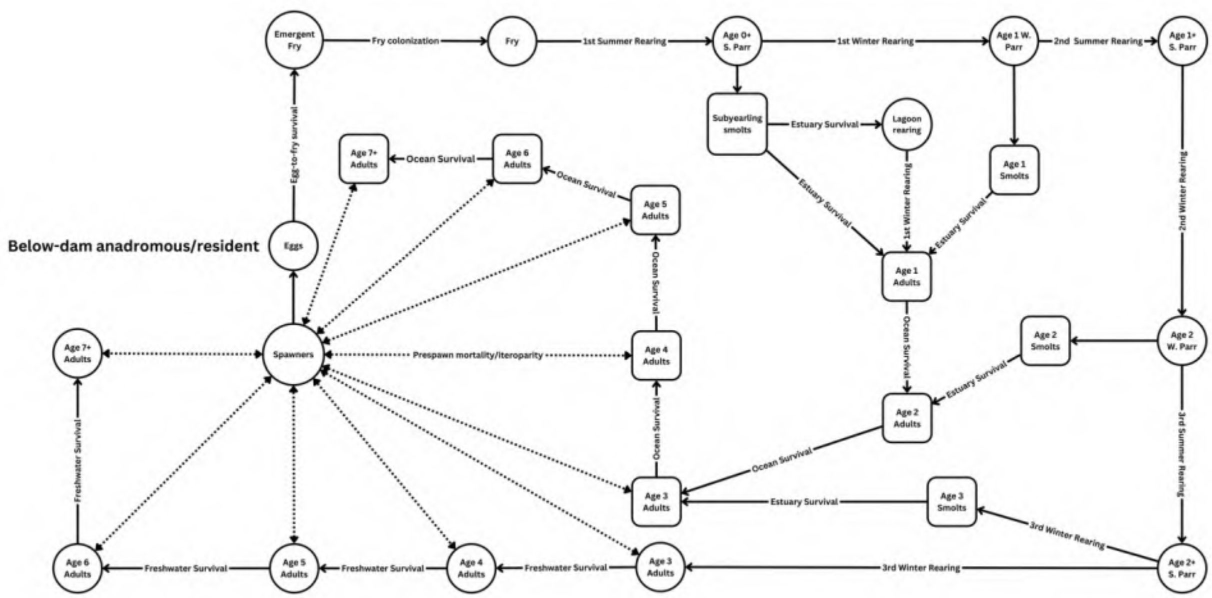

Figure 7. Conceptual life cycle diagram for Southern California steelhead which includes both freshwater (circles) and anadromous (squares) life stages.

Modeled Life Histories

As previously mentioned, this model considers three distinct life history variants that interact with each other to create the overall dynamics observed for the SCS population:

Anadromous (A) – Often referred to as the steelhead life history, these fish leave their natal basins and head out to the estuary and marine environment, where they rear for <1 to several years, before returning to spawn. They are affected by estuary and nearshore conditions, as well as the overall ocean conditions, and can exhibit straying behavior (see "Natal Straying" below).

Freshwater Resident (R) – The freshwater life history is often referred to as "Rainbow Trout" and represent fish that fully rear in freshwater. The Freshwater Resident population serves as the source of the Anadromous population, as all juveniles are considered freshwater residents until they smolt and head to the ocean.

Perched Freshwater Resident (P) – The perched freshwater life history represents freshwater residents that have no consistent connection to ocean, and therefore, cannot exhibit anadromous life histories outside of specific conditions (see Wet and Dry year effects below). Although this population does not directly affect the anadromous population, it can increase the freshwater resident population via spillover (R) which, in turn, effects the anadromous population (A).

By modeling all three life history variants simultaneously we are able to demonstrate complex population dynamics like reseeding and recolonization of extirpated habitats. When combined, we can demonstrate how *O. mykiss* adaptations, through life history variation, can extend the fitness and longevity of the overall population.

Modeled Basins

The SCS LCM considers multiple Basins within the DPS listing of SCS. The model is structured around the following river basins: Santa Maria River (Cuyama River and Sisquoc River as separate sub-basins), Santa Ynez River, Ventura River, Santa Clara River (with Piru Creek as a separate sub-basin), Los Angeles River, San Gabriel River, Santa Ana River, San Mateo Creek, San Luis Rey River, and San Diego River (Figure 8). Although each of the basins contribute to the population, the specific habitat and capacities vary widely, and necessitate separate parametrizations.

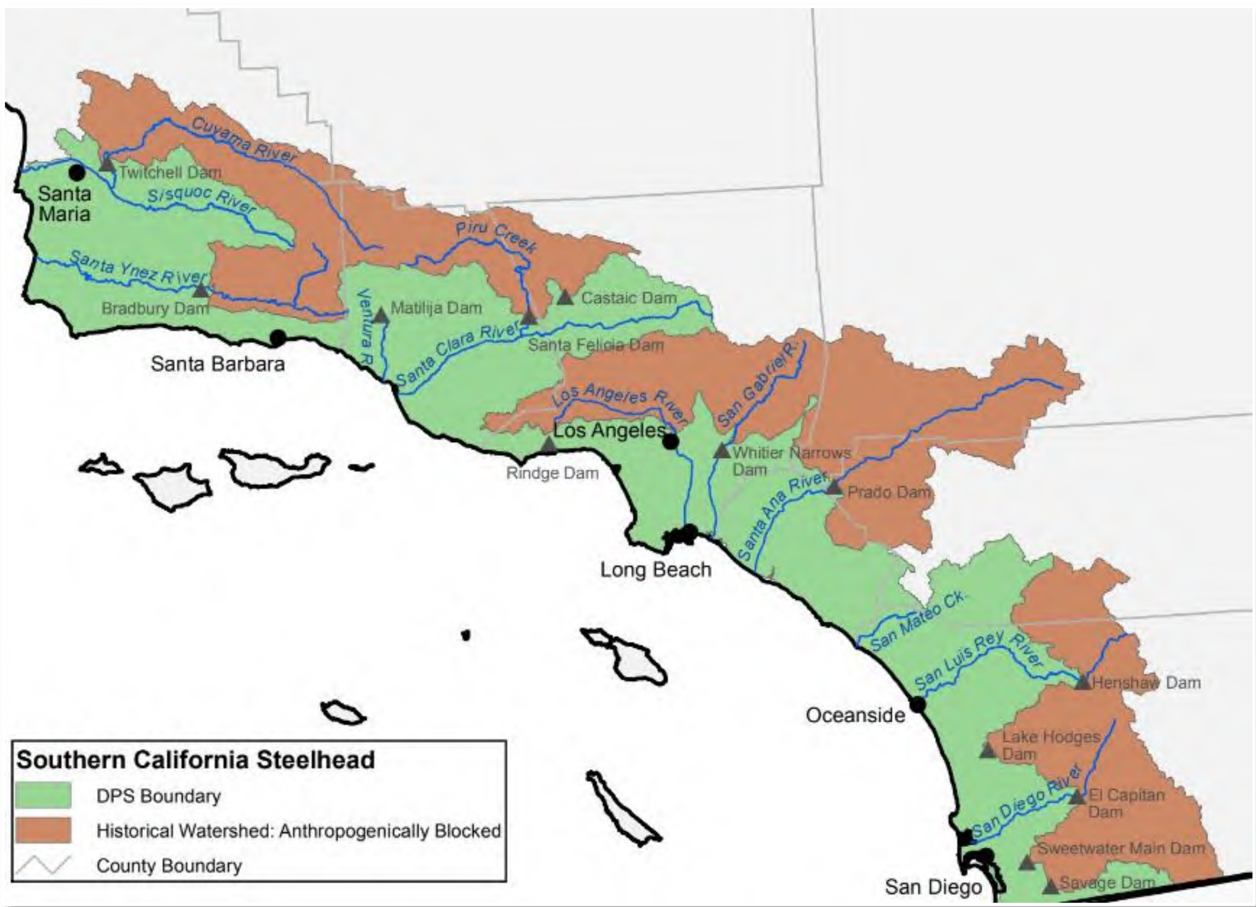

Figure 8. Basins modeled, and approximate extent of historical habitat. From NMFS 2016.

Natal Straying

Straying is typically defined as adult migration to—and attempted reproduction at—non-natal sites (Quinn 1993). Natal straying refers to the phenomenon where spawners do not return to their natal basin, but instead return to a nearby watershed to spawn. This process is responsible for recolonizing areas with previously extirpated populations and has been widely documented amongst many species as an adaptation to density dependence or overall lack of quality habitat. For the SCS we model straying using a transition matrix that determines how much of a population might stray each year, and where they stray to. The transition matrix is an *n x n* matrix that represents all *n* watersheds. Each row represents a watershed, and values indicate what other watersheds (columns) receive straying. The diagonal of this matrix represents the amount of spawners that successfully return to their natal basin. Given limited data to parameterize the matrix, we have assumed small amounts of straying occur up and down the coast to adjacent watersheds, and that this rate may adjust based on available habitat (see dry year effects below).

Wet and Dry year effects

The model assumes three broad categories representing the overall hydrological conditions across the year: Wet, Regular, and Dry. These categories were determined by looking at historical records and binning model components and data into equal quantiles. Although this is aggregated and simplified classification, it allows us to incorporate and explore how wet and dry years can affect the population overall.

Regular Years- The model's default state assumes regular conditions. These conditions allow for anadromous connection and rely on the full reach capacities to drive density dependence. Perched populations have no emigration below blockages and remain "perched".

Wet Years- In wet years, we assume there is the opportunity for spill-over and downstream connection to anadromy for perched populations. In these years, we model volitional movement downstream of blockages by allocating the overage from the density dependent survival downstream into the resident population. This increase in resident population then also contributes to an increase in the anadromous population via the resident population smolt rate.

Dry years- In dry years, several adjustments are made. First, there is reduction in capacity for Freshwater and Perched populations representing both disconnection from habitat, as well as reduction of available habitat. Second, there are reduced smolting rates from resident populations to model the effect of disconnection to anadromous waters that can occur. Overall, these processes combine to have an overall negative effect on all three populations (perched, resident, and anadromous). Finally, following the assumptions of Quinn (1984) related to less stable streams in that we model an increase in straying rates in dry years to represent the potential disconnection from natal streams.

LCM Stages:

The state-space model moves fish through life stages (Figure 7) and records and reports metrics on an annual time step. Following is a brief description of how each transition occurs, and what values control it in the model.

(A) Returns to Spawners: Represents moving back to the natal spawning range and preparing to spawn. Reductions from both pre-spawn mortality, and harvest rate. Both factors are separated by LHP as well as region.

(B) Spawner to Eggs: Shifts successful return into spawners. Calculated using the Female ratio (fixed), as well as a hockey stick function for spawning capacity (separate for each LHP and region). Successful spawners are then converted to eggs via the fecundity parameter. Note, that successful spawners are not all removed from their population, see “Iteroparity” below.

(C) Egg to Fry: Egg survival and successful hatching into fry. Controlled by the ‘Egg to Fry’ parameter. Separate for freshwater and perched populations.

(D) Fry Rearing and Colonization: Fry survival to initial winter rearing. Controlled by the ‘Fry Survival’ parameter that represents the proportion of fry that survive. Separate for Resident and Perched populations. Reduced value in dry years.

(E) Winter Rearing: Density dependent reduction using Beverton-Holt based on capacity and productivity. Separate for Resident and Perched populations. Capacity and productivities by watershed and age. We assumed that the capacities by age account for effects of other age classes (NOAA HARP Model).

(F) Summer Rearing: Density dependent reduction using Beverton-Holt based on capacity and productivity. Separate for Resident and Perched populations. Capacity and productivities by watershed and age.

(G) Smolting: Rate that freshwater fish convert to Anadromous life strategies. Determined by smolt rates. Rates vary by age and potential to adjust for each watershed. Reduced values in dry years to represent disconnection to the anadromous floor. Only applied up to age 4.

(H) Lagoon Rearing: Specific adaptation strategy observed for anadromous population. Provides greater survival compared to estuary and nearshore rearing. Limited by lagoon capacity. Relies on density dependent curve to allocate population to lagoon (preferred), with overage rearing in estuary. Reduced lagoon capacities in dry years. We assume similar dynamics are at play for perched populations where reservoirs are present (Leidy 2004).

(I) Estuary Survival: Default conditions for anadromous rearing when lagoon area is unavailable/ occupied. Fixed rate that depends on age.

(J) Ocean Survival: Represents annual survival in the ocean using a fixed proportion. Separate values by age.

(K) Maturation: Rate that fish mature to spawners. Determined by maturation rates with separate rates for each LHP and age (fixed proportion).

(L) Adult Freshwater Annual Survival: Represents annual survival of freshwater adults. fixed rate. Separate value for resident and perched populations

(M) Iteroparity: Ability for spawners to return and spawn again next year. Controlled by iteroparity rate and respawn survival factor. Separate values for Resident and Perched populations. Assumes that a spawner's LHP is fixed and does not change on repeat spawning.

Initial conditions

The model requires initial conditions to seed the various populations. Long term dynamics are controlled by functional relationships and capacities, and are somewhat robust to initial conditions, however, the ramp up time to stable conditions will depend on the initial seeding and should not be overlooked. Given the potential for a 7-year anadromous return, we would not expect to hit stable dynamics in less than 10 years for most initial values. For this reason, the default model length is set to 125 years to account for the model's "warm up" time.

Demonstrated Population Dynamics – Useful tool without exact empirical data

As mentioned in the modeling section, one benefit of prediction models is the ability to compare a baseline scenario to alternate parameterizations to explore how changes in values (or assumptions) affect overall outcomes. Evaluating population dynamics often poses a challenge when empirical data is scarce or limited. In the case of the SCS population, the lack of empirical data has necessitated the use of a simplified model. However, despite these data limitations, we can still gain valuable insights by exploring how population dynamics are affected by individual modeling components and their values.

To that end, we have developed a model baseline scenario that serves as a fundamental starting point for our analysis. This model baseline parameterization not only helps us navigate the complexities of the SCS population dynamics but also serves as a crucial tool for demonstrating key phenomena in a controlled environment. While the model baseline scenario is an abstraction, it allows us to dissect and understand the impact of various factors, such as reproductive rates, mortality, and environmental variables, on population growth and sustainability.

These concepts, while derived from a simplified model, are robust and reveal core features of the model, and SCS adaptations. By focusing on these fundamental principles, we can uncover insights that may guide future data collection efforts or help refine more complex models as data becomes available. Thus, the use of the simplified model not only provides a pragmatic solution to data limitations but also offers a valuable framework for examining critical population dynamics and their sensitivity to different parameters and assumptions.

Impacts of Wet and Dry years

The model baseline assumes an 'regular' water year and has multiple parameters and capacities that are directly tied to 'dry' years to represent deleterious effects on the population. Similarly, 'wet' years offer opportunities for the perched population to 'spill' into connected freshwater habitat. The model's default behavior assumes a sequence of water years that match historic trends, but the model also allows users to generate alternate randomized sequences to explore the impact of longer or shorter sequences of wet and dry years.

To emphasize these effects, consider the following parametrization. By setting the model to only include 'Dry' years, the perched population cannot contribute to the Resident population (and therefore the Anadromous population), and we can generate a downward trend for population, reaching an asymptote of the Perched population total (Figure 9).

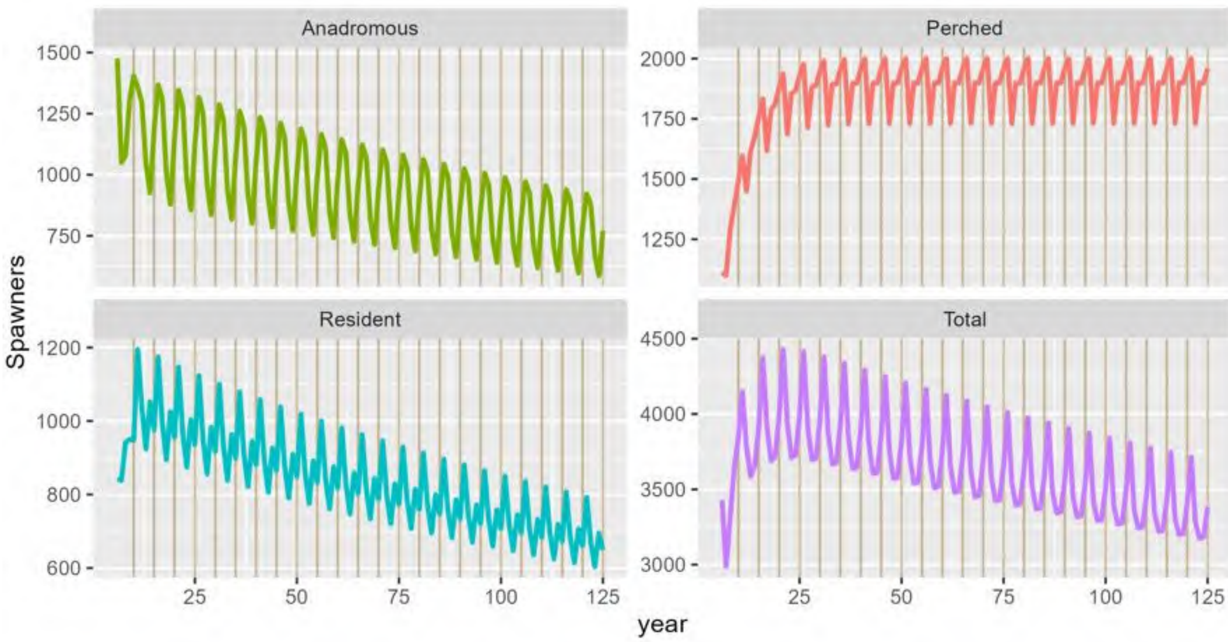

Figure 9. Example of Dry year effects. Plots of Spawners over time for the life history variants modeled in the SCS LCM, along with an aggregated total. Vertical brown lines represent 'dry' years in the run.

Introducing 'wet' years allows the perched population to contribute to the Resident population and can help offset the impacts of the 'dry' years in the run, eventually achieving values approaching MVP (Figure 10).

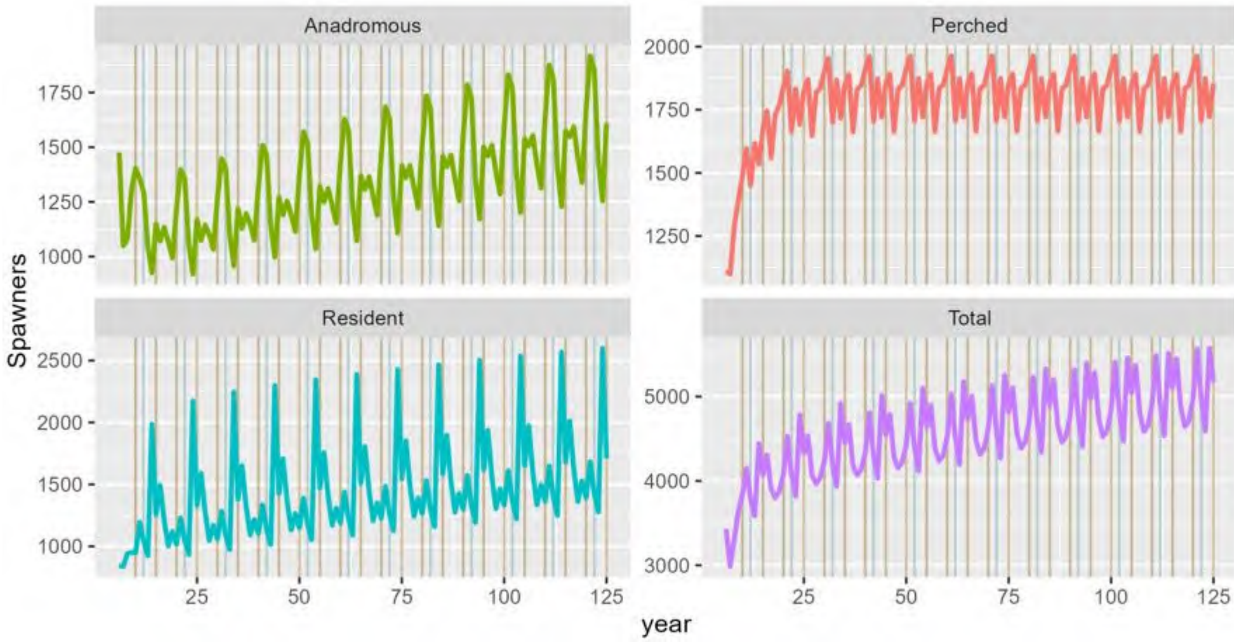

Figure 10. Example of Wet and Dry year effects. Plots of Spawners over time for the life history variants modeled in the SCS LCM, along with an aggregated total. Vertical brown lines represent 'dry' years in the run while blue lines indicate 'wet' years.

Reseeding Populations

Interchange between the resident and anadromous population allows for reseeding an extirpated anadromous population through smolting. Similarly, anadromous adults in the ocean may be able to reseed the freshwater resident population given their lagged return. Finally, the Perched population can reseed the resident population in wet years via ephemeral connections and spillover.

To highlight these dynamics, consider the following parametrization that extirpates the Resident and Anadromous populations after a series of 'dry' years, only to reseed the population from the perched population in a subsequent 'wet' year (Figure 11).

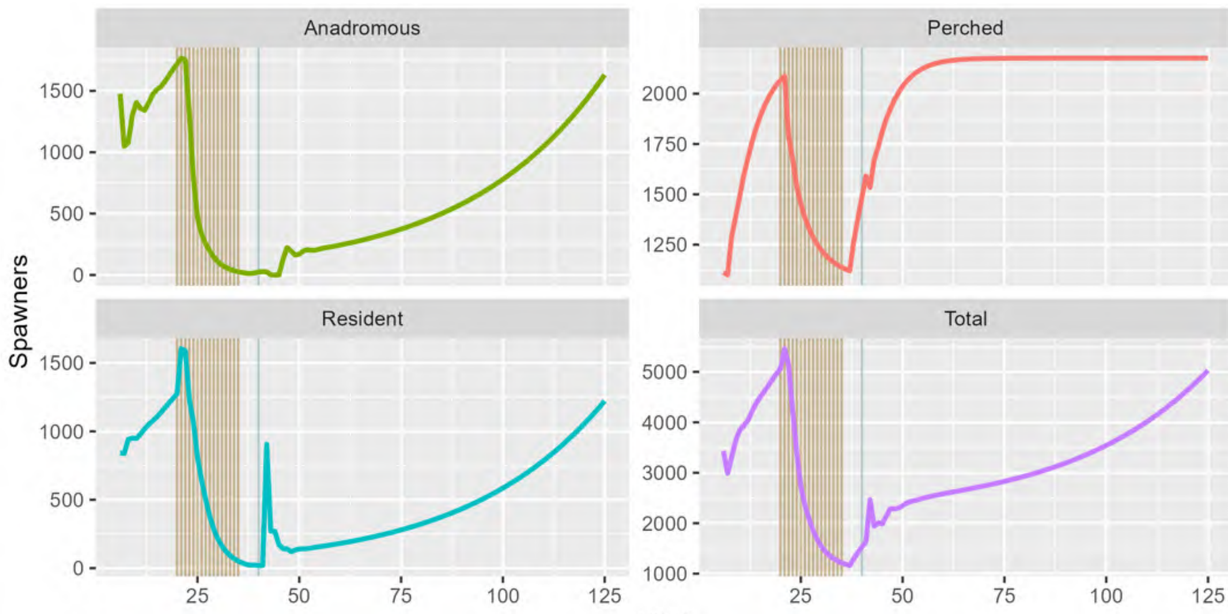

Figure 11. Example reseeding extirpated populations using interchange with a perched population. Plots of Spawners over time for the life history variants modeled in the SCS LCM, along with an aggregated total. Vertical brown lines represent 'dry' years in the run while vertical blue lines represent 'wet' years.

By including both 'wet' and 'dry' years, as well as the potential for interchange between populations, we can begin to produce complex population dynamics (Figure 12).

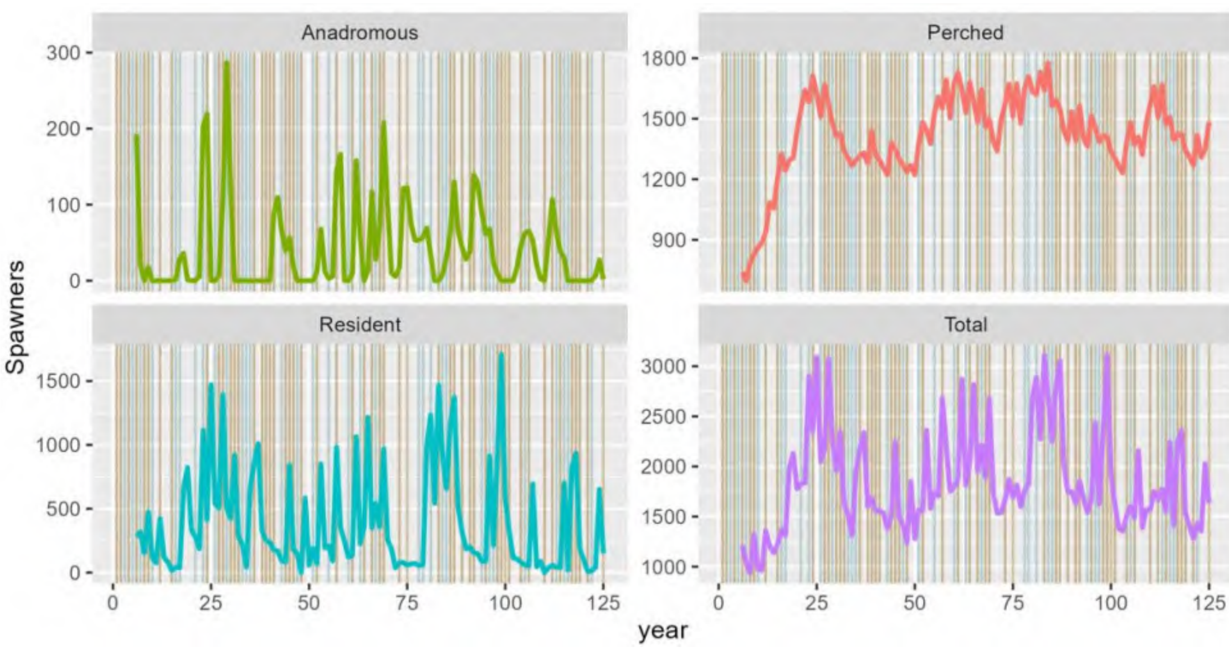

Figure 12. Example of complex populations dynamics by simulating a random sequence of water type years from an empirical distribution. Plots of Spawners over time for the life history variants modeled in the SCS LCM, along with an aggregated total. Vertical brown lines represent 'dry' years in the run while vertical blue lines indicate 'wet' years. Note the anadromous population being reseeded multiple times across the 125-year model run.

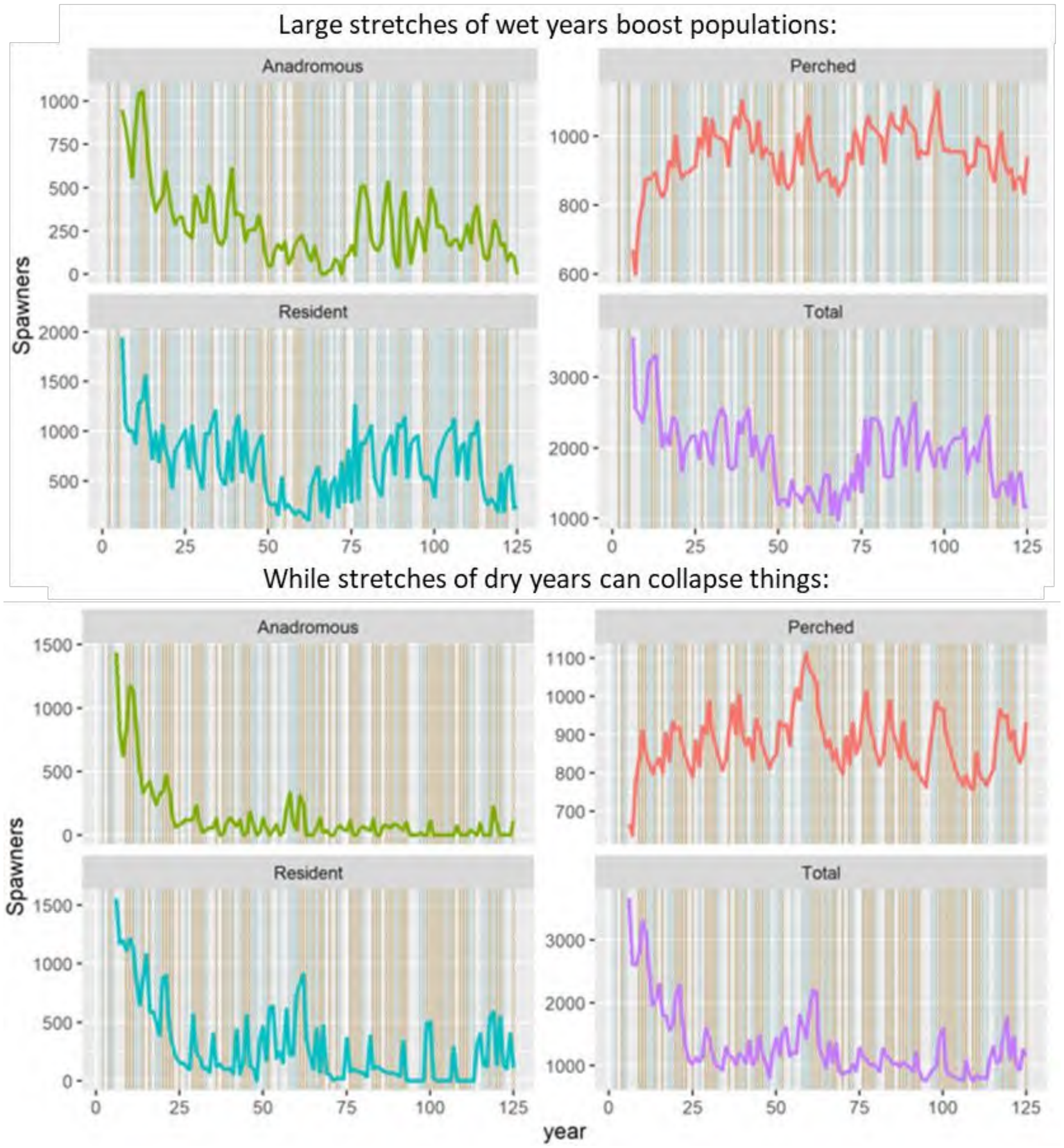

Figure 13. Further examples of complex dynamics demonstrating effects of wet and dry effects. Plots are the same as in Figure 12, but with larger stretches of Wet and dry years highlighting the importance of these environmental factors.

Recolonizing Extirpated Habitats

Beyond local interchange between Resident, Anadromous, and Perched populations, natal straying from the anadromous population can recolonize extirpated habitats. To demonstrate this, we created a diagnostic scenario that forces extirpation in a basin for a set of continuous years to highlight how recolonization can manifest (Figure 14). In the following example, Santa Clara River is recolonized from Natal Straying from nearby systems (Figure 14). Note that the model does not allow the upstream exchange of the Resident population to the Perched population (only the converse), and so the Perched population remains extirpated here:

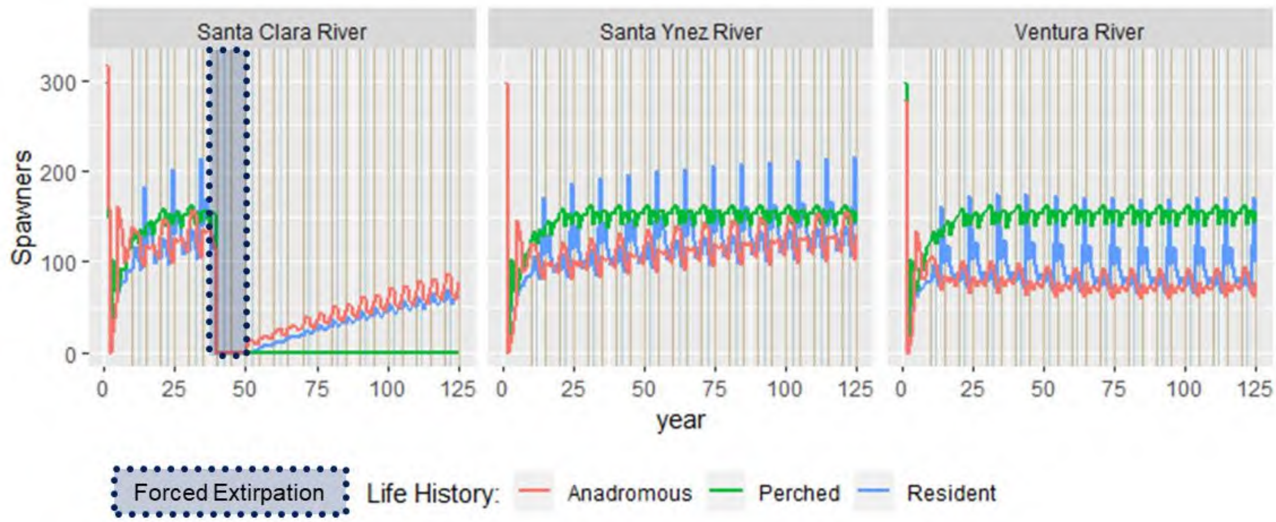

Figure 14. Example of recolonization of extirpated habitat by long-distance natal straying from alternate basins. Plots are of Spawners by year with three basins shown separately, with each Life History Variant distinguished by color. The shaded box represents a forced extirpation lasting 10 years. Vertical brown lines represent 'dry' years in the model while vertical blue lines represent 'wet' years. Note that the water year types match those presented in Figure 10.

Baseline scenario and default Parametrization:

For the model baseline scenario, we set the Anadromous return spawner total to just over the MVP needed to ensure genetic viability (~833 [2500 over 3 years for low extinction risk], Spence et al 2008), while aiming for a total population (including Freshwater and Perched populations) to exceed 4000 fish to achieve an MVP that is more robust to catastrophes and environmental stochasticity (Reed et al 2003 suggests ~5800). Finally, freshwater age structures will be calibrated to closely resemble empirical data from Piru Creek. This parametrization should highlight the overall contributions of the life history variants and connectivity to the long-term persistence of the DPS.

Model Implementation and Dashboard

The SCS LCM model has been implemented in R (R Core Team 2023, version 4.3.1) and only relies on well vetted packages that are available on CRAN with extensive histories of maintenance ("data.table", and "ggplot2"). The model requires little computational resources to operate and should be able to run on most modern computers. Although the code is well commented, it can be intimidating to work with as it is a somewhat complex model relying on nested loops and complex accounting structures. To make the model as user friendly and transparent as possible, we have adapted the code into an R Shiny framework to create a reactive Graphic User Interface (GUI) to run the model (Figure 15). The GUI includes options to rapidly adjust the majority of the model's parameters, and should allow novice users to explore the model, its assumptions, and results.

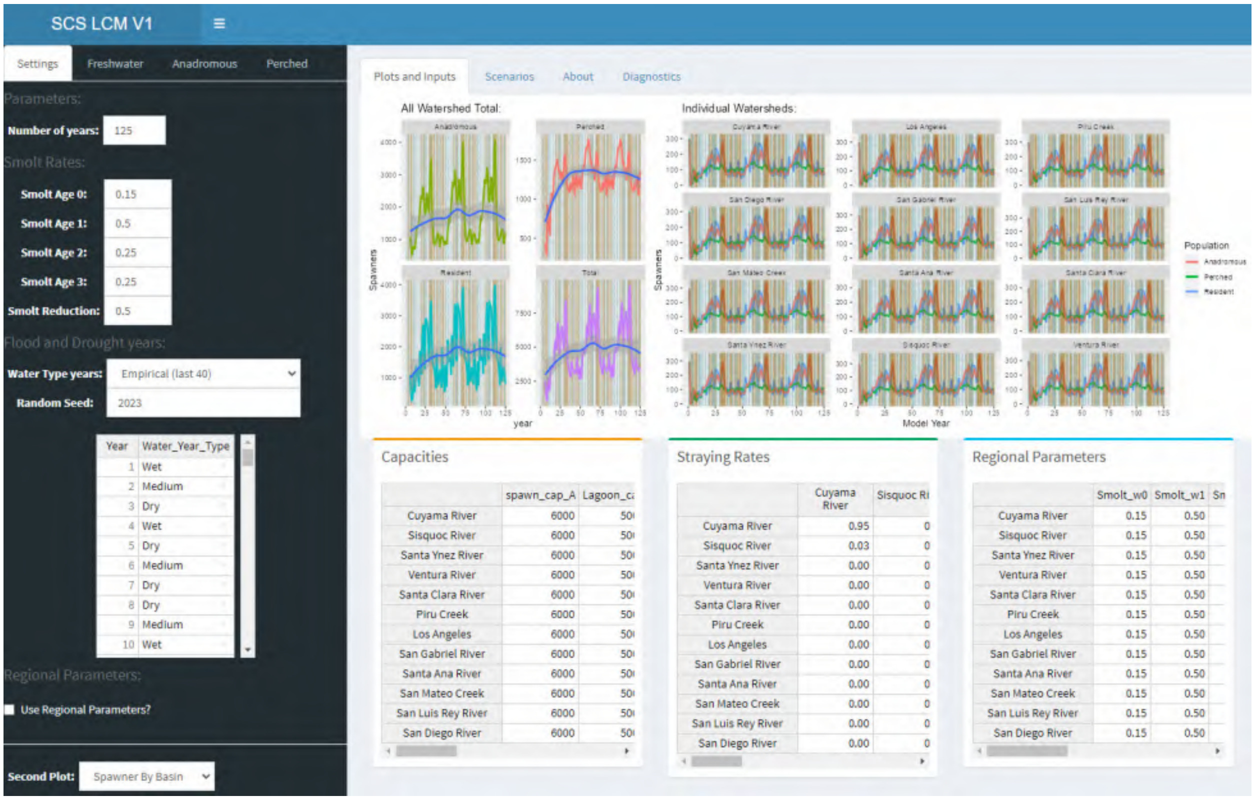

Figure 15. Screen capture of the GUI. A User guide for the model interface is under development and will be included in the 'About' tab.

Additional Scenarios

The model framework is easy to adapt and expand to consider other additional scenarios. As an example of this, we have added a “Reduction Event” scenario to the GUI (under the “Scenarios” tab in the main panel) that allows users to simulate a one-off large scale reduction event. Users have the option to select what year the reduction event starts, its total duration, and how large of a reduction in returning spawners should be applied. This sandbox scenario can help explore the effects of major unforeseen environmental impacts, and to evaluate population resiliency to these events. Moreover, this is meant to demonstrate the type of additional scenarios that can be created and evaluated using this model framework.

Concluding Remarks

- SCS show many adaptations and life history variants, many unique or emphasized for this population (e.g. Freshwater life histories, lagoon Rearing, ‘mini-jacks’, etc.). Ecological theory suggests that these adaptions are important to the population (hence their development) and should be considered in a population life cycle model to fully understand the dynamics of the population.
- Our model demonstrates how many of these adaptations can impact the long-term population dynamics, generally increasing the longevity and fitness of the population overall.

- Although the model is relatively simple and relies on many assumptions, the core dynamics demonstrate that concepts like connectivity (e.g., straying and perched population spill over) and life history variants (e.g., inclusion of both anadromous and resident spawners) can have relatively large impacts on a population's trajectories and persistence, and that omitting them may not fully capture the population's capabilities.
- By providing the GUI interface, the model can facilitate open discussion on management actions and future condition effects on the persistence of the SCS DPS at both regional and population wide scales.
- The model highlights data gaps and needs and can be updated as more information is available.

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From: Russell Marlow [redacted]>
Sent: Thursday, April 4, 2024 03:09 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Materials for Commissioners Meeting Packet

Good Afternoon,

Attached you will find a public support letter that EnviroVoters collected in favor of fully listing Southern Steelhead under CESA.

Please let me know if there are any needed changes to ensure that these docs are included for the Commissioners' review prior to the meeting.

Thanks, Russell

Thank you,

Russell Marlow
[redacted]

April 4th, 2024

California Fish and Game Commission
P.O. Box 944209
Sacramento, California 94244-2090

RE: California Trout, Inc.'s Petition to list Southern California Steelhead (Oncorhynchus mykiss) as Endangered Office - Administrative Law's Notice ID #Z2021-0702-02 and Z2022-0426-01

President Murray and Commissioners:

As concerned California residents, I write to you today to express my full support for designating the Southern California steelhead as endangered under California's Endangered Species Act.

Southern steelhead are an iconic native species, but without further protections we risk losing them forever. That's not a California I want to live in. Do you? You must act immediately to put in place all precautions to prevent this species from total loss.

Recent research tells us that Southern steelhead populations are in danger of extinction within the next 25 to 50 years if current trends persist. Since their listing as an endangered species in 1997 under the federal Endangered Species Act, Southern steelhead numbers have continued to decline to precariously low levels. In the past 25 years, only 177 adult Southern steelhead were documented in their native range! Allowing this species to disappear is not acceptable, and more protections are essential.

These fish play a key role in our ecosystems, and they can give us crucial information about the greater health of the watersheds they swim in (and that our communities rely upon). We can look to them for clues on how California must work to address bigger problems in our southern rivers and streams, watersheds that provide countless societal and economic benefits for the entire state. I believe that we prosper when rivers and waterways in key locations are thriving, and in many of these places there is work to be done.

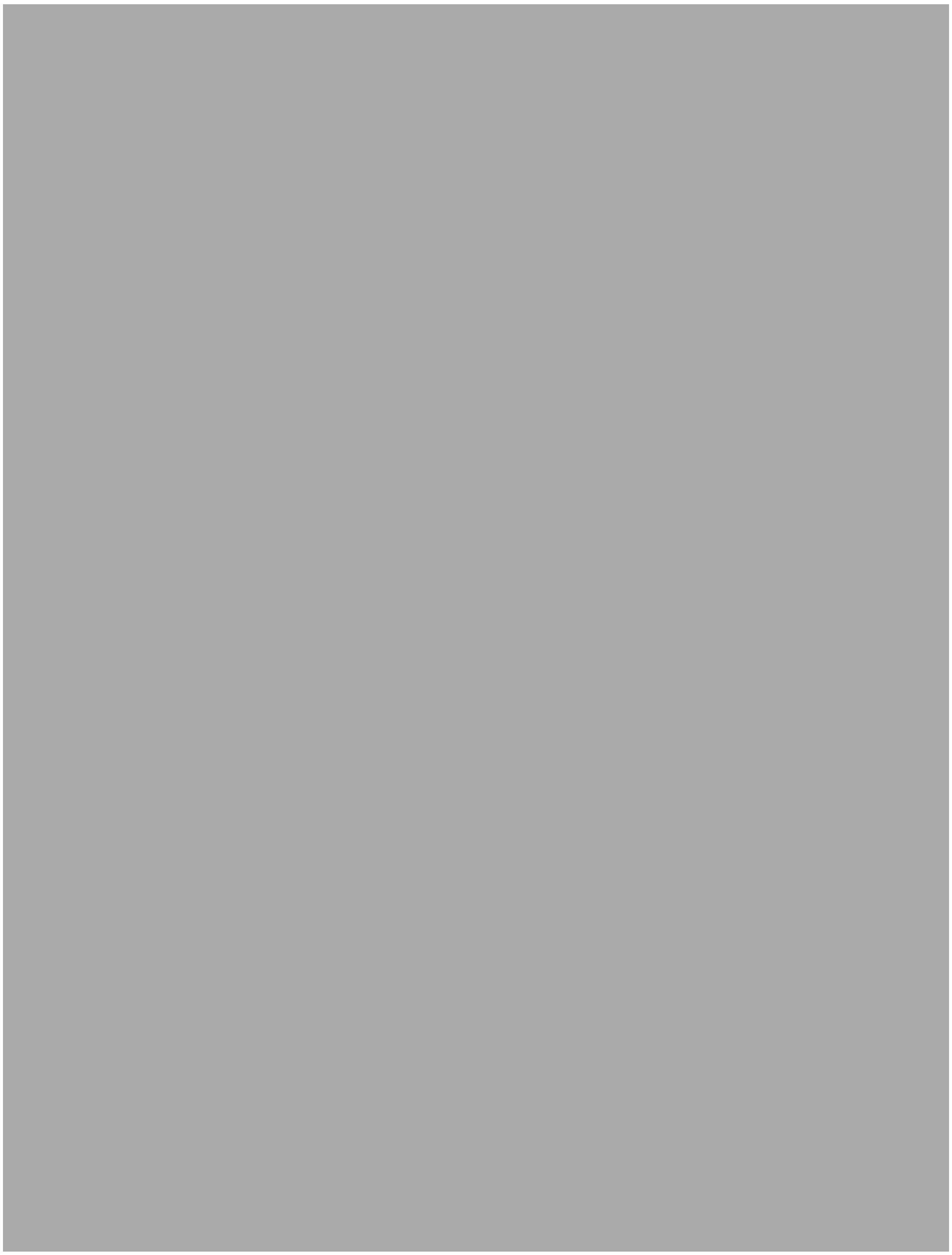
These fish may also play a role in providing resiliency for ecosystems further north along the coast. Southern steelhead are uniquely adapted to Southern California's warmer Mediterranean climate. As climate change continues to increase water temperatures and alter flow regimes along the entire West Coast, Southern steelhead could be critical to the long- term resiliency of their northern relatives.

For all these reasons, I wholeheartedly support California Trout's recommendation that Southern California steelhead be listed as endangered in all waterways within historic range below natural or man-made barriers. CalTrout chose this delineation thoughtfully, so that fishing and continued management for rainbow trout, the freshwater form of this amazing species, would still be possible above these barriers.

It's not too late to save the Southern California steelhead species from blinking out – but if you don't act urgently, we may very well miss our chance. Please make protection of these amazing and important fish a conservation priority by listing them as endangered under the state's Endangered Species Act.

Sincerely,

EnviroVoters Together as Concerned Californians and Individuals All Over



LOS ANGELES COUNTY SANITATION DISTRICTS
Converting Waste Into Resources

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April 4, 2024

VIA EMAIL fgc@fgc.ca.gov

Ms. Samantha Murray, President & Members
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244

Dear President Murray and Members:

Comments on the Petition to List the Southern California Steelhead Pursuant to the California Endangered Species Act and the Department of Fish and Wildlife's Status Review Report

The Los Angeles County Sanitation Districts (Sanitation Districts) received the Notice of Final Consideration of the subject petition by the California Fish and Game Commission (Commission) for their April 17-18, 2024, meeting, and have reviewed the January 2024 California Department of Fish and Wildlife (CDFW) Status Review Report of Southern California Steelhead (2024 Status Report). The Sanitation Districts previously reviewed the June 7, 2021, Petition to List the Southern California Steelhead under the California Endangered Species Act (CESA) and the November 2021 Petition Evaluation prepared by CDFW and provided comments to the Commission on January 27, 2022 (see Attachment 1). By way of background, the Sanitation Districts are a confederation of 24 special districts serving approximately 5.4 million people in Los Angeles County (County). Our service area covers approximately 850 square miles and encompasses 78 cities and unincorporated territory within the County. The Sanitation Districts construct, operate, and maintain facilities to convey, treat, recycle, and dispose of wastewater, and generate recycled water, bioenergy, and biosolids as byproducts of the treatment process.

General Comments Related to Listing and Identification of the Upper Santa Clara and Lower San Gabriel Rivers

As indicated in our previous comment letter, the Sanitation Districts are not taking a position regarding the listing of Southern California Steelhead (SCS) under CESA. However, we hope that the information provided in that letter has allowed the Commission and CDFW to gain an understanding of our operations and the significant potential consequences of CESA listing to our operations. For the upper Santa Clara River above its confluence with Piru Creek, and the portion of the lower San Gabriel River below its confluence with San Jose Creek, we are unaware of any evidence that SCS currently use these waterbodies due to the presence of physical barriers, lack of streamflow, and/or lack of suitable habitat. Thus, the Sanitation Districts are concerned about the implications of designating these areas as currently supporting SCS, and the impact that this designation may have over time on our ability to carry out the essential public services that we provide. We are concerned about requirements and water quality objectives that may be imposed on the water reclamation plants (WRPs) that we operate by CDFW and/or the Los Angeles Regional Water Quality and State Water Resources Control Boards (collectively the "Waterboards") in order to protect purported SCS habitat. Specifically, we are concerned that, when considering requests for Streambed Alteration Agreements, CDFW may incorrectly assume the presence of SCS to impose stringent prohibitions or conditions on essential activities such as maintaining sewers (which may cross under/over these rivers), maintaining or installing retaining walls, and maintaining discharge outfalls located in the affected water bodies. Further, the Waterboards may update the Los Angeles Region Water Quality Control Plan, as well as subsequently modify National Pollutant Discharge Elimination System (NPDES) permits, to require higher-quality discharges to receiving waters to protect SCS, even if they are not and cannot be present in these locations due to the barriers (i.e., dry gaps, dams, etc.) preventing access. Finally, the Sanitation Districts' wastewater facilities operate under California Water Code Section 1211 approved petitions, which are issued by the Waterboards and govern the discharges, and these allow us to provide recycled water for municipal uses.

One possible consequence of the potential changes to water quality regulatory requirements, or imposition of other new regulatory requirements, could be a need for new types of treatment at our WRP facilities. The cost, energy, and greenhouse gas emission impacts of constructing and operating additional treatment facilities to support SCS habitat would be substantial, and all for a purported SCS distribution that is not known to occur in reaches of the upper Santa Clara River, lower San Gabriel River, and their tributaries to which the Sanitation Districts' WRPs discharge recycled water. Furthermore, the potential listing of SCS could lead to unintended consequences such as less recycled water being available for reuse due to additional discharges to the rivers that could be required, even if this habitat is not accessible or appropriate for SCS. This would affect the water supply and resiliency of this region and potentially create water shortages.

Specific Comment on 2024 CDFW Status Report Figure 7

Moreover, the Sanitation Districts are concerned that Figure 7 of CDFW's 2024 Status Report (page 43) clearly mis-identifies reaches of the Santa Clara River extending far upstream of Piru Creek as current SCS distribution areas. The Sanitation Districts own and operate two WRPs that discharge approximately 18 million gallons per day of recycled water into the upper Santa Clara River, constituting most of the surface flow in portions of that waterbody where surface flow is present. Reaches of the Santa Clara River where discharges occur are separated by a naturally occurring "dry gap" from coastal reaches (see map in Attachment 2). Piru Creek was indicated as the upper limit of potential SCS habitat identified in the National Marine Fisheries Service January 2012 Southern California Steelhead Recovery Plan. Thus, it was the Sanitation Districts' understanding that the Santa Clara River upstream of Piru Creek is not suitable SCS habitat and consequently is not a focus of the potential CESA listing. Prior discussions with CDFW staff in March 2022 had supported this understanding. Furthermore, we are currently working on receiving water temperature studies in the upper Santa Clara River with CDFW and United States Fish and Wildlife Service (USFWS) staff, and SCS have never been identified by the USFWS or any other State or federal resource agencies as a species present in this area of the watershed. Despite these facts, and without any evidentiary basis, the 2024 Status Report shows a blue line signifying actual SCS presence in these reaches.

Research by ESA Consultants (see Attachment 3 for ESA technical memorandum), including several studies conducted over the past several decades in the area, has indicated that there is no record of current SCS occupation in the upper Santa Clara River watershed (east of the Piru Creek confluence) on which to support any determination of species "presence". Despite extensive fish sampling in the area over the last few decades, no SCS have been encountered. Habitat conditions currently do not suggest suitable habitat is present for this species in the area. Furthermore, the 2024 Status Report did not reference any scientific work or publication that would support such a determination. Sanitation Districts staff recently met with CDFW staff involved with development of the 2024 Status Report, and we appreciate the cooperation of CDFW staff in discussing this matter with us. However, during this discussion, CDFW staff did not provide any new evidence or sufficient scientific justification for demarcating the upper Santa Clara River watershed as current SCS habitat. The references discussed in the 2024 Status Report have been thoroughly reviewed by ESA Consultants and incorporated into their attached report. While the Sanitation Districts recognize this is only a status report, we are very concerned about the potential for future misuse of the SCS distribution indicated in the 2024 Status Report to require or suggest unnecessary restrictions and conditions on our facilities in the upper Santa Clara River to protect the species.

Based on the above, the Sanitation Districts respectfully request that the Commission take the following actions:

1) Santa Clara River – Direct CDFW staff to remove the "Current" SCS distribution designation for the Santa Clara River upstream of Piru Creek from Figure 7 of the 2024 Status Report.

2) San Gabriel River – Direct CDFW staff to work with the Sanitation Districts to develop a Section 2084 regulation and Section 2081(d) rule that is protective of the SCS species yet allows the Sanitation Districts to continue activities necessary to support their essential function of providing wastewater treatment and related services, including but not limited to discharge, monitoring and the provision of recycled water, to County residents and businesses. This reiterates the request from our previous correspondence, which is provided again as Attachment 1.

Once again, we thank you for the opportunity to provide these comments and look forward to working with CDFW and the Commission. For any questions, please contact the undersigned at (560) 908-4288, ext. 2701 or rtremblay@lacsd.org.

Very truly yours,

Ray Tremblay

Raymond L. Tremblay
Department Head
Facilities Planning

Attachment 1 – Sanitation Districts previous comment letter dated January 27, 2022
Attachment 2 – Map of the Santa Clara River Watershed relative to Sanitation Districts WRPs
Attachment 3 – ESA Technical Memorandum: Review of Current and Historical *Oncorhychus mykiss* Occurrences in the Upper Santa Clara River Watershed (Los Angeles County)

cc: Melissa Miller-Henson, Executive Director, FGC
Charlton Bonham, Director, CDFW

ATTACHMENT 1

LOS ANGELES COUNTY SANITATION DISTRICTS
Converting Waste Into Resources

Robert C. Ferrante
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Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
(562) 699-7411 • www.lacsd.org

January 27, 2022

VIA EMAIL fgc@fgc.ca.gov

Mr. Peter S. Silva, President & Members
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244

Dear President Silva and Members:

Comments on the Petition to List the Southern California Steelhead Trout Pursuant to the California Endangered Species Act and the Department of Fish and Wildlife's Petition Evaluation

The Los Angeles County Sanitation Districts (Sanitation Districts) have reviewed the June 7, 2021, Petition to List the Southern California Steelhead (Steelhead) under the California Endangered Species Act (CESA) and the November 2021 Petition Evaluation prepared by the California Department of Fish and Wildlife (CDFW). While the Sanitation Districts are not taking a position regarding the application of CESA to Steelhead in Southern California, we wish to provide the California Fish and Game Commission (Commission) and CDFW with information about our operation to help inform the decision making processes of the Commission and CDFW as to the potential consequences of listing as related to our operations. To provide some background, the Sanitation Districts are a confederation of 24 independent special districts serving approximately 5.6 million people in Los Angeles County (County). The Sanitation Districts' service area covers approximately 850 square miles and encompasses 78 cities and unincorporated territory within the County. The Sanitation Districts construct, operate, and maintain facilities to convey, treat, recycle, and dispose of wastewater and industrial wastes and generate recycled water, bioenergy, and biosolids as byproducts of the treatment process. As such, the Sanitation Districts are requesting that if the Steelhead listing proceeds, CDFW and the Commission also develop a Section 2084 regulation and Section 2081(d) rule that is protective of the species, yet allows the Sanitation Districts to continue activities necessary to support their essential function of providing wastewater treatment and related services, including but not limited to discharge, monitoring and the provision of recycled water, to County residents and businesses.

Description of Sanitation Districts Operations Potentially Affected by Steelhead CESA Listing

Facilities

Among other facilities, the Sanitation Districts operate a network of inland water reclamation plants designed to produce high quality recycled water for municipal reuse. Not all the recycled water is currently utilized by our partner water agencies however and the remaining flows must be discharged to inland surface water bodies. A portion of the recycled water that is used is also discharged to inland rivers which are used as conveyance to downstream uses. The Sanitation Districts currently discharge over 30 million gallons per day (MGD) into the San Gabriel River and its tributaries (San Jose Creek and Coyote Creek), from five water reclamation plants (WRPs) under National Pollutant Discharge Elimination System (NPDES) permits issued by the Los Angeles Regional

Water Quality Control Board (Regional Board) (see Figure1). Conditions in the San Gabriel River are unsuitable for promotion of Steelhead under baseline conditions. For example, the portions of the San Gabriel River and tributaries in which these treatment facilities discharge are highly managed, highly modified, mostly concrete lined, and receive little flow from other sources other than stormwater runoff. The only reason there are measurable flows on a seasonal basis is due to the artificial condition of wastewater discharges. There is no affirmative duty under CESA to maintain an artificial condition. Further, the National Marine Fisheries Service January 2012 Southern California Steelhead Recovery Plan (Recovery Plan) found that restoring conditions for Southern California Steelhead in the San Gabriel River would require multiple long-term measures related to water management, recreation, and urban development. It went on to state that a fish passage barrier inventory and assessment for the watershed should be conducted as there are several operating dams that impede fish passage. It is our understanding that any use of the reaches we discharge to for Steelhead recovery would be solely for migration on a seasonal basis.

The Sanitation Districts also own and operate two additional water reclamation plants that discharge approximately 18 MGD into the Upper Santa Clara River, constituting most of the surface flow in portions of that waterbody where surface flow is present. The reaches of the Santa Clara River where discharges occur are separated by a “dry gap” from coastal reaches with surface flow and are far upstream of Piru Creek, the limit of potential Steelhead habitat identified in the Recovery Plan. Thus, it is our understanding that the Santa Clara River upstream of Piru Creek is not a focus of the potential CESA listing and our remaining comments in this letter focus on the San Gabriel River.

Recycled Water and CA Water Code Section 1211 Approved Petitions

Any listing decision should consider the current instream conditions, as well as current and future discharges of recycled water to the San Gabriel River. These discharges vary seasonally and are heavily managed by the Los Angeles County Flood Control District. The Sanitation Districts’ goal is to maximize reuse. The Sanitation Districts work with regional and local water agencies to develop these recycled water projects and are actively working on the development of several new projects in the region due to the need to develop additional local climate-resilient water supplies, which can help local and regional municipalities reduce reliance on imported water and ease the pressure on distant watersheds that support habitat for a number of threatened and endangered species. There is significant demand for the Sanitation Districts to supply additional recycled water to local water agencies to the extent to which it is available.

To this end, after numerous years of working with CDFW and the State Water Resources Control Board, the Sanitation Districts obtained approval for several California Water Code Section 1211 Petitions that allow us to reduce our combined discharge to a total of 7 MGD (5 MGD from our San Jose Creek WRP and 2 MGD from our Los Coyotes WRP) to the San Gabriel River. These approved Section 1211 Petitions allow us to provide additional recycled water for reuse to local water agencies without impacting riparian habitat or special status species. The permits require the Sanitation Districts to monitor the surrounding riparian habitat using an adaptive management approach to protect the least Bell’s vireo, an endangered avian species. Further, as part of the adaptive management plan, a habitat management committee, which includes participation by CDFW and the United States Fish and Wildlife Service, reviews the collected data collected and provides future recommendations. Because these petitions were only recently approved, the reductions in discharges to the San Gabriel River have not yet occurred. The Sanitation Districts expect to reach these levels of minimum discharge over the next decade as new recycled water projects are implemented.

In addition to minimum discharges to comply with the Section 1211 Petitions, the Sanitation Districts also use the San Gabriel River and its tributaries to convey recycled water from our WRPs to their point of use. Recycled water produced at our WRPs and not used for municipal purposes is discharged for percolation and conveyance downstream. Unlined portions of the San Gabriel River and adjacent engineered spreading basins are used as part of the Montebello Forebay Groundwater Recharge Project to capture recycled water to augment local groundwater supplies. Los Angeles County Flood Control District operates the river and spreading basins to maximize conservation of recycled water and stormwater. During most times of the year, the vast majority of the discharges from the San Jose Creek, Whittier Narrows and Pomona WRPs are captured and conserved.

Excess Recycled Water Discharge

The Sanitation Districts also wish to emphasize that, while we take our responsibility to protect the beneficial uses and habitat of the waterbodies to which we discharge very seriously, we also have a primary responsibility to provide the essential public service of wastewater treatment to approximately 5 million people residing in the Los Angeles Basin; this service must be available on a continuous basis. While supplying recycled water is also an important function, recycled water demand fluctuates diurnally (due to daily usage patterns) and seasonally. Moreover, the amount of wastewater production fluctuates over time, whether it be due to flow reductions attributable to water conservation or peak wet weather flows that occur during and immediately after storms. During winter months and during storm events, demand for recycled water is lower, and more treated wastewater must be discharged to the environment. In short, wastewater treatment and the ability to discharge must always be available, as the volume of water is significant and cannot be directly controlled by the Sanitation Districts. The variability of the flows must also be taken into account when considering the application of discharge standards. While it may be feasible to treat our recycled water to be suitable for Steelhead migration at low flows, it may be infeasible to provide that treatment for all flow after a rain event when recycled water demands are minimal. If discharges were to continue, the Sanitation Districts could be required to construct and maintain very large-scale treatment facilities that only operate a few times of year. There is likely not sufficient space available at our WRPs to provide higher levels of treatment for all the flow.

Treatment Requirements

It is our understanding that if a CESA listing is adopted, the Water Quality Control Plan, Los Angeles Region (Basin Plan) may need to be modified to reflect updated beneficial uses (e.g. for endangered species) and accompanying water quality standards for constituents such as temperature and ammonia toxicity could be adopted by the Regional Board to protect these beneficial uses. The Sanitation Districts are concerned with having to comply with far more stringent effluent limitations to support this beneficial use (potentially at all times of the year) despite the absence of Steelhead in the San Gabriel River under baseline conditions and the presence of Steelhead in the San Gabriel River in the vicinity of our discharges would only occur during migration. The cost, energy, and greenhouse gas emissions for having to construct and operate additional treatment facilities would be substantial. CDFW should consider these costs and other factors when determining if conditions in the San Gabriel River watershed are suitable for Steelhead recovery.

Monitoring Programs

The Sanitation Districts conduct extensive water quality monitoring activities in the San Gabriel River and Santa Clara River. In addition to implementation of an extensive monitoring and reporting program in and around the discharges from the WRPs to the San Gabriel and Santa Clara Rivers, the Sanitation Districts fund and participate in the San Gabriel River Regional Monitoring Program, which is a watershed-wide monitoring program that has been active for over 16 years. All of these monitoring activities are required by the Regional Board and are contained in our NPDES permits.

Request for Pre-Emptive Consultation and Accommodation for Essential Public Services

Notwithstanding our understanding that the reaches of the San Gabriel River to which our facilities discharge are not likely suitable for Steelhead recovery under the CESA listing (and dry reaches upstream of the San Jose Creek and Pomona WRPs make those reaches unsuitable as well), if CDFW decides to accept the petition for consideration, it's our understanding that the Commission can adopt regulations under Section 2084 of the California Fish and Game Code to authorize the taking of a candidate species, subject to terms and conditions it prescribes, based on the best available scientific information. Under Section 2084, CDFW may also recommend to the Commission that it authorize the taking of an endangered, threatened or candidate species. The Sanitation Districts would be glad to work with CDFW and the Commission to develop a Section 2084 regulation that is protective of the species, yet allows the Sanitation Districts to continue activities necessary to support their essential function of providing wastewater treatment services to Los Angeles County residents and businesses.

At this time, the Sanitation Districts recommend that CDFW propose and the Commission adopt a Section 2084 regulation that authorizes the exceptions to the take prohibition described below. These incidental take authorizations would support critical operations, maintenance and capital activities required to provide reliable wastewater services to protect public health, safety, and the environment. In crafting a Section 2084 regulation that accommodates these authorizations, the Sanitation Districts are ready and willing to collaborate with CDFW and the Commission to develop best management practices and other measures to provide for conservation of the species. Furthermore, if the Commission decides to ultimately list the Southern California Steelhead, the Sanitation Districts request CDFW consider adopting a rule pursuant to section 2081(d) that contemplates the same incidental take authorizations.

Incidental Take Authorizations Being Requested

1. Take authorization as it relates to the Sanitation Districts' previously approved Section 1211 permits, and any of their successors.

   As noted above, increasing recycled water supplies is urgently needed to address the State's water crisis. The Sanitation Districts spent over 5 years working with CDFW to develop an adaptive management plan to ensure riparian habitat and special status species will not be impacted by the reduction in discharge to the San Gabriel River from Sanitation Districts' WRPs. The discharge reduction enables more recycled water to be beneficially reused, thereby providing a resilient water supply source. Given the long history of Sanitation Districts' partnership with CDFW in these efforts, the Sanitation Districts believe it is appropriate to exempt actions undertaken pursuant to implementation of conditions contained in approved the 1211 petitions

2. Take authorization to allow required monitoring to be conducted per NDPES permit Monitoring and Reporting Programs and the San Gabriel River Regional Monitoring Program.

   The Sanitation Districts conduct routine monitoring for discharges into the San Gabriel and Santa Clara River watersheds as part of implementation of NPDES permit requirements. The Sanitation Districts also participate in implementation of the San Gabriel River Regional Monitoring Program (www.sgrrmp.org). If best management practices are adhered to, these water quality monitoring activities should be identified as exempt from "incidental take" as they not only help ensure that NPDES permit limits are being met, but also that public health and the environment are protected.

3. Take authorization to allow the Sanitation Districts to discharge more flow (compared to average or dry weather conditions) to the San Gabriel River and its tributaries during wet weather or due to other conditions that may periodically occur, such as maintenance or repair to a recycled water system.

   When there is a reduction in demand for recycled water from one of its WRPs in the San Gabriel River Watershed or during wet weather conditions, the water reclamation plants have historically discharged higher than average flow into the San Gabriel River. For flood control and other public health and safety reasons, the Sanitation Districts need to maintain the flexibility to be able to continue this historic practice.

4. Take authorization to allow the Sanitation Districts to adhere to the temperature compliance schedules in our NPDES permits, including any related studies.

   As mentioned previously, within the San Gabriel River, the Sanitation Districts have five WRPs with NPDES permits issued by the Regional Board. Each of those permits, which were renewed in 2021, contains a ten-year temperature compliance schedule that will allow the Sanitation Districts to identify and implement measures needed to comply with Basin Plan temperature objectives. The Sanitation Districts are also required to conduct studies as part of their compliance. Providing this exception will allow the Sanitation Districts to maintain compliance with their NPDES permits and assure compliance with Los Angeles Region Basin Plan temperature objectives. Similar activities to conduct studies and comply with Los Angeles Region Basin Plan temperature objectives are expected to be included in NPDES permit updates scheduled during 2022 for the two WRPs that discharge to the Upper Santa Clara River, and this exception should be applied there as well.

5. Take authorization to allow continued rotation of discharge from our San Jose Creek and Whittier Narrows WRPs to each of the various NPDES permitted outfall discharge locations.

   Historically, discharge from the San Jose Creek WRP rotates to various NPDES permitted outfall discharge locations. This has been done to maximize recycled water deliveries, maintain habitat, ensure public safety, and allow for system maintenance. Before, during, and after storm events, the Los Angeles County Department of Public Works may switch discharge locations for flood control purposes and to maximize stormwater capture. This flexibility and practice of rotating discharges must be allowed to continue in order to support this diverse range of public-interest goals.

Once again, we thank you for the opportunity to provide these comments and look forward to working with CDFW and the Commission. For any questions, please contact the undersigned at (560) 908-4288, ext. 2701 or rtremblay@lacsd.org.

Very truly yours,

Ray Tremblay

Raymond L. Tremblay
Department Head
Facilities Planning

RLT:JL:pb

Enclosure

cc: Melissa Miller-Henson, Executive Director, FGC
Charles Bonham, Executive Director, CDFW

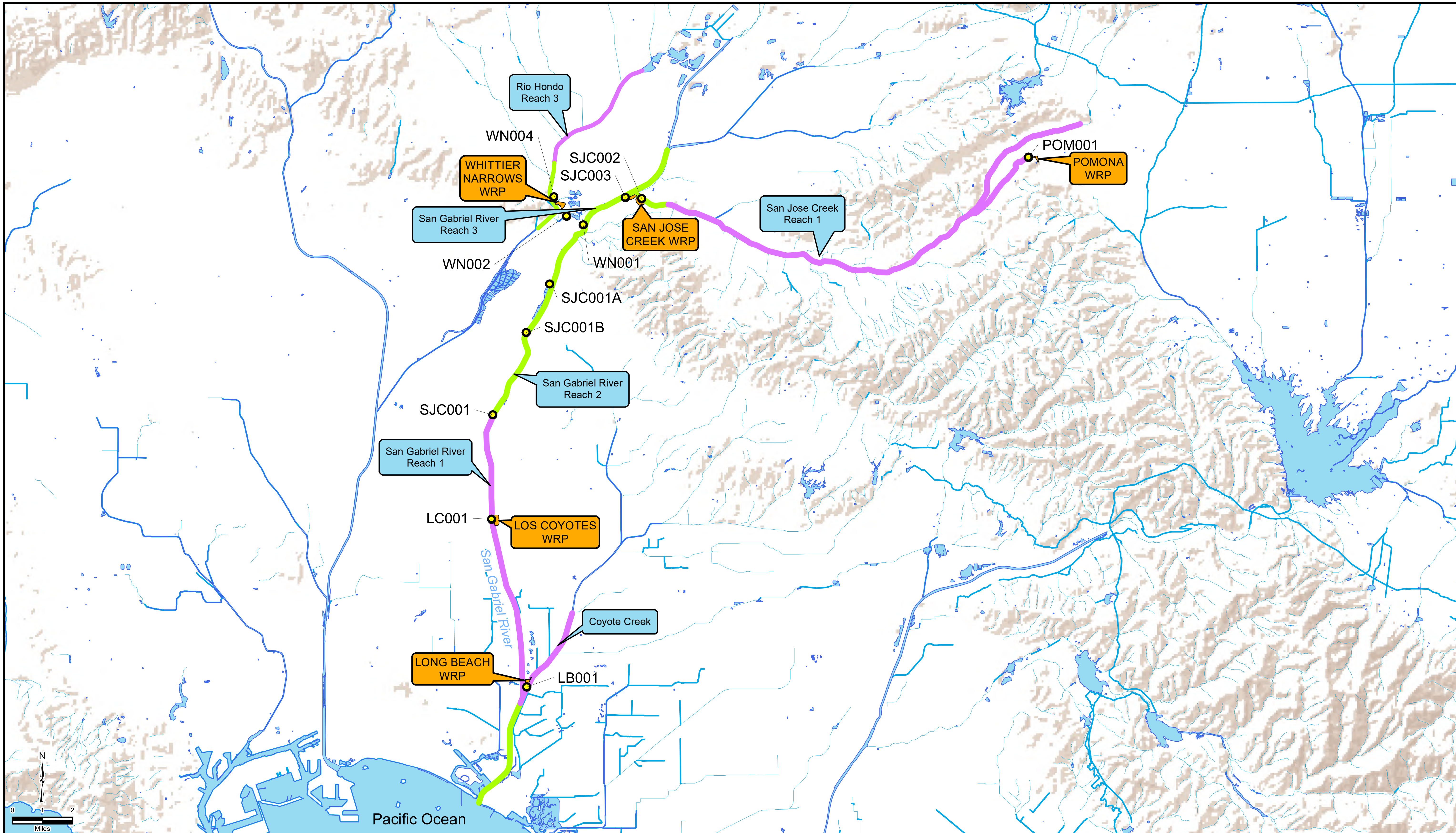

FIGURE 1

WRP Discharge Location (some not used frequently)

WRP

Lined Channel

Unlined Stream Bottom

LACSD Discharges to San Gabriel River System

November 08, 2021

R:\Planning\GIS-Team\Wastewater\projects\SanGabrielRivSysDischargeWRPs.mxd | DOC#: 4445090

ATTACHMENT 2

Path: R:\Planning\GIS-Team\Wastewater\SCV\projects\SantaClaraRiver_Discharges_and_DryGaps\SantaClaraRiver_Discharges_and_DryGaps.aprx DOC#7188413

ATTACHMENT 3

ESA

2945 Towngate Road
Suite 200
Thousand Oaks, CA 91361
805.914.1500 phone

esassoc.com

memorandum

date	April 2, 2024
to	Santa Clarita Valley Water Agency
cc	
from	Joel Mulder
subject	Review of Current and Historical Oncorhychus mykiss Occurrences in the Upper Santa Clara River Watershed (Los Angeles County)

Purpose

ESA has prepared this technical memorandum (memo) for Santa Clarita Valley Water Agency to review and document available information on the current and historical distribution of *Oncorhynchus mykiss (O. mykiss)*, including both the anadromous (southern California steelhead, referred to as steelhead herein) and resident (rainbow trout) life history forms of the species, in the upper Santa Clara River watershed within Los Angeles County (i.e., the watershed upstream of the Piru Dry Gap[1]). Information from a variety of sources is summarized in this memo, including biogeographic datasets, state and federal documents, peer-reviewed publications, historical source compilations, non-governmental organization information, and survey data.

Biogeographic Datasets

A query of California Department of Fish and Wildlife (CDFW) California Natural Diversity Database data (both processed and unprocessed data) found no documented occurrence of steelhead in the Santa Clara River watershed upstream of the Piru Creek confluence.

The CDFW Biogeographic Information and Observation System online mapping tool (BIOS) layers for steelhead range and distribution offer conflicting mapping of southern Steelhead distribution, as described below.

Winter Steelhead Range (ds699).

This dataset, developed by CDFW, contains all CalWater 2.2.1 Planning Watersheds where CDFW has documented winter run steelhead to be present (representing planning watersheds intersecting the known distribution, which is based on where the species has been observed and reported) during or after 1990. This

[1] Beginning about 3.5 river miles downstream of the Los Angeles - Ventura County line, the Santa Clara River surface flow is infiltrated into the underlying eastern Piru groundwater basin. Surface flow reappears approximately 6 miles downstream, past the confluence of Piru Creek. The river is dry through this reach most of the year, with water present only when rainfall events create sufficient stormwater runoff into the river (GSI 2008, LARWQCB 2007). This dry ephemeral reach of the river is informally known as the “Piru dry gap” in the Santa Clara River.

dataset does not show winter steelhead range as occurring in the Santa Clara River watershed upstream of the Piru Creek confluence.

Winter Steelhead Distribution (ds340)

This dataset, developed by CDFW, depicts observation-based stream-level geographic distribution of anadromous winter-run steelhead in California. It was developed for the express purpose of assisting with steelhead recovery planning efforts. The distributions reported in this dataset were derived from a subset of the data contained in the Aquatic Species Observation Database (ASOD), a Microsoft Access multi-species observation data capture application. Data source contributors, as well as CDFW fisheries biologists, have been provided the opportunity to review and suggest edits or additions during a recent review. Data contributors were notified and invited to review and comment on the handling of the information that they provided. The distribution was then posted to an intranet mapping application, and CDFW biologists were provided an opportunity to review and comment on the dataset. During this review, biologists were also encouraged to add new observation data. The dataset does not show steelhead distribution as occurring in the Santa Clara River watershed upstream of the Piru Creek confluence.

Southern California Steelhead Range (ds1290)

This dataset, developed by the University of California at Davis (U.C. Davis), shows a species extant range layer for steelhead by HUC12 watersheds based on datasets and interpreted by PISCES, which is software and data describing the best-known ranges for California's 133 native fish and numerous non-native fish. PISCES “models” presence, with corresponding probabilities if appropriate, based on expert opinion and observation data. PISCES biogeographic modeling outcomes reflect environmental and anthropogenic variables that “predict” where a given species may occur (Santos et al. 2014). The metadata for the layer describes the references for the datasets interpreted by PISCES as Moyle, Quinines and Bell (expert opinion) and NMFS Southern California Steelhead ESU Current Stream Habitat Distribution Table.pdf. It is not clear what the source is for the NMFS current stream habitat distribution table.

There are two primary layers in the PISCES model for steelhead. One is HUC12 watersheds with observations of *O. mykiss*. No HUC12 watersheds upstream of the Piru Creek confluence are shown as having positive observations. The other layer is a “historical expert” layer, which depicts HUC12 watersheds where steelhead occurred historically based on expert opinion. This layer shows steelhead occurring in the HUC12 watersheds containing the mainstem from Piru Creek upstream to about Soledad Canyon, and Castaic Creek, based on expert opinion but not on observational data.

Coastal Steelhead Trout Watersheds (ds962)

This dataset, developed by CDFW, provides a minimal set of watershed fields used to identify coastal steelhead management units. This data set is an extract of the California Watershed (CalWater) dataset. It has been generalized to hydrologic sub-areas for those watersheds that are considered part of the coastal steelhead range. However, the source data for the inclusion of hydrologic units in the “coastal steelhead trout range” is not cited or referenced in the dataset metadata. The dataset depicts hydrologic units in the upper Santa Clara River basin (upstream of the Piru Creek confluence) as coastal steelhead watersheds.

Federal and State Documents

Federal Endangered Species Act designated critical habitat for southern California steelhead in the Santa Clara River watershed extends from the Pacific Ocean, upstream the main Santa Clara River to the confluence with Piru Creek; critical habitat in the Santa Clara River does not extend beyond the confluence with Piru Creek (70 FR 52487).

In the NMFS population characterization for steelhead recovery planning, the discussion of the Santa Clara River states "The available evidence suggests that steelhead have been limited to the western part of the Santa Clara basin (Kelley 2004)" (Boughton et al. 2006). The document uses Boughton and Goslin's (2006) over-summering habitat model (described below) as the basis for its findings.

Boughton and Goslin (2006) developed a model of potential steelhead over-summering habitat using the method of environmental envelopes. Under the envelope method, predicted habitat is the set of stream segments falling within the same range of conditions that encapsulate the known occurrences of the species. In the discussion of results from the Los Angeles Basin, the authors note "The model predicted a distinct patch of potential habitat in the far eastern end of the Santa Clara basin (upper right quadrant, east of Newhall). This did not conform to expectations. Reports from the area suggested that steelhead were confined to the western end of the Santa Clara system. Visits to the eastern area between Newhall and Palmdale indicated that this area is drier than implied by the model, due to a rain-shadow effect from the San Gabriel Mountains (C. Swift, personal communication, Entrix). It probably did not contain potential habitat in reality". In their discussion of the model's environmental envelope outputs, the authors note that the Southern California Coast ESU[2] may have more false positives (warm areas with no potential for thermal refugia), but that these false positives may occur at a finer resolution than addressed by the model. In other words, the model may indicate suitable habitat in some areas of Southern California where in reality temperatures and lack of thermal refugia preclude steelhead occurrence.

In NMFS' 2023 5-Year Review for the species, there is no mention of areas of the Santa Clara River watershed upstream of the Piru Creek confluence (NMFS 2023). In the Southern California Steelhead Recovery Plan (NMFS 2012) discussion of current watershed conditions the only mention of the Santa Clara River watershed upstream of the Piru Creek confluence is that "Fish passage is further impacted by the operation of Castaic Dam on Castaic Creek". Table 2-1 of the Recovery Plan lists the Santa Clara River watershed as historically occupied by steelhead, citing Becker et al. 2009, Boughton et al. 2005, and Titus et al. 2010 (NMFS 2012). A discussion of those sources is provided below, with a focus on historical occurrences in the upper watershed.

Boughton et al. (2005) assessed the current occurrence of anadromous *O. mykiss* in each coastal basin of southern California in which it occurred historically. While the current and historical occurrences in the Santa Clara River are not described specifically in the memorandum, Figure 4 shows the historic distribution of spawning and rearing basins for steelhead in southern California. The figure shows the Santa Clara River basin up to approximately the Ventura-Los Angeles County line as historically occupied. The figure notes that shading of entire basins implies only that steelhead occurred somewhere, not necessarily everywhere, in a basin. The source

[2] Listed steelhead are now referred to as a ''distinct population segment'' (DPS), which is not recognized in the scientific literature. In 1991, NMFS issued a policy for delineating Pacific salmon DPS (56 FR 58612; November 20, 1991). Under this policy a group of Pacific salmon populations is considered an ''evolutionarily significant unit'' (ESU) if it is substantially reproductively isolated from other conspecific populations, and it represents an important component in the evolutionary legacy of the biological species. Further, an ESU is considered to be a DPS (and thus a ''species'') under the ESA.

for the historical occurrence data for the figure is noted as Titus et al. 2003, Stoecker et al. 2002, and a third source which was omitted from the figure description (text is cut off). Further discussion of Titus et al. is provided below. Stoecker et al. (2002) is a report on steelhead assessment and recovery opportunities in southern Santa Barbara County as is not relevant to the Santa Clara River.

The Titus et al. 2003 in preparation document cited in Boughton et al. 2005 and Titus et al. 2010 in preparation document cited in the species recovery plan (NMFS 2012) is cited as several sources under different publication years as the document has been in draft form with various updates for some time. As of April 2, 2024, the manuscript is still a draft[3]. The report provides stream-specific information on steelhead in central and southern California gathered from three main sources: (1) A literature search of pertinent journal articles, CDFW (known as California Department of Fish and Game until 2013) administrative reports and fish bulletins, and other resource agency, university, and consultant publications; (2) Resource agency files, especially CDFW stream survey files; (3) Interviews conducted with professional biologists, academicians, and representatives of sportfishing organizations and other special interest groups for information from personal files, and anecdotes based on personal observations. The report's description of the Santa Clara River Headwater Tributaries in Los Angeles County states no historical evidence of steelhead runs. San Francisquito Canyon and Soledad Canyon are noted as two streams for which there are CDFW records for rainbow trout presence and/or stocking dating back to circa 1930.

Non-Governmental Organization Resources

Becker et al. (2009) summarizes historical accounts of *O. mykiss* in streams south of San Francisco Bay based on thousands of documents in public and private collections, and interviews with biologists. Only three areas in the upper Santa Clara River watershed are described in the report as having fish observations. It is important to note that these observations are for fish in general, and not specifically steelhead.

Elizabeth Lake Canyon, tributary to Castaic Creek - Field notes from US Forest Service staff from 1947 indicate that "some fish" were caught in Elizabeth Lake Canyon Creek in the previous season (CDFG 1952). The author noted that the creek was unlikely to support fish life throughout the year, presumably due to low flow.

Fish Canyon, tributary to Castaic Creek - A 1956 CDFW stream inventory for Fish Canyon Creek states, "…some native fish reported in upper reaches" (CDFG 1956b). It adds, "This is definitely a marginal water…"

Bouquet Canyon - According to CDFW records, rainbow trout fry from the Shasta hatchery were planted in Bouquet Canyon Creek in 1943 (CDFG 1943). A 1947 stream survey indicates that *O. mykiss* including a "few fingerlings" were observed in the creek but notes, "Fishing maintained only be frequent plantings" (CDFG 1947b).

In a previous document, Becker et al. (2008) appears to acknowledge the unreliable nature of these observations in Figures 24 and 25 of the report, describing the historic and current, respectively, status of *O. mykiss* in coastal streams of southern Ventura County. In the figures, Castaic Creek and its tributaries, as well as San Francisquito and Bouquet Canyon creeks, are shown as "unknown or insufficient data". Paradoxically, the mainstem Santa Clara River upstream of the Piru Creek confluence is shown as "definite run or population" despite no

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[3] Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=10194

documentation in the report of any observations currently or historically in that section of river. CalTrout, an organization focused on healthy waters and resilient wild fish, provides on The Southern Steelhead page of their website[4] as well as their publication “SOS II: Fish in Hot Water: Status, threats and solutions for California salmon, steelhead, and trout” a map of current and historical steelhead range. The source of the map is noted as PISCES (2017). See the discussion above under Biogeographic Datasets - Southern California Steelhead Range (ds1290) for PISCES.

The conservation group Trout Unlimited’s website[5] provides maps of the historical and current status of *O. mykiss* in coastal streams of southern Ventura County, California. Both maps show the mainstem of the upper Santa Clara River from the Piru Creek confluence up to about the N3 Angeles Forest Highway as historically and currently having a “definite run or population”. However, the cited source for these maps is Becker et al. 2009, described above, which does not appear to substantiate the steelhead historical and current distribution depicted on these figures.

Other Sources

Stoecker and Kelley (2005) analyzed the habitat conditions, population status and barriers to migration for steelhead in the lower Santa Clara River watershed from the Piru Creek tributary downstream, including significant drainages. There is no mention of steelhead resources upstream of the Piru Creek confluence.

Bowers (2008) compiled historical steelhead accounts in Ventura County, primarily from newspaper accounts, personal fishing logs, books, pamphlets, and Ventura County Board of Supervisors’ Minutes. Because the report looked at Ventura County, little mention is made of the upper Santa Clara River watershed in Los Angeles County except two articles from the Santa Paula Chronicle. The first, in 1925, noted five thousand “trout” were planted in Bouquet Canyon. The second, in 1943, described Bouquet Canyon as being “in good shape with plenty of good-sized fish left over from last year’s plant”, presumably referring to planted *O. mykiss.*

Bell (1978) described the fishes of the Santa Clara River and made collections at 46 stations from the river mouth upstream as far as water existed. In the upper watershed, this included San Francisquito Creek, Castaic Creek, Arrastre Canyon, and the mainstem river. No *O. mykiss* were encountered. Bell cites Hubbs (1946) as reporting large and consistent runs of *Salmo gairdneri* (the former scientific name for *O. mykiss*) in the Santa Clara River. However, Bell notes that at the time of his survey, *Salmo* were abundant in Sespe Creek, but Piru Creek and the Santa Clara mainstem were much less suitable habitat, and trout were restricted to a few deep holes in Piru Creek and as escapees to the mainstem from Fillmore fish hatchery. No mention is made of trout in the upper watershed.

Numerous fish sampling events have been conducted in the upper Santa Clara River, particularly the mainstem, in more recent years. Table 1 below presents a list of the sources examined. No *O. mykiss* were encountered in any of the surveys.

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[4] Available at: https://caltrout.org/sos/species-accounts/steelhead/southern-steelhead#:~:text=Southern%20Steelhead%20Distribution&text=They%20are%20most%20abundant%20in,Ventura%2C%20and%20Santa%20Clara%20rivers

[5] Available at: https://www.tu.org/california-coastal-steelhead-data/. Figure 24 -– Historical and current status of Oncorhynchus O. mykiss in coastal streams of southern Ventura County, California; Figure 25 - Current status of Oncorhynchus mykiss in coastal streams of southern Ventura County, California.

TABLE 1
SUMMARY OF FISH SPECIES PRESENCE IN UPPER SANTA CLARA RIVER WAERSHED BASED ON LITERATURE REVIEW

Santa Clara River Reach[a] and Location		Unarmored Three spine Stickleback	Santa Ana Sucker	Arroyo Chub	Prickly Sculpin	Common Carp	Mosquitofish	Black Bullhead	Fathead Minnow	Green Sunfish	Largemouth Bass	Goldfish	Sailfin Molly	Convict cichlid	Source
SCR	SCR Watershed	X	X	X			X		X	X	X				Bell 1978, Swift et al. 1993
6	Bouquet Canyon area			X	X		X							X	Compliance Biology 2010
6	SWRP outfall channel													X	Dellith Pers. Comm. 2023
6	Iron Horse Bridge area	X													CDFW 2021
6	Iron Horse Bridge area		X	X											CDFW 2022
6	Iron Horse Bridge to VWRP	X	X	X											Haglund & Baskin 2000
6	McBean Parkway area	X					X								Hovore et al. 2008
5/6	Bouquet Cyn. to Castaic Ck.	X	X	X											Haglund & Baskin 1995
5/6	Bouquet Cyn. to Castaic Ck.	X	X	X											Impact Sciences Inc. 2003c
5/6	Saugus to Castaic Ck.	X		X			X								Haglund 1989
5	I5 to Castaic Ck.	X		X											Aquatic Consulting Services 2002a
5	Old Road to VWRP	X	X												CDFW 2015
5	Old Road to VWRP	X	X	X			X								Pareti Pers. Comm. 2003
5	VWRP to Salt Ck.		X	X		X	X	X			X				Cardno 2015
5	VWRP to Salt Ck.	X	X	X											ENTRIX Inc. 2006a
5	Commerce Center Dr. to Salt Ck.	X	X	X	X	X					X				ENTRIX Inc. 2010
5	Commerce Center Dr. to Salt Ck.	X	X	X											Dudek 2010
5	Castaic Ck. to u.s. 7.2mi	X	X	X	X		X				X	X	X		Impact Sciences Inc. 2003b
5	Commerce Center Dr. to Castaic Ck.	X	X	X											Aquatic Consulting Services 2002b
5	Commerce Center Dr. to Co. Line	X		X			X				X				Aquatic Consulting Services 2002c
5	Castaic Ck. to d.s. 7mi	X	X	X	X		X				X				Impact Sciences Inc. 2003a
5	Castaic Creek to Long Cyn.	X	X	X			X								ENTRIX Inc. 2006b
5	Castaic Ck. to Long Cyn.	X	X	X											Impact Sciences Inc. 2010
5	u.s. of San Martinez Grande Cyn.	X													USFWS 1980
5	u.s. of San Martinez Grande Cyn.	X	X	X			X	X		X					USFWS 1985

NOTES:
Blue shading = Native species, native to Study Area
Green shading = Native to Southern California
No shading = Not native to California (introduced)
a. Reaches delineated according to LARWQCB water body names

Discussion

In review of the available information, no verifiable or concrete observations of native *O. mykiss* in the upper Santa Clara River watershed have been described or recorded historically or currently. Observations that potentially could have been native *O. mykiss* are described in Becker et al. 2009. However, observations of "some fish" or "some native fish" in Elizabeth Canyon and Fish Canyon do not specifically mention *O. mykiss.* The references could be to other native fish in the upper watershed such as threespine stickleback (*Gasterosteus williamsoni*) which were formerly more common in the upper headwater tributaries (Bell 1978). Titus et al. (*In preparation*) also notes San Francisquito Canyon and Soledad Canyon as two streams for which there are CDFW records for rainbow trout presence and/or stocking dating back to circa 1930.

These observations may all well have been planted trout. As described in Titus et al. (*In preparation*) above and in newspaper accounts (Bowers 2008), extensive stocking was occurring in the upper watershed as early as 1925, and it would have been impossible to distinguish native resident trout or steelhead from stocked trout.

Given these unreliable historic accounts and lack of any other verifiable observations, it is of concern that Becker et al. 2008 and Titus et al. (*In preparation*) appear to be the basis for some historic and current distribution maps for southern California steelhead in the upper Santa Clara River (e.g., Boughton et al. 2005, Trout Unlimited), particularly since Becker et al. 2008 itself shows occurrence maps in upper watershed tributaries where there are questionable fish observations as "unknown or insufficient data". It is also not apparent why the upper watershed is considered to have been historically occupied by experts for the U.C. Davis PISCES model, and historically and currently occupied in Figures 24 and 25 of in Becker et al. 2008 despite the absence of observations. Perhaps the underlying assumption is that because the lower Santa Clara River had a well-documented and robust steelhead run (Hubbs 1946, Stoecker and Kelley 2005, Bowers 2008), fish would have inevitably made their way all the way up the river to the upper basin headwaters. However, an examination of habitat conditions in this area suggests that the habitat in the upper basin may have precluded or greatly limited steelhead migration in most years, and that even in particularly wet years when migration was possible, available upstream spawning and over-summering habitat was and is extremely limited or of poor quality.

The Santa Clara River is a perennial stream from Interstate 5 downstream to just west of the Los Angeles - Ventura County line. Beginning about 3.5 river miles downstream of the county line the entire surface flow is infiltrated into the underlying eastern Piru groundwater basin. Surface flow reappears approximately 6 miles downstream, past the confluence of Piru Creek. The river is dry through this reach most of the year, with water present only when rainfall events create sufficient stormwater runoff into the river (GSI 2008, LARWQCB 2007). This dry ephemeral reach of the river is informally known as the "Piru dry gap" in the Santa Clara River. Flood flows in the Upper Santa Clara River increase, peak, and subside rapidly in response to high-intensity rainfall. The "flashy" hydrograph produced by these conditions shows a rapid increase in discharge over a short time period with a quickly developed peak discharge compared to normal baseflow (Kennedy/Jenks 2014). Thus, migration opportunities through the dry gap for upstream migrating steelhead adults and downstream migrating smolts would have historically been limited to typically brief high flow events. The same is true under current conditions, though flows through the dry gap may be artificially altered in duration due to releases from or withholding in upstream reservoirs (e.g., Castaic Lake).

Habitat conditions in the upper watershed tributaries are described in historic accounts as generally poor for *O. mykiss*. For example, field notes from US Forest Service staff from Elizabeth Lake Canyon Creek in 1952 note that the creek was unlikely to support fish throughout the year "presumably due to low flow", and in 1956 regarding Fish Canyon "This is definitely a marginal water…", and in Bouquet Canyon Creek, 1943, "Fishing maintained only by frequent plantings" (Becker et al. 2009). Boughton and Goslin (2006) acknowledge that the watershed between Newhall and Palmdale is subject to a rain-shadow effect from the San Gabriel Mountains and "probably did not contain potential habitat in reality". No current information or surveys reviewed suggest that suitable habitat for *O. mykiss* is extant in the upper basin tributaries. Becker et al. (2010) analyzed information on rearing habitat to identify regionally significant watersheds, which are those offering the greatest potential for producing steelhead smolts, including over-summering opportunities and conditions favoring high growth rates. Within these watersheds the report identifies "essential" streams or reaches that offer the best habitat resources. Within the upper Santa Clara River watershed, portions of the mainstem and several tributaries are identified as “essential” stream, but no waterbodies in the upper watershed are identified as “available” or “suitable” *O. mykiss* habitat (see Figure 14 in the report).

In conclusion, there is no record of current *O. mykiss* occupation in the upper Santa Clara River watershed (east of the Piru Creek confluence) on which to support any determination of species “presence”. Despite extensive fish sampling in the area over the last few decades, no *O. mykiss* have been encountered. Habitat conditions currently do not suggest suitable habitat is present for this species in the area.

There are no verifiable or concrete historical observations of native *O. mykiss* in the upper Santa Clara River watershed, and historical descriptions of habitat conditions do not suggest suitable, perennial habitat was present for *O. mykiss* in the area.

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April 4, 2024

Samantha Murray
President
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814

Electronically Submitted To:
fgc@fgc.ca.gov

Re: California Fish and Game Commission April 17-18, 2024 Meeting Agenda #22 – Southern California steelhead

Dear President Murray:

The California Building Industry Association (CBIA) appreciates the opportunity to comment on the petition to list the Southern California steelhead (steelhead) and the accompanying California Department of Fish and Wildlife (Department) Status Review Report. CBIA is a statewide trade association based in Sacramento representing thousands of member companies including homebuilders, trade contractors, architects, engineers, designers, suppliers and industry professionals in the homebuilding, multi-family and mixed-use development markets.

We have reviewed the petition to list the steelhead, the Department's status review report, and additional information submitted by stakeholders and believe that the petitioned action is not warranted and urge the California Fish and Game Commission (Commission) to deny the petition.

CBIA shares the concerns raised by organizations including the Association of California Water Agencies regarding both the scientific basis for a listing determination, the potential impacts on California's water agencies and their ability to reliably provide water, and the impact certain aspects of the listing will have on the state's homebuilding industry.

CBIA is concerned that part of the rationale leading the Department to recommend to the Commission that the petitioned action is warranted is based on serious deficiencies regarding population information and mapping inaccuracies. The Department's status review points out on page 40 (4.2 Sources of Information) that:

> "Data limitations and uncertainties associated with historical accounts for Southern SH/RT limits our ability to understand their complete historical abundance and distribution in their range. The majority of available historical data are in reports, technical memos, and other documents that have not undergone a formal peer-review process."

The report goes on to state that the data constraints "may limit the power of statistical analyses to assess trends in viability criteria. Therefore, the results of the analyses conducted in subsequent portions of this chapter should be interpreted in the context of these limitations."

CBIA believes that the data limitations has produced flawed analyses and speculation as to what is the current and historical range of the species to the point that several figures contained in the report – for example Figure 7 located on Page 43 and Figure 11 located on Page 58) – could lead a person to believe that Southern California steelhead should be found in certain watersheds where in reality none have been observed.

CBIA believes that if such types of maps are necessary then the Department should utilize the data developed by the U.S. Fish and Wildlife Service in order to provide a level of consistency instead of relying on information and data that is at its core limited and full of uncertainty.

Based on these issues and those raised by organizations including the Association of California Water Agencies, we urge the Commission to find that the petitioned action is not warranted.

Sincerely,

Nick Cammarota
Senior Vice President & General Counsel
California Building Industry Association
ncammarota@cbia.org

State of California
Department of Fish and Wildlife

Original on file,
received April 11, 2024

M e m o r a n d u m

Date: April 4, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Evaluation of Additional References Received for the Status Review of southern California steelhead (Oncorhynchus mykiss)

Summary

The California Department of Fish and Wildlife (Department) has prepared this supplemental information for southern California steelhead (*Oncorhynchus mykiss*) memo for the California Fish and Game Commission (Commission). The Department created the memo in response to references the Department received in February 2024 after the Department transmitted its final status review report on southern California steelhead (Status Review) to the Commission in January 2024. The Department reviewed each reference, assessed its relevance to the Status Review, and compiled the information in this memo. Of the 39 references, we determined that 17 contained information that is directly relevant to the Status Review, 14 contained useful background information but were determined to not be directly relevant to the Status Review, and 8 were already cited in the Status Review. Collectively, the 39 references either support or are consistent with the analysis, conclusions, and recommendations in the Status Review.

If you have any questions or need additional information, please contact Jay Rowan, Branch Chief, Fisheries Branch, at (916) 212-3164 or by email at fisheries@wildlife.ca.gov.

Information directly relevant to the Status Review

1. Allesio, P., M. H. Capelli, S. D. Cooper, B. Keller, E. A. Keller, H. A. Loaiciga, C. McMahon, and J. M. Melack. 2023. Upper Mission and Rattlesnake Creeks: Hydrogeologic and Biologic Investigation, Santa Barbara, California with Special Reference to Mission Tunnel Effects on Creek Flows. Prepared for Urban Creek Council, Santa Barbara.

   This reference reports the key findings and recommendations resulting from a hydrologic, geomorphologic, geologic, and aquatic, and riparian study of the upper, non-urban, watershed of Mission Creek (including its tributary, Rattlesnake Creek). It includes a detailed summary of the history of southern California steelhead populations in the watershed as well as an assessment of suitable habitat. The discussion on abundance and trends in this report is consistent with the Status Review analysis results in Chapter 4, Section 4.4.1.2, Page 63.

2. Boughton, D. A. and M. Goslin. 2006. Potential Steelhead Over-Summering Habitat in the South-Central/Southern California Coast Recovery Domain: Maps Based on the Envelope Method. NOAA Technical Memorandum NMFS-SWFSC-391.

   This report discusses the results of a modeling exercise to map and visualize potential over-summering habitat in the federal South-Central/Southern California Coast recovery domain. The Department evaluated this report during the development of the Status Review. Even though a significant area of over-summering habitat is located above barriers to anadromous migrations, the findings provide useful information about the life-history and habitat of southern California steelhead and is consistent with Chapter 2, Section 2.4, and Chapter 5 of the Status Review.

3. Capelli, M. H. 2023. The role of wildfires in the recovery strategy for the endangered southern California steelhead. In: J. L. Florsheim, A.P. O'Dowd, and A. Chin (eds.). *Biogeomorphic Responses to Wildfire in Fluvial Ecosystems*. Geological Society of America. Special Paper 562

   This research article discusses the role of wildfires in the recovery strategy for the endangered southern California steelhead. It supports and provides additional useful information related to Chapter 6, Section 6.2.7, Pages 101-102 of the Status Review.

4. Cooper, S. D., H. H. Page, S. W. Wiseman, K. Klose, D. Bennett, T. Even, S. Sadro, C. E. Nelson, and T. L. Dudley. 2015. Physicochemical and biological responses of streams to wildfire in riparian zones. *Freshwater Biology* 60(12): 2600–2619.

   This academic journal article documented wildfire impacts on stream food webs resulting from wildfires in the riparian zones of streams in Santa Barbara County. This study was conducted within the range of southern California steelhead and provides post-fire vegetation recovery management implications, and the results support Chapter 6, Section 6.2.7, pages 101-102 of the Status Review.

5. Cooper, S. D., K. Klose, D. B. Herbst, J. White, S. M. Drenner, S.M., and E. J. Eliason. 2021. Wildfire and drying legacies and stream invertebrate assemblages. Freshwater Science 40(4): 659–680 https://doi.org/10.1086/717416.

This academic journal article examines the effects of drought and wildfire on stream invertebrate communities. Stream reaches in Southern California were sampled at sites that have been either burned or unburned during both wet and dry years. The findings highlight the importance of protecting water supplies and riparian vegetation, and support Chapter 6, Section 6.2.7, pages 101-102 of the Status Review.

6. Florsheim, J. L., A. Chin, A. M. Kinshita, and S. Nourbakhshbeidokhti. 2017. Effect of storms during drought on post-wildfire recovery of channel sediment dynamics and habitat in the southern California chaparral, USA. Earth Surface Processes and Landforms 42(10):1482-1492.

   This research article investigated post-wildfire geomorphic responses from storms during a prolonged drought period following a large wildfire in southern California. The study emphasizes the complex, dynamic, and substantial effects of multi-year drought on geomorphic processes following wildfire, with implications for post-fire riparian ecosystem recovery. The study provides useful insight on the complex interactions between storms, wildfires, and drought in southern California streams and supports Chapter 6, Section 6.2.7, pages 101-102 of the Status Review.

7. Douglas, P. L. 1995. Habitat Relationships of Over summering Rainbow Trout (*Oncorhynchus mykiss*) in the Santa Ynez Drainage. M.A. Thesis. University of California Santa Barbara.

   This master's thesis examined the relationship between trout density and habitat characteristics in streams throughout the Santa Ynez watershed. The results indicate that fry density is associated with instream cover and negatively associated with water temperature. Adult trout were found to be positively correlated with instream cover and negatively associated with stream temperature, aquatic vegetation, and the density of non-salmonid fish species. Although this study was conducted above the major barrier to anadromy in the Santa Ynez watershed, it provides useful information and supports Chapter 5, Sections 5.3 through 5.5 of the Status Review.

8. Hemmert, J. 2018. Coldwater Canyon Creek Rainbow Trout (Oncorhynchus mykiss) Rescue Summary. Fisheries Heritage and Wild Trout Program, Inland Deserts Region. California Department of Fish and Wildlife, Region 6.

   This memo describes rescue actions to relocate rainbow trout from the Coldwater Canyon Creek to the Mojave River hatchery in response to the 2018 Holy Fire. This effort included the capture and transportation of 241 rainbow trout from Coldwater Canyon by the Department. While this rescue effort occurred far upstream of the artificial barrier to anadromy in the Santa Ana River watershed, it provides additional information to support Chapter 6, Section 6.2.7, Page 101 of the Status Review.

9. Jacobson, S. 2021. Southern California Native Rainbow Trout Sub-Population Expansion Plan. Prepared for California Trout, Inc. June 15, 2021.

   This management plan describes a proposal by Cal Trout Inc. and partners to increase the abundance, distribution, and genetic diversity of native rainbow trout through a network of subpopulations in its range through embryonic translocation. This information may contribute in the future to the Influence of Existing Management Efforts (Chapter 7).

10. Pareti, J. 2021. Bobcat Fire Fish Rescue: West Fork San Gabriel River and Bear Creek. Fall 2020. California Department of Fish and Wildlife, Region 5.

    This report details fish rescue efforts on the West Fork San Gabriel River and Bear Creek following the Bobcat fire. A total of 1,374 rainbow trout fish were rescued for this effort. Although this report is not cited in the Status Review, a subsequent report (cited as Pareti 2020 but should be Pareti 2021) is cited that describes how the rescued fish were then translocated to the Arroyo Seco and East Fork San Gabriel Rivers.

11. Stillwater Sciences, R. Dagit, and J. C. Garza. 2010. Lifecycle Monitoring of *O. mykiss* in Topanga Creek, California. Final Report to California Department of Fish and Game Contract No. P0750021. Resources Conservation District of the Santa Monica Mountains.

    This report provides the results of nine years of lifecycle monitoring of steelhead rainbow trout in Topanga Creek. We evaluated this report during the development of the Status Review and opted to instead reference Dagit et al. 2019, which includes a comprehensive summary of lifecycle monitoring efforts in Topanga Creek from 1994 to 2019.

12. Stillwater Sciences. 2020. Conceptual Ecological Model and Limiting Factors Analysis for Steelhead in the Los Angeles River Watershed. Final Technical Memorandum. Prepared by Stillwater Sciences, Los Angeles, California for the Council for Watershed Health, Pasadena, CA. September 2020.

    This technical memorandum describes the ecological basis (i.e., life-history, LA River watershed description, limiting factors analysis, conceptual ecological model) for the steelhead passage and habitat improvements central to the Los Angeles River Fish Passage and Habitat Structures project. This pilot project aims to restore fish passage and habitat within a 4.8-mile section of the concrete-lined Los Angeles River. While this project is still in its pilot phase, it provides additional information that informs the influence of existing management measures described in Chapter 7.3.5 and 7.3.6 of the Status Review.

13. Taylor, J. B., E. D. Stein, M. Beck, K. Flint, and A. Kinoshita. 2019. Vulnerability of Stream Biological Communities in Los Angeles and Ventura Counties to Climate Change Induced Alterations of Flow and Temperature. Southern California Coastal Water Research Project. Southern California Coastal Water Research Project Technical Report 1084.

    The authors of the report used models to relate streamflow and temperature to the probability of six species occurrences (including southern California steelhead) to map out future species distributions. The authors note that the results of their analysis could be used to support a variety of future management and monitoring decisions. The findings specific to southern California steelhead provide additional information and support for the Status Review in Chapter 5, "Habitat That May Be Essential to the Continued Existence of southern California steelhead rainbow trout".

14. Ventura County Fish and Game Commission. 1973. *The Ventura River Recreational Area and Fishery: A Preliminary Report and Proposal*. Prepared for the Ventura County Board of Supervisors. March 1, 1973.

    This draft report describes the Ventura River recreational area and fishery during the early 1970s. The fisheries section of the report characterizes the watershed as an especially productive trout fishery during the pre-1940s. An estimated 4,000-5,000 adult steelhead were observed to have entered the Ventura River to spawn in 1946. The post-1946 fishery was marked by a significant alteration to the watershed, which resulted in the decline of the fishery. However, angling for trout and steelhead was still considered to be productive. This preliminary report provides additional useful background information and support for Chapter 4, Section 4.3.1.3, pages 46-48 in the Status Review.

15. Capelli, M. H. 1997. Ventura River steelhead survey, Ventura County, California. Prepared for California Department of Fish and Game, Region 5. UC Santa Barbara Library: Special Collections, University of California, Santa Barbara, USA.

    This report summarizes the results of a sampling survey conducted on the lower Ventura River below the Robles Diversion. The effort captured a total of 52 rainbow trout across a total of 4.25 stream miles. The fish ranged in size from 7.5 to 16 inches. Five individuals were hatchery fish, while the remaining were determined to be natural residents or anadromous individuals. This survey provides additional relevant information and support for Chapter 4, Section 4.3.1.3, Pages 46-48 of the Status Review.

16. Harrison, L., E. Keller, and M. Sallee. 2005. Santa Monica Mountains Steelhead Habitat Assessment: Watershed hydrologic analysis. University of California, Santa Barbara.

    This watershed analysis aimed to identify which basins in the Santa Monica Mountains are most capable of supporting steelhead trout populations. The study examined the relationship between baseflow and geology and modeled predictions of rainfall-runoff between important watersheds. Larger basins with higher flows were ranked as having the highest potential to support steelhead. These basins include Malibu, Topanga, Arroyo Sequit, Trancas, Zumas, and Las Flores Creek. This study provides an important contribution to our understanding of habitat potential for steelhead trout in the Santa Monica Mountains. However, more recent reports were reviewed during the development of the Status Review, such as the federal Recovery Plan of 2013, which includes updated information on core recovery watersheds in the Santa Monica Mountains and southern California.

17. Nielsen, J., C. Zimmerman, J. Olsen, T. Wiacek, E. Kretschmer, G. Greenwald, J. Wenburg. 2002. Population Genetic Structure of Santa Ynez Rainbow Trout - 2001 Based on Microsatellite and mtDNA Analyses.

    This study examined the genetic diversity of 8 rainbow trout subpopulations in the Santa Ynez River. The relevant findings of the study are that most subpopulations sampled do not appear to be significantly influenced by hatchery fish, despite the considerable amounts of hatchery supplementation that had occurred up until the end of the 1990s. These results provide further support for information provided in Chapter 2, Section 2.5.7, Page 32-33 on the genetic impacts of historical stocking in the Status Review.

Background Information Not Directly Relevant to the Status Review

18. Barabe, R. M. 2021. Population estimates of wild rainbow trout in a remote stream of southern California. *California Fish and Wildlife* 107(1):21-32.

    This reference reports a CDFW-led study on the distribution and abundance of wild Rainbow Trout in Pauma Creek, a tributary to the San Luis River in northern San Diego County. A total of 854 fish were captured during this two-year seasonal survey. Pauma Creek is currently located above multiple barriers to anadromous migration and is therefore not directly relevant to the Status Review.

19. Cooper, S. D., P. Sam, S. Sabater, J. M. Melack, J.M., and J. L. Sabo. 2013. The effects of land-use changes on streams and rivers in Mediterranean climates: Hydrobiologia 719(1): 383–425 https://doi.org/10.1007 /s10750-012-1333-4.

    This academic journal article reviewed literature on the effects of land use changes on Mediterranean river ecosystems, including those in Chile, South Africa, and California. While the information is informative, it is not directly relevant to the Status Review.

20. HDR Engineering, Inc. 2013. Los Padres National Forest Steelhead Monitoring, Tracking and Reporting Program. Final Plan. Prepared for the U.S. Forest Service, Los Padres National Forest. Santa Maria, CA.

    This report provides guidance on monitoring, tracking, and reporting of rainbow trout populations and habitat conditions within the Los Padres National Forest. While informative, watershed specific monitoring programs for streams occurring outside the scope of the Petitioner’s listing definition are not directly relevant to the Status Review.

21. Keller, E. A., G. Bean, and D. Best. 2015. Fluvial geomorphology of a boulder-bed, debris-flow- dominated channel in an active-tectonic environment. Geomorphology 243(2015):14-26.

    This scientific research article describes the fluvial geomorphic processes of Rattlesnake Creek in the Santa Ynez Range in Southern California. The authors hypothesize the mechanisms that drive the underlying step-pool morphology of the creek. While the study was conducted within the geographic range of southern California steelhead, its results are not directly relevant to the Status Review.

22. McMahon, C., S. D. Cooper, and S. W. Wiseman, S.W. 2023. Postfire stream responses to spatial fire patterns in riparian and upland zones. In: J. L. Florsheim, A. P. O’Dowd, and A. Chin, A. (eds.). *Biogeomorphic Responses to Wildfire in Fluvial Ecosystems*. Geological Society of America. Special Paper 562.

    This book chapter examined differences in burn patterns in riparian versus upland zones and their implications for stream characteristics. The authors studied fire patterns and postfire vegetation trajectories for the two habitat types across 26 stream sites in coastal southern California over a period of 12-years. There are many interesting and informative findings from this long-term study; however, the findings are not directly relevant to the Status Review.

23. Nielsen, J. L., D. J. Scott, and J. L. Aycrigg. 2001. Endangered species and peripheral populations: cause for conservation. *Endangered Species Update* 18(5):194-197.

This letter to the editor of the School of Natural Resources and Environment at the University of Michigan advocates for the value of peripheral populations in endangered species conservation. The letter is a rebuttal to a previous article supporting the opposite claim that peripheral populations dilute the effectiveness of species conservation. Southern California steelhead are referenced to support the authors' claim that peripheral populations have intrinsic population value. However, this letter is not directly relevant to the Status Review.

24. Hemmert, J. 2020. 2019 Coldwater Canyon Creek Rainbow Trout (*Oncorhynchus mykiss*) Relocation Summary Report – Mojave River Hatchery to Marion Creek. Fisheries Heritage and Wild Trout Program, Inland Deserts Region. California Department of Fish and Wildlife, Region 6. June 8, 2020.

This report describes the relocation of Coldwater Creek rainbow trout from the Mojave River hatchery. Of the 241 individuals rescued from Coldwater Creek in response to the Holy Fire, 149 perished at the Mojave River Hatchery, and 92 were translocated to Marion Creek. While these actions serve to inform future management efforts, they are not directly applicable to the Status Review because the watersheds in question are far above natural barriers to anadromy and are thus not directly relevant to the Status Review.

25. White, J., L. Takata, and M. Rieck. 2017. Final Los Padres National Forest 2017 Steelhead Monitoring Report. U.S. Forest Service, Los Padres National Forest. Challenge Cost Agreement between the University of California, Santa Barbara and USFS-LPNF (Agreement No. CS-11050700-007).

This report assessed the physical, chemical, and biological conditions of streams affected by three major fires that occurred in the Los Padres National Forest. Rainbow trout were observed at 6 of 8 unburned sites but were not observed at sites impacted by fire. This report provides insight on the impact of fire on resident rainbow trout populations and their habitat above major barriers to anadromy. However, the survey sites were all outside the scope of the Petitioner's definition of the species and thus not directly relevant to the Status Review.

26. Bean, G. S. 2007. Geologic controls on channel morphology and low-flow habitat in Rattlesnake Creek, Santa Barbara, California. M.S. Thesis. University of California Santa Barbara.

This master's thesis examined whether geologic and hydrogeologic properties control channel morphology and low-flow habitat for southern California steelhead in Rattlesnake Creek. The study found that rock strength and joint strength of the underlying geology did not significantly affect the channel morphology of the creek. This study is not directly relevant to the Status Review.

27. Capelli, M.H. 1999. Dam Sand Rights: Removing Rindge and Matilija Dams. Proceedings, Sand Rights 1999: Bringing back the beaches, Ventura, CA. September 23-26, 1999.

    This article discusses the many benefits of removing the Rindge and Matilija dams, including the establishment of natural sediment transport, beach restoration, and shoreline armoring. The article advocates for inland sources of beach material, such as sediment trapped behind outdated dams, to be used to restore the beaches of southern California. While this article provides useful background information on the history of Matilija and Rindge dams, it is not directly relevant to the Status Review.

28. Capelli, M.H. 2004. Removing Matilija Dam: Opportunities and challenges for Ventura River restoration. Proceedings U.S. Society on Dams. St. Louis Missouri. March 29-April 2, 2004.

    This article discusses the opportunities, benefits, and challenges of removing Matilija Dam from the Ventura River watershed. Matilija Dam traps 213,000 to 230,000 cubic yards of sediment annually since it was constructed in 1946. The article summarizes the benefits to the southern California steelhead population in the Ventura River if it was removed. Although this article provides detailed background information on the potential for dam removal on the Ventura River, it is not directly relevant to the Status Review.

29. Harrison, Lee & E. Keller. 2007. Modeling forced pool–riffle hydraulics in a boulder-bed stream, southern California. Geomorphology. 83. 232-248. 10.1016/j.geomorph.2006.02.024.

    This scientific research article modeled the interactions among pool-riffle sequences in Rattlesnake Creek in Santa Barbara County. The authors found that pool-riffle sequences in boulder-bed streams are maintained by flows at or near bankfull discharge due to variability in velocity and tractile force. This research article is not directly relevant to the Status Review.

30. Rich, A. & E. Keller. 2013. A hydrologic and geomorphic model of estuary breaching and closure. Geomorphology. 191. 64–74. 10.1016/j.geomorph.2013.03.003.

This scientific research article modeled the hydrology of bar-built estuaries to better understand breaching and closing patterns. The study site used was the Carmel Lagoon in Monterey County. The results demonstrate that the model could accurately predict the breaching and closing of Carmel Lagoon. While the results of the study contribute many interesting findings to estuary hydrology, they are not directly relevant to the Status Review.

31. Cooper, S.D., S.W. Wiseman, B. DiFiore, and K. Klose. 2024. Trout and invertebrate assemblages in stream pools through wildfire and drought. Freshwater Biology (69): 300-320.

    This scientific research article examines how climate change (i.e., drought and fire) influences top predators and their impacts on lower trophic levels. The study examined relationships among the distribution of trout, environmental factors, and stream invertebrate assemblages across sample sites that both contained and did not contain trout. The results indicate that the impact that trout have on invertebrate communities depends on environmental conditions and bottom-up and top-down trophic pressures. While this information contributes to the growing body of science on stream trophic food web impacts due to climate change, the results are not directly relevant to the Status Review.

Information already cited in the Status Review

32. Allen, M. 2014. Steelhead population and habitat assessment in the Ventura River/Matilija Creek Basin 2006 - 2012. Normandeau Associates, Inc., Arcata, CA. (Cited in Chapter 5, Section 5.5, Page 90)

33. Kendall, N. W., J. R. McMillan, M. R. Sloat, T. W. Buehren, T. P. Quinn, G. R. Pess, K. V. Kuzishchin, M. M. McClure, and R. W. Zabel. 2015. Anadromy and residency in steelhead and rainbow trout (*Oncorhynchus mykiss*): a review of the processes and patterns. Canadian Journal of Fisheries and Aquatic Sciences 72(3):319-342. (Cited in Chapter 6, Section 6.7, Page 108).

34. Moore, M. R. 1980. Factors Influencing the Survival of Juvenile Steelhead Rainbow Trout (*Salmo gairdeneri gairdneri*) in the Ventura River, California. M.S. Thesis. Humboldt State University. (Cited in Chapter 4, Section 4.3.1.3 and 4.3.1.4., Page 48-50 and Section 4.6, Page 78)

35. Nielsen, J. L., C. Carpanzano, M. C. Frountain, and C. A. Gan. 1997. Mitochondrial DNA and nuclear microsatellite diversity in hatchery and wild *Oncorhynchus mykiss* from freshwater habitats in southern California. *Transactions of the American Fisheries Society* 126(4):397-417. (Cited in Chapter 2, Section 2.5.7, Page 32 and Chapter 4, Section 4.6, Page 79)

36. Nielsen, J. L., 1999. The evolutionary history of steelhead (*Oncorhynchus mykiss*) along the U.S. Pacific Coast: Developing a conservation strategy using genetic diversity. *ICES Journal of Marine Sciences* 56(4):449-458. (Cited in Chapter 2, Section 2.5.6, Page 31 and Chapter 4, Section 4.3.4.1, Page 56)

37. Moore, M. 1980a. An assessment of the impacts of the proposed improvements to the Vern Freeman Diversion on anadromous fishes of the Santa Clara River system, Ventura County, California. Prepared for the Ventura County Environmental Resources Agency under Contract Number 670. (Cited in Chapter 4, Section 4.3.1.4 Page 48, 49, 50)

38. Chubb, S. 1997. Ventura Watershed Analysis - Focused on Steelhead Restoration. Los Padres National Forest, Ojai Ranger District. (Cited in Chapter 5, Section 5.1, Page 85)

39. Moore, M.R. 1980b. Factors influence the survival of juvenile steelhead rainbow trout (*Salmo gairdneri gairdneri*) in the Ventura River, California. M.A. Humboldt State University. (Cited in Chapter 4, Section 4.6 Page 79)

*Note: The Status Review includes two separate Moore (1980) citations, however only one citation is referenced in the literature cited section. The correct in-text should have been Moore 1980a and Moore 1980b.

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PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION SUPPORTING INFORMATION FOR

Agassiz's desert tortoise or Mojave desert tortoise (*Gopherus agassizii*)
Common Name **Scientific Name**

EXECUTIVE SUMMARY

Based upon a scientific review of its distribution and status, this petition requests that the Agassiz's desert tortoise (*Gopherus agassizii*; Mojave desert tortoise or desert tortoise) be moved from listed as Threatened to Endangered by the California Fish and Game Commission (Commission). Despite federal and state protections, the desert tortoise is closer to extinction than it was in 1989 and 1990 when it was listed by the Commission and U.S. Fish and Wildlife Service (USFWS), respectively. A change in listing from Threatened to Endangered will reflect the current dire situation facing California's state reptile and is necessary to generate substantially increased attention and efforts to reverse the very real likelihood that desert tortoise will become extinct in California.

The Commission listed the desert tortoise as Threatened under the California Endangered Species Act (CESA) in 1989. The Mojave population of the desert tortoise was listed as Endangered under a federal emergency listing rule under the Endangered Species Act (ESA) by the USFWS that same year. In 1990, the Mojave population of the species was listed by the USFWS under a final ESA rule as Threatened (USFWS 1990). A recovery plan prepared by the USFWS for this federally-listed species was adopted in 1994 (USFWS 1994a), with Critical Habitat concurrently designated (USFWS 1994b). A revised recovery plan for the species, noting problems in implementing certain previous recovery plan actions, was adopted in 2011 (USFWS 2011).

The initial California listing of the desert tortoise as threatened was based on a severe decline of tortoises throughout California, Nevada, Utah, and northwest Arizona – with California populations considered the most endangered.

Recent genetic analysis has concluded that the Mojave population of the desert tortoise is a distinct species, not a population, with a range that includes southeastern California, southern Nevada, northwest Arizona, and southwest Utah (Murphy et al. 2011). Those tortoises occurring in the rest of Arizona and northwest/west Sonora, Mexico, have recently been described as a separate species, Morafka's desert tortoise (*Gopherus morafkai*), and those in southwest Sonora and Sinaloa, Mexico, as Goode's thornscrub tortoise (*Gopherus evgoodei*) (Edwards et al. 2016). The species occurring in California is best described as Agassiz's desert tortoise (*Gopherus agassizii*).

Thirty-years after its listing as Threatened under provisions of the CESA and ESA, Agassiz's desert tortoise is in worse condition with the species on a path to extinction due to an increase in the number and severity of threats. Similarly, while Critical Habitat was designated for this species in 1994 and several federal resource management plans have been adopted by the Bureau of Land Management (BLM) and designed to improve habitat conditions, the sobering reality is that conditions on the ground have worsened for Agassiz's desert tortoise habitat over the long term, especially in California. More development and increased human uses have occurred in the California desert since listing, resulting in substantial loss of individuals, reduced recruitment, and substantial loss/degradation of habitat. Further, these threats are amplified by the effects of climate change on tortoise habitat. As a result, tortoise populations throughout **all** Recovery Units in California continue to decline.

Reversing the trend towards extinction and putting Agassiz's desert tortoise on a path towards recovery is difficult because the tortoise is a long-lived reptile, requiring up to 20 years to reach sexual maturity, and has a low reproductive rate over a long period of reproductive potential. The combination of a late breeding age and a low reproductive rate makes accomplishing desert tortoise recovery very challenging (USFWS 1994a). In addition, the continued, ongoing loss and degradation of the species' last remaining occupied habitat from a variety of authorized and unauthorized land uses, in an area of increasing human population growth, renewable energy development and generation, motorized vehicle recreation, and other human impacts, only makes the conservation and recovery of the desert tortoise even more challenging.

Threats to the species at the time of the 1990 federal listing as Threatened have not abated. Instead, they are more widespread and intense. The relatively recent expansion of military testing and training installations (United States Army National Training Center, Fort Irwin; United States Navy, Marine Corps Air Ground Combat Center, Twentynine Palms); development of large-scale renewable energy projects throughout the range of Agassiz's desert tortoise; and increased human population growth and activities in the California desert have resulted in concurrent tortoise mortality and habitat degradation/loss, both adjacent to human communities and at appreciable distances. Notably, tortoise populations located immediately adjacent to expanding human communities have disappeared.

Tortoises and their habitats are impacted by a myriad of authorized and illegal human activities that degrade or eliminate suitable creosote bush scrub and other vegetation communities needed as habitat. In particular, off-highway vehicle use, especially widespread, unregulated use on lands that are supposed to be protected, destroys and fragments habitat, injures and kills tortoise, and crushes tortoise burrows and eggs. Human activities also subsidize predators whose increased numbers prey on tortoises and facilitate invasion of non-native species of plants that degrade habitat quality and displace native forbs and grasses needed for adequate nutrition and reproduction/recruitment (Brooks and Berry 2006). Invasive, non-native plants also increase flammable fuel load to the point where wildfire, when it occurs, results in catastrophic megafires that kill tortoises outright. Recovery from fire in Mojave and Colorado desert vegetation communities is extremely slow because these communities are not adapted to wildfire and non-native plants outcompete native species during the post-fire period (Brooks and Esque 2002).

Climate modeling predicts that California's deserts will experience longer and more frequent drought and increased temperatures. These climate conditions will impact tortoise habitat and food supply, the species' ability to reproduce and recruit tortoises, and its sensitivity as a cold-blooded reptile to increasing temperature extremes. These impacts combined with the ongoing impacts from human activities are endangering Agassiz's desert tortoise throughout California.

The USFWS has repeatedly identified high adult tortoise survivorship as a key factor in meeting tortoise recovery objectives (USFWS 1994a, 2011). However, science-based surveys (line distance sampling) extending over a 10-year period throughout the species' range in California and data from permanent study plots indicate this key factor is not being achieved (USFWS 2015). These surveys demonstrate that desert tortoise numbers are declining significantly and resulting in all three Recovery Units experiencing reduced numbers and densities that reflect a species on a trajectory toward extinction.

Based on systematic USFWS-designed line distance sampling conducted by the USFWS's Desert Tortoise Recovery Office (DTRO), from 2004 through 2014, adult tortoises in the three California Recovery Units (Western Mojave, Colorado Desert, Eastern Mojave) declined 51.3 percent from 119,029 individuals to 65,726 (USFWS 2015). It is noteworthy and troubling for the future survival and recovery of desert tortoise that these losses occurred within federally designated Critical Habitat Units for tortoises, which, in theory, receive a higher level of protection under provisions of the federal ESA and land use plans prepared by federal agencies, primarily by the BLM for public lands in the California Desert Conservation Area.

Adult tortoise densities in Critical Habitat within the Western Mojave Recovery Unit averaged 5.7 per square kilometer in 2004, in contrast with an average density of 2.8 per square kilometer in 2014. This serious reduction is consistent with the substantial decreases in tortoise population densities documented within all three Recovery Units in California (Allison and McLuckie 2018). Unfortunately, this current decline is a continuation of the downward population trends documented in the Western Mojave by BLM wildlife biologists using a series of one square-mile study plots beginning in 1979 and extending to 2002. Initial surveys on these plots documented adult desert tortoise densities ranging from 29 to 147 per square kilometer in much of the western Mojave Desert (Tracy et al. 2004). Using the available scientific survey data, **adult tortoise densities in the Western Mojave Recovery Unit declined by 85 to 95 percent between 1980 and 2014** and continue to decline to the present time.

According to Allison and McLuckie (2018), adult tortoise densities in the three California Recovery Units of Agassiz's desert tortoise declined at the following annual rates during the period 2004 through 2014: Colorado Desert –4.5%; Eastern Mojave –11.2%; and Western Mojave –7.1%.

Allison and McLuckie (2018) also concluded that:

- *Overall this threatened species is **experiencing large, ongoing population declines**, and **adult tortoise numbers have decreased by over 50% in some recovery units** since 2004*;

- ***Declining adult densities through 2014 have left the Western Mojave adult numbers at 49% and in the Eastern Mojave at 33% of their 2004 levels**. Such steep declines in the density of adults are only sustainable if there were suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere since 2007, and in these two recovery units **the proportion of juveniles in 2014 has declined to 91% and 77% of their representation in 2004,** respectively*;

- *Recent attention has focused especially on increased predation risk in the Western Mojave, Eastern Mojave, and Colorado Desert recovery units due to prey-switching during droughts by* Coyotes *(Canis latrans) and especially by increasing abundance of* Common Ravens *(Corvus corax), which typically prey on smaller tortoises rather than on adults*;

- *The negative population trends in most of the* [Tortoise Conservation Areas] *TCAs for Mojave Desert Tortoises indicate that **this species is on the path to extinction under current conditions.** This may reflect inadequate recovery action implementation, slow response by tortoises and their habitat to implemented actions, or new and ongoing human activities in the desert that have not been mitigated appropriately. It may also be a result of stochastic or directional climatic events that impact large expanses of tortoise habitat (e.g., drought, fire, climate change) and are largely beyond the realm of local land management activities. **Our results are a call to action to remove ongoing threats to tortoises from TCAs, and possibly to contemplate the role of human activities outside TCAs and their impact on tortoise populations inside them.***

(Emphasis added).

The USFWS (1994a) has determined that the minimum viable density of adult tortoises is 3.9 tortoises per square kilometer (10 tortoises per square mile), and that populations with densities below this size are in danger of extinction. The USFWS (2015) has reported that the density of adult desert tortoises in the three

Desert Tortoise Recovery Units in California are less than the minimum viable density and are experiencing a declining trend.

In addition to the startling population declines, this species is also facing significant uncertainty regarding protections on federal land. The California Desert Conservation Area (CDCA) Plan is the primary document guiding management on BLM land and was amended by the Desert Renewable Energy Conservation Plan (DRECP) in 2016 and the West Mojave Plan Route Network and Livestock Grazing Project in 2019. The most recent West Mojave Plan provides for a continuation of excessive vehicle use and livestock grazing, which are two of the most important threats to the desert tortoise and its critical habitat. Further, there is a currently pending plan amendment to the DRECP that is anticipated to contain further reductions in protections to desert tortoise.

Based on the best available scientific information presented in this petition, naturally-occurring populations of Agassiz's desert tortoise are on the verge of extirpation in California from a variety of human-caused threats and warrant a change in their listing status from Threatened to Endangered. Defenders of Wildlife, Desert Tortoise Council and Desert Tortoise Preserve Committee (Petitioners) believe changing the status of the species from Threatened to Endangered under provisions of the California Endangered Species Act will result in improved conservation and management outcomes for this species because it will (1) accurately reflect its status under CESA, (2) better inform project proponents that the tortoise is in danger of extinction and they should move their projects out of tortoise habitat/linkage areas to avoid extinction in California, (3) result in fully mitigation/compensation for the direct, indirect, and cumulative impacts to the tortoise, (4) provide for the implementation of more recovery actions to prevent its extinction in California, and (5) result in a higher-level of analysis of impacts to this species by the California Department of Fish and Wildlife (CDFW) from proposed land use activities on both federal, state, local, and private lands. If California is going to have any hope of avoiding the extinction of its state reptile, Agassiz's desert tortoise, and reverse the current decline of the tortoise to move toward recovery, the Commission must act by changing the listing status of this species from Threatened to Endangered.

1. **POPULATION TRENDS**

Describe current population trends (with numbers and rate) and relate these to viable population numbers. Explain survey methodology used to arrive at numbers or estimates and what assumptions, if any, were involved.

Background:

Population Sampling Methodologies

Permanent Study Plots: In the late 1970s, the Bureau of Land Management implemented a sampling methodology to collect demographic data on desert tortoises at 47 study plots in the spring. The method was to survey the sites intensively, locating all living tortoises and shell remains (BLM 2002). From these 47 plots, BLM selected and established 15 permanent one square mile study plots at various locations in the three Recovery Units (Figure 1) for the desert tortoise in the California Desert Conservation Area – Western Mojave, Colorado Desert, and Eastern Mojave (BLM 2002, Berry 2003) (See Tables 1a and 1b below). One hundred percent of each plot was surveyed twice for live desert tortoises and tortoise sign (e.g., burrows, scat, tracks, etc.). Surveys occurred in spring for 60 days. Density estimates were determined using mark-recapture sampling methods. Abundance, sex ratio, mortality, size distribution, and other population attributes were determined from the data collected. Most study plots were surveyed from every year to every 10 years (Berry 2003). The results of the surveys were applied to adjacent areas.

From the data collected, BLM reported the abundance of all size classes of desert tortoises (e.g., hatchlings, juveniles, immatures, subadults, and adults), mortality, population density and trend, size-specific sex ratios, age structure, survivorship rates, and causes of mortality at the size class and population levels in the California desert when compared to prior surveys at each plot. BLM in Nevada and Utah implemented this methodology in 1981 and Arizona in 1987 (USFWS 2010). BLM surveyed these study plots until 1995 when the U.S. Geological Survey assumed the task in California (BLM 2002; BLM et al. 2005).

The permanent study plot method had its downsides and assumptions. These include:

- Because of the intensive search effort needed to survey 100 percent of each plot, most study plots were not surveyed annually.
- Placement of permanent study plots was not random.
- Generally, plots were located where densities of tortoises were found to be high. This placement was done to get an adequate sample size to determine density using mark-recapture calculations. Thus, density estimates from study plots when applied to adjacent areas could be greater or less than the actual densities.
- The assumption that tortoises do not enter or leave the study plot during the entire 60-day spring survey period is not likely being met for the mark-recapture method.
- Tracy et al. (2004) concluded that it was not appropriate to extrapolate data from these plots to serve as a range-wide population baseline from which to assess recovery.

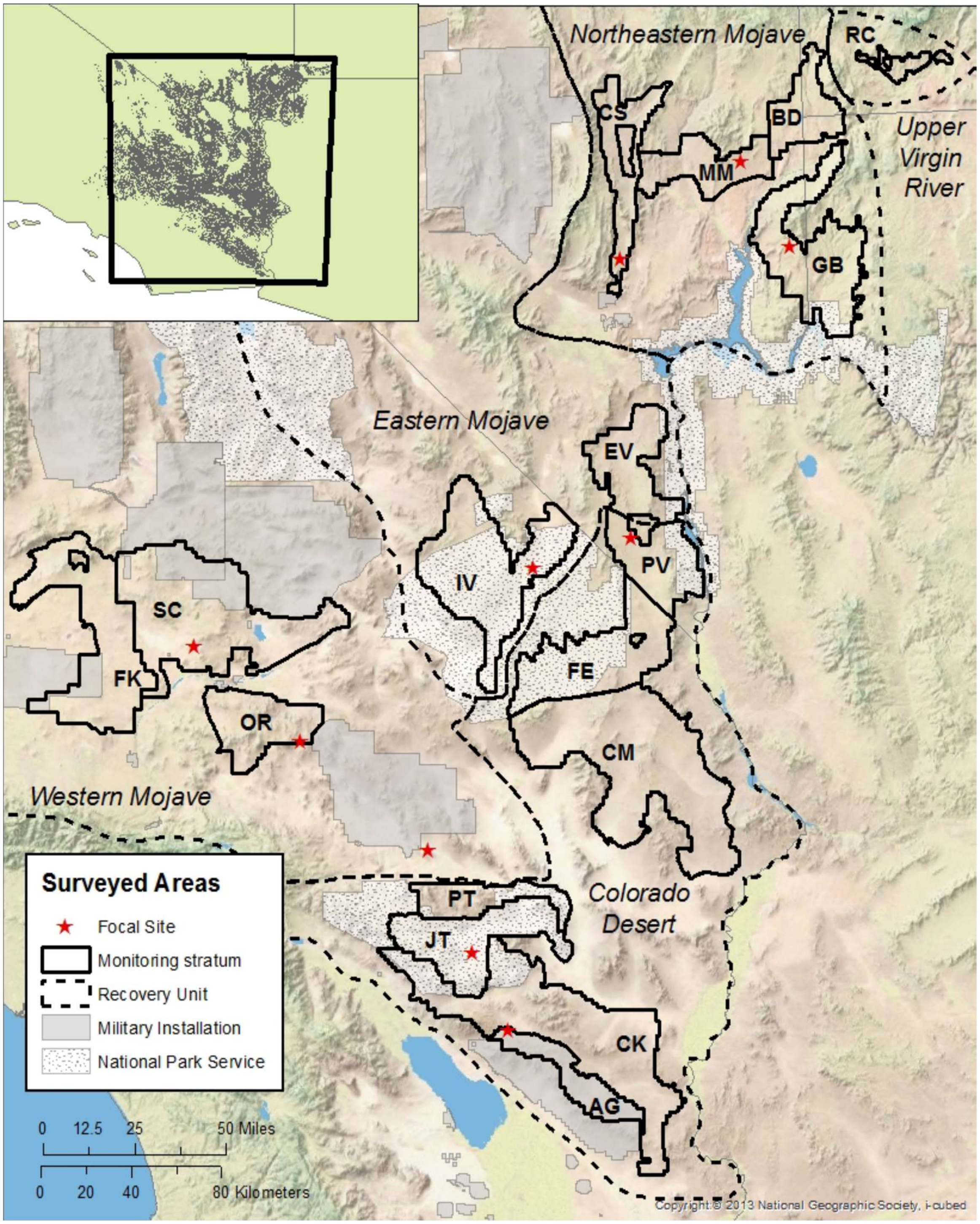

Figure 1. Map of the Recovery Units and Critical Habitat Units (CHUs) for Agassiz's desert tortoise. The CHUs in California are: FK = Fremont-Kramer, SC = Superior-Cronese, OR = Ord-Rodman, PT = Pinto Mountains, JT = Joshua Tree, CK = Chuckwalla, AG = Chocolate Mtns Aerial Gunnery Range, CM = Chemehuevi, FE = Fenner, IV = Ivanpah.

Line Distance Sampling: In June 1999, the interagency Desert Tortoise Management Oversight Group (DTMOG) adopted line distance sampling as the method for estimating adult desert tortoise abundance and density on a rangewide basis, and to detect long-term population trends (Anderson and Burnham 1996). This sampling method is intended to document rangewide population trends for adult desert tortoises over time and to determine whether the goals and objectives in the Recovery Plan regarding tortoise densities are being met. This monitoring strategy uses annual surveys on randomly placed line distance transects, with effort levels designed to detect long-term population trends (e.g., 10-year trends) in adult tortoises. This method was used beginning in 2001 by experienced survey crews under the direction of the USFWS DTRO, who publishes annual reports of line distance survey result reports (e.g., USFWS 2019a, 2020).

The downsides and assumptions of line distance sampling include:

- Line distance sampling collects data only to estimate the density of live adult tortoises. No systematic methodology is used to collect data on other population attributes (e.g., sex ratio, carcasses (mortality), cause of death, abundance or density of hatchling or juvenile tortoises, or short-term changes to population characteristics such as a catastrophic decline or remarkable increase) (USFWS 2006).
- Transects are not located randomly throughout the range of the desert tortoise. Rather, they are located randomly within CHUs, due to funding constraints and logistical issues. This methodology leaves occupied tortoise habitat outside these areas and areas needed for connectivity between CHUs/TCAs/Desert Wildlife Management Areas (DWMAs) unsurveyed.
- There are no trend data for tortoise populations outside CHUs.
- CHUs are more likely to be managed for the tortoise and its habitat than habitat outside CHUs and more likely to have greater densities of tortoises than areas outside CHUs. Therefore, the density estimates for adult tortoises in CHUs obtained from line distance sampling would likely be greater than for areas outside the CHUs in tortoise habitat and greater than rangewide density estimates. Thus, the line distance sampling does not provide a rangewide density estimate; it provides a density estimate for CHUs.
- Like permanent study plots, CHUs are not surveyed annually but about once every 3 years.
- Results from the range-wide line distance sampling survey program for population monitoring in CHUs/TCAs/DWMAs are intended to provide a baseline from which recovery criteria for stable populations within recovery units may be measured (USFWS 2006). However, collection of this baseline data was started in 2001. This is 12 years after listing Agassiz's desert tortoise as under CESA and ESA. Desert tortoise densities and abundance continued to decline from 1989/1990 (date of listings) to 2001. Using tortoise densities obtained from 2001 and later implies that although

listed as threatened, the densities of tortoises could decline further and still achieve recovery. A more appropriate approach would have been to use densities at the date of listing as the baseline.

CHUs for Agassiz's desert tortoises receive, in theory, greater protection under ESA provisions for federal actions because of the prohibition of adversely modifying or destroying Critical Habitat under ESA Section 7(a)(2). In spite of this prohibition, recent programmatic plans by the BLM in the California deserts have designated Extensive Recreation Management Areas (ERMAs) and Special Recreation Management Areas (SRMAs) in hundreds of thousands of acres of Critical Habitat for the tortoise (BLM 2016). BLM has also opened Cuddeback and Coyote dry lake beds within Critical Habitats in the Western Mojave Desert to unrestricted motorized vehicle use (BLM 2019).

With greater protection afforded to desert tortoise habitat within designated Critical Habitat, one would assume that tortoise populations occurring in Critical Habitat would have higher densities, a higher probability of recovery, and upward population trends over time with implementation of developed recovery plan actions. However, when analyzing the data from multiple years of line distance sampling, this assumption, has proven incorrect (Berry et al. 2014, USFWS 2015), and exactly the opposite. (See "Line Distance Sampling Results.")

Population Viability for Agassiz's Desert Tortoise

In the 1994 Recovery Plan for the Mojave Population of the Desert Tortoise, the USFWS determined that the minimum viable tortoise population density is 3.9 adults per square kilometer, or approximately 10 per square mile. In calculating this detailed population viability analysis, many assumptions were factored into this analysis, including a male-female ratio of 1:1 (i.e., the number of female tortoises should not be less than the number of male tortoises) (USFWS 1994a), and certain minimum areas of conserved habitat (reserves) would be established and managed, with most of these areas geographically linked by adjacent borders or corridors of suitable tortoise habitat. Populations of Mojave desert tortoises with densities below this amount are not viable and in danger of extinction (USFWS 1994a).

At the time the 1994 Recovery Plan was written, there was less consideration of the potentially important role of drought and climate change in the desert ecosystem, and with regard to desert tortoises and tortoise habitats in particular. In the meantime, studies have documented vulnerability of juvenile (Wilson et al., 2001) and adult tortoises (Peterson 1994, 1996; Henen 1997; Longshore et al., 2003) to drought (USFWS 2006).

The analysis of population viability for the desert tortoise used (1) population densities as of the early 1990s and size of reserves (i.e., areas managed for the desert tortoise), and (2) the population numbers (abundance) as of the early

1990s and size of reserves. As population densities for the Mojave desert tortoise decline, reserve sizes must increase, and as population numbers (abundance) for the Mojave desert tortoise decline, reserve sizes must increase (USFWS 1994a).

Reserve design (USFWS 1994a) and designation of Critical Habitat were based on the population viability analysis from numbers (abundance) and densities of populations of the Mojave desert tortoise in the early 1990s. Inherent in this analysis is that the lands be managed with reserve level protection (USFWS 1994a) or ecosystem protection as described in section 2(b) of the federal ESA, and that sources of mortality be reduced so recruitment exceeds mortality (that is, lambda >1)(USFWS 1994a).

Permanent Study Plot Results

Since the permanent study plots were first established in the late 1970s to 2002, tortoise populations have experienced declines both in numbers of tortoises registered during the surveys and in densities of live tortoises (Berry and Medica 1995, Brown et al. 1999, Berry et al. 2002). Declines of >50% and up to 96% have occurred regardless of initial densities (Berry 2003). Declines in numbers and densities of live tortoises were confirmed by corresponding increases in carcasses, including remains of marked tortoises (Berry 2003).

Beginning in the 1980s, high tortoise mortality associated disease was documented throughout the western Mojave Desert, and shortly thereafter, in populations within the eastern Mojave Desert in California and Nevada. Disease outbreak was first detected in surveys at the Desert Tortoise Research Natural Area (DTRNA) study plot (Brown et al. 1999) on the west edge of what is now the Fremont-Kramer CHU and subsequently in populations in adjacent Critical Habitat Units (i.e., Fremont-Kramer and Superior-Cronese).

Table 1a. Estimated annual densities of adult Agassiz's desert tortoises (midline carapace length (MCL) >180 mm) during 60-day spring surveys using mark-recapture methodology at one square-mile permanent study plots in two of the three Agassiz's Desert Tortoise Recovery Units and Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs)/Desert Wildlife Management Areas (DWMAs) in California. Density is in adult tortoises/square-kilometer. DTRNA = Desert Tortoise Research Natural Area.

	Western Mojave Recovery Unit								**Eastern Mojave Recovery Unit**	
CHU/TCA/ DWMA	**Fremont-Kramer**				**Superior-Cronese**	**Ord-Rodman**			**Ivanpah**	
Permanent Study Plot	DTRNA Interpretive Plot	DTRNA Interior Plot	Fremont Valley Plot	Kramer Hills Plot	Plots established by National Training Center	Lucerne Valley	Johnson Valley	Stoddard Valley	Ivanpah	Shadow Valley
Year Surveyed										
1977									37- 46 (1)	
1979	56 (2)	34 (2,8)						20 (2)	40 (2)	XXX
1980				29 (3)		30-35 (3, 9)	23-26 (3, 9)			
1981									38-50 (4)	
1982				30 (5)						
1985	61 (6)									
1986						29 (9)	19 (9)		XXX	
1988										XXX
1989	XXX	61(8)								
1990						25 (9)	6 (9)		XXX	
1992										XXX
1993	XXX									
1994						25 (9)	6(9)		XXX	
1997	8 (7)									

XXX– Sampled but data unavailable

(1) Berry 1978
(2) Berry 1980, BLM et al. 2005
(3) Berry 1981, BLM et al. 2005
(4) Turner, F., et al. 1982. DTC Symposium
(5) Berry, Nicholson; Juarez, and Woodman 1986
(6) Berry Shields, Woodman, Campbell, Roberson, Bohuski, and Karl 1986
(7) Berry, Stockton, and Shields 1998
(8) Berry, Woodman, and Knowles 1989
(9) BLM and CDFG 2002
(10) BLM 2002

Table 1b. Estimated annual densities of adult Agassiz's desert tortoises (MCL >180 mm) during 60-day spring surveys using mark-recapture methodology at one-mile[2] permanent study plots in the third Agassiz's Desert Tortoise Recovery Unit and Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs)/Desert Wildlife Management Areas (DWMAs) in California. Density is in adult tortoises/kilometers^2.

	Colorado Desert Recovery Unit								
CHU/TCA/ DWMA	**Chuckwalla**		**Chemehuevi**		**Fenner**		**Joshua Tree**	**Pinto Mountains**	**Chocolate Mtns AGR**
Permanent Study Plot / **Year Surveyed**	Chuckwalla Valley II Plot	Chuckwalla Bench Plot	Chemehuevi Wash Plot	Ward Valley Plot	Fenner	Goffs	Joshua Tree	No study plots	No study plots
1978							17-18 (1)		
1979		59 (5)	12-16 (2,5)						
1980	17(5,6)			29 (4,6)		61 (4)			
1982		61 (5)	15 (5)						
1983						XXX			
1984						XXX			
1985						XXX			
1986						XXX			
1987	XXX			XXX					
1988		43 (6)	XXX						
1990		XXX				XXX			
1991	XXX			XXX			45* (3)		
1992		XXX	XXX				51* (3)		
1993							47* (3)		
1994						XXX			
1995				XXX					
1996			XXX						
1997		XXX							
2000						XXX			

(1) Barrow 1979

XXX – Sampled this year but data unavailable

(2) Berry 1980
(3) Freilich, J. and B. Moon 1993* Densities reported for all tortoises rather than adults.
(4) Berry 1981
(5) Berry, Nicholson; Juarez, and Woodman 1986
(6) Berry 1981
(7) Berry, Woodman, and Knowles 1989

In the Western Mojave Recovery Unit, between 1982 and 1992, the overall tortoise population at the DTRNA declined by 86% with the adult population declining by about 94%, primarily due to *Mycoplasmosis* disease mortality (Brown et al. 1999). Juvenile tortoise mortality occurred primarily from Common raven (*Corvus corax*) predation. Tracy et al. (2004) concluded that the apparent downward trend in desert tortoise populations in the western portion of the range (Western Mojave Recovery Unit) that was identified at the time of listing from permanent study plot data was valid and ongoing from several threats including disease.

In the Colorado Desert Recovery Unit, BLM and CDFG (2002) reported that populations of desert tortoises "have declined precipitously in some parts of the range, such as the Chuckwalla Bench….Population estimates of permanent study plots at Chemehuevi Valley and Chuckwalla Bench have shown declines as high as 90 percent over the past decade" (i.e., early 1990s to 2000s).

Surveys in the eastern Mojave Desert (i.e., Goffs, California) (Colorado Desert Recovery Unit) have found high levels of Agassiz's desert tortoise mortality attributable to tortoise shell (*dyskeratosis*) and respiratory tract (*mycoplasmosis*) diseases (Berry 2000). Surveys performed in 2000, eleven years after state listing of the desert tortoise as Threatened, revealed that all tortoise size classes in sampled eastern Mojave Desert Critical Habitats had declined by as much as 76-80% from previous tortoise population estimates. The decline rate in larger tortoise size classes, which have a greater reproductive contribution to the population [i.e., larger females produced larger clutch sizes (Wallis et al. 1999)], was estimated to have declined by as much as 90% from previous estimates (Berry 2000, BLM 2002).

Lovich (2016) reported on the trend of desert tortoise densities in Joshua Tree National Park (Colorado Desert Recovery Unit). He noted tortoise populations "decreased in size during droughts." And, "What was once a robust and large population of tortoises in the early 1990s declined precipitously by 2012."

In the Eastern Mojave Recovery Unit in California, surveys performed in 2000, eleven years after state listing of the desert tortoise as Threatened, revealed that all tortoise age classes sampled in the CHUs of the Eastern Mojave Recovery Unit had declined by as much as 76-80% from previous tortoise population estimates. The decline rate in larger tortoise size/age classes, which have a greater reproductive contribution to the population, was estimated to have declined by as much as 90% from previous estimates (Berry 2000).

Line Distance Sampling Results

The USFWS Desert Tortoise Recovery Office has published reports of annual line distance sampling results since 2001 (e.g., USFWS 2019a, 2020). The first multi-year report was issued in 2006 for years 2001-2005.

Below are the results of line distance surveys by year (2001-2019) and change in estimated abundance of adult tortoises by Recovery Unit and Critical Habitat Unit in

California (Table 2) (USFWS 2006, 2009, 2010, 2011, 2012b, 1012c, 2013, 2014, 2015, 2016a, 2018, 2019, 2020).

Table 2. Density of adult Agassiz's desert tortoises (>180 mm MCL) per km^2 by year (2001-2018) in Critical Habitat Units designated for the species within California.

Year	Western Mojave Critical Habitat Unit			Eastern Mojave Critical Habitat Unit	Colorado Desert Critical Habitat Unit					
	Fremont-Kramer	Superior-Cronese	Ord-Rodman	Ivanpah	Chuckwalla	Chemehuevi	Fenner	Chocolate Mountains AGGR	Pinto Mountains	Joshua Tree
2001	5.5	4.3	10.1	2.8	10.1	7.2	15.7	No data	6.5	5.8
2002	4.7	8.1	13.1	5.4	7.7	No data	3.7	No data	4.0	3.3
2003	3.4	7.8	4.1	No data	4.0	6.3	2.8	No data	3.8	2.7
2004	6.1	4.5	5.2	4.7	6.4	6.9	8.7	No data	2.2	1.7
2005	5.7	6.7	8.1	4.6	7.9	10.8	14.0	No data	10.3	2.8
2006	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
2007	2.7	6.3	8.2	6.5	4.5	4.6	6.6	7.1	2.4	2.8
2008	0.4	1.4	3.8	3.8	3.2	3.6	5.0	3.4	2.5	1.8
2009	3.3	4.9	7.1	4.0	0.0	9.2	8.1	7.3	5.0	2.3
2010	2.5	2.6	7.5	1.0	3.7	4.2	6.9	13.8	3.4	2.8
2011	3.5	3.4	3.2	4.5	3.9	4.0	6.8	No data	3.3	3.5
2012	2.2	4.4	4.6	2.8	3.9	0.8	0.9	6.1	3.7	3.4
2013	No data	No data	No data	No data	No data	No data	No data	7.3	No data	No data
2014	4.7	2.5	3.5	2.3	3.3	2.8	4.8	8.4	2.4	3.7
2015	4.5	2.6	No data	1.9	No data	No data	No data	10.3	No data	No data
2016	No data	3.6	No data	No data	No data	1.7	5.5	8.5	2.1	2.6
2017	4.1	1.7	3.9	No data	4.3	No data	No data	9.4	2.3	3.6
2018	No data	No data	2.5/3.4*	3.7	No data	2.9	6.0	7.6	No data	No data
2019	2.7	1.9	2.1	2.6	1.8	No data	2.8	7.0	1.7	3.1

*Density of 2.5 adult tortoises per km^2 in the Ord-Rodman CHU is for resident tortoises only. The 3.4 adult tortoises per km^2 includes the tortoises translocated from the expansion area of the Marine Corps Air Ground Combat Center to Ord-Rodman CHU that were found during transect sampling.

USFWS (2006) reported low tortoise densities across recovery units from 2001-2005 and are indicative of a continuing long-term decline of tortoise abundance and population densities throughout the Mojave and Colorado deserts in California. This decline was first reported in the 1980s and resulted in the Commission listing the desert tortoise as Threatened in 1989 and USFWS following in 1990.

In their 2015 report, the USFWS provides an aggregate analysis of the data from 2004 through 2014 to determine the trend of adult desert tortoise (>180 mm midline carapace length) densities and abundance from rangewide sampling in CHUs/TCAs/DWMAs (Table 3).

Table 3. Summary of 10-year trend data (from 2004 to 2014) for Recovery Units and Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA)/Desert Wildlife Management Areas (DWMAs) for Agassiz's desert tortoise, *Gopherus agassizii* (=Mojave desert tortoise*)* in California The table includes the area of each Recovery Unit and CHU/TCA/DWMA, percent of total habitat for each Recovery Unit and CHU/TCA/DWMA, density (number of breeding adults/km^2 and standard errors = SE), and the percent change in population density between 2004-2014. Populations below the viable level of 3.9 breeding individuals/km^2 (10 breeding individuals per mi^2) (assumes a 1:1 sex ratio (i.e., number of adult females equal to or greater than adult males) and showing a decline from 2004 to 2014 are in red (USFWS 2015).

Recovery Unit Designated Critical Habitat Unit/Tortoise Conservation Area/Desert Wildlife Management Area	Surveyed area (km^2)	% of total habitat area in Recovery Unit & CHU/TCA	2014 density/km^2 (SE)	% 10-year change (2004–2014)
Western Mojave, CA	**6,294**	**24.51**	**2.8 (1.0)**	**–50.7 decline**
Fremont-Kramer	2,347	9.14	2.6 (1.0)	**–50.6 decline**
Ord-Rodman	852	3.32	3.6 (1.4)	**–56.5 decline**
Superior-Cronese	3,094	12.05	2.4 (0.9)	**–61.5 decline**
Colorado Desert, CA	**11,663**	**45.42**	**4.0 (1.4)**	**–36.25 decline**
Chocolate Mtn AGR, CA	713	2.78	7.2 (2.8)	**–29.77 decline**
Chuckwalla, CA	2,818	10.97	3.3 (1.3)	**–37.43 decline**
Chemehuevi, CA	3,763	14.65	2.8 (1.1)	**–64.70 decline**
Fenner, CA	1,782	6.94	4.8 (1.9)	**–52.86 decline**
Joshua Tree, CA	1,152	4.49	3.7 (1.5)	+178.62 increase
Pinto Mtn, CA	508	1.98	2.4 (1.0)	**–60.30 decline**
Eastern Mojave, CA	**3,446**	**13.42**	**1.9 (0.7)**	**–67.26 decline**
Ivanpah, CA	2,447	9.53	2.3 (0.9)	**–56.05 decline**

Using line distance sampling data, Defenders of Wildlife prepared a series of graphs showing the population trend of adult desert tortoises from 2001 within CHUs in California, including a line showing the minimum viable density threshold of 3.9 adults per square kilometer, and a projected date of extirpation or extinction (Attachment 1).

An analysis of these data indicate:

- The aggregate adult tortoise densities in the Western Mojave Recovery Unit, Colorado Desert Recovery Unit, and Eastern Mojave Recovery Unit in

California were below the population viability density of 3.9 adult tortoises per km^2.

- At the CHU/TCA/DWMA population level, 9 of the 10 populations in these Recovery Units in California were below this viability density.
- For percent change in population abundance between 2004 and 2014, all populations in the three CHUs/TCAs/DWMAs except one (Joshua Tree National Park) experienced a decline.
- For percent change in population abundance in 2014 using 2004 data as a baseline, the aggregate change in all Recovery Units in California experienced declines ranging from 36 to 67 percent.
- In the Western Mojave Recovery Unit at the population level, the three populations experienced 50 to 61 percent declines.
- In the Colorado Desert Recovery Unit in California, five of six populations experienced 29 to 64 percent declines.
- In the Eastern Mojave Recovery Unit in California, the Ivanpah population experienced a 56 percent decline.
- Only the Joshua Tree population in the Colorado Desert Recovery Unit had an increase in population abundance. Despite this 178 percent increase, its population density was below the 3.9 tortoises per km^2 population viability level.

The population viability analysis in the 1994 Recovery Plan assumed a 1:1 male - female sex ratio and used the estimated densities of tortoises in the early 1990s in the analysis to calculate the population viability density. Unfortunately, we were unable to find information in the USFWS reports on the sex ratios of these populations. Therefore, we are unable to determine if this assumption is being met. A male - female sex ratio that favors males would require a greater population density than 3.9 adult tortoises per square kilometer for a population to be viable.

In addition, the density and abundance of desert tortoises has declined substantially in the Western Mojave Recovery Unit, Colorado Desert Recovery Unit, and Eastern Mojave Recovery Unit since the population viability analysis was published in the 1994 Recovery Plan. Consequently, the minimum viable density for tortoise populations may now be greater than the 3.9 adult tortoises per km^2 (10 adult tortoises per m^{i2}) because population density estimates in the 1990s were used to calculate the population viability density along with other parameters.

In their analysis of the USFWS's 2015 Line Distance Survey Report, Allison and McLuckie (2018) reported:

"*Populations of the Mojave Desert Tortoise (Gopherus agassizii) experienced severe declines in abundance in the decades leading up to 1990, when the species was listed as threatened under the U.S. Endangered Species Act. Prevailing declines in the abundance of adults overall and in four of the five recovery units indicate the need for more aggressive implementation of recovery actions and more critical evaluation of the suite of future activities and projects in tortoise habitat that may exacerbate ongoing population declines. Adult densities in the* [California recovery units] *declined at different annual rates: Colorado Desert (-4.5%, Eastern Mojave*

(-11.2%), and Western Mojave (-7.1%). Of the four recovery units in which we used two-pass surveys, the probability of encountering a juvenile was consistently lowest in the Western Mojave Recovery Unit.

Overall this threatened species is experiencing large, ongoing population declines, and adult tortoise numbers have decreased by over 50% in some recovery units since 2004. Declining adult densities through 2014 have left the Western Mojave adult numbers at 49% and in the Eastern Mojave at 33% of their 2004 levels. Such steep declines in the density of adults are only sustainable if there were suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere since 2007, and in these two recovery units the proportion of juveniles in 2014 has declined to 91% and 77% of their representation in 2004, respectively.

Throughout our assessment, we describe tortoise status based on adult densities, which is useful for comparison of areas of different sizes. However, if the area available to tortoises is decreasing, then trends in tortoise density no longer capture the magnitude of decreases in abundance. Some of the area of potential habitat (68,501 km^2) has certainly been modified in a way that decreases the number of tortoises present.

We used area estimates that removed impervious surfaces created by development as cities in the desert expanded. However, we did not address degradation and loss of habitat from recent expansion of military operations (753.4 km^2 so far on Fort Irwin and the MCAGCC [in addition to training/bombing lands expanded at China Lake Naval Weapons Center]*… the current range-wide distance sampling program provides fairly coarse but clear summaries of patterns in tortoise density and abundance, definitive because they sample regionally and range-wide.*

The negative population trends in most of the TCAs for Mojave Desert Tortoises indicate that this species is on the path to extinction under current conditions. This may reflect inadequate recovery action implementation, slow response by tortoises and their habitat to implemented actions, or new and ongoing human activities in the desert that have not been mitigated appropriately.

It may also be a result of stochastic or directional climatic events that impact large expanses of tortoise habitat (e.g., drought, fire, climate change) and are largely beyond the realm of local land management activities. Our results are a call to action to remove ongoing threats to tortoises from TCAs, and possibly to contemplate the role of human activities outside TCAs and their impact on tortoise populations inside them."

Combining Permanent Study Plots and Line Distance Sampling Results

By the time formal line distance sampling of adult tortoise populations in California began in 2001, high levels of tortoise mortality had been documented and already reduced these populations by up to approximately 90%, such as in the Fremont-Kramer CHU in the Western Mojave Recovery Unit (USFWS 1994a).

As mentioned above, beginning in the 1980s, high tortoise mortality was reported in the three Recovery Units in California. Combining the adult density data from permanent study plots and line distance sampling for these three Recovery Units indicates a substantial long-term downward trend in the density of these desert tortoise populations (Attachment 2).

Agassiz's desert tortoise is a "K-strategist" (MacArthur and Wilson 1967, USFWS 1994a), with delayed maturity and long life under normal conditions. Its survival strategy is to live a long time and recruit a small number of individuals into the population to replenish the loss of adults or slowly increase the population size. However, given the numerous, increasing, and compounding threats to the desert tortoise (see Section 6 "Factors Affecting Ability to Survive and Reproduce") and the long-term downward trend in the density of reproducing adults, these data indicate that adults are not living a long time and recruitment is much lower than mortality. With most population densities in California below the minimum viable density, this long-term downward trend indicates the survival strategy of the desert tortoise has not been working for several decades. Agassiz's desert tortoise is on a path to extirpation in California.

Analyzing the line distance sampling data that spans 19 years, population declines of desert tortoises have been documented since 2001, currently resulting in a breeding adult tortoise density generally below the minimum population viability level of 3.9 tortoises per square kilometer in all but one of the tortoise Critical Habitat Units in California (USFWS 2020). Twenty-five years after the publication of the 1994 Recovery Plan, the USFWS has confirmed that the densities of the 10 tortoise populations in CHUs/TCAs/DWMAs in California are below this minimum viable density, except for the Chocolate Mountains. If the density estimates from line distance sampling in CHUs is below the minimum viable density, it is likely that the occupied habitats outside the CHUs have lower population densities, as Critical Habitat receives an additional regulatory level of management. This would mean that rangewide the density and abundance of the tortoise may not be as great as reported from line distance sampling.

In summary, the permanent study plots data and long-term monitoring data from the USFWS's line distance sampling show a multi-decadal decline in the density of adult desert tortoises in California. The line distance sampling shows the density of 9 of 10 populations of Agassiz's desert tortoise in the CHUs of the California desert are below the population viability density of 3.9 adult tortoises per km^2. All populations have experienced steep declines in abundance since 2004 except the Joshua Tree population. Between 2004 and 2014, nine populations continue to decline at substantial rates. If these rates of decline continue, the trajectory for extirpation of the tortoise in California will likely occur within the foreseeable future. This assumes that factors such as drought and climate change do not become worse and that human uses of desert lands do not increase substantially in the future. Based on past history and regional climate models, we know this is unlikely.

2. RANGE AND DISTRIBUTION

In the text, indicate the percentage of historic distribution that is in existence and the rate of loss. If appropriate, indicate the number of extant occurrences, populations or portions of populations in California. Indicate whether the rate of loss is accelerating, and estimate when extinction would occur if current trends continue. Discuss the relationship between historic and current acreage and degree of habitat fragmentation. Describe the quality of the existing habitats in terms of ability to maintain viable populations with or without enhancement.

The following information is from the report published by the USFWS DTRO, entitled "Status and Trend of the desert tortoise and its Critical Habitat in 2019" (USFWS 2019b):

Beginning in the 1970s *"the range and distribution of the Desert tortoise in California was initially mapped using observations of live individuals and their sign collected by the Bureau of Land Management during development of the California Desert Conservation Area Plan. Over 1,000 triangular transects were surveyed between 1978 and 1983 and were used to build a Desert tortoise occurrence map based on five classes of estimated abundance (0-20, 21-50, 51-100, 101-250, > 250 tortoises/mile. Further refinement of the occurrence and relative abundance of Desert tortoises in the Western Mojave Desert was completed by the Bureau of Land Management from 1998-1999 in support of the West Mojave Plan. Approximately 1,800 transects were performed*. *Within its range in California, habitat degradation and loss due to land-use practices include development (urban and rural), military training activities, habitat fragmentation from roads and utility corridors, recreational activities, and livestock grazing."*

In 2009, the US Geological Survey looked at the distribution of the desert tortoise by focusing on available habitat for the species (USFWS 2019b): *"Typical habitat of the desert tortoise in the Mojave Desert is characterized as Creosote Bush Scrub ranging in elevation from approximately 1,000 to 5,500 feet. A key habitat component within this habitat is a reliable food source in the form of annual forbs and grasses, which rely on annual precipitation ranging from approximately 2-8 inches. Based on an evaluation of environmental variables associated with occupied Desert tortoise habitat, U.S. Geological Survey researchers developed a habitat suitability model in 2009* (Nussear et al. 2009), *which provided the first accurate map of predicted occupied habitat for the species.*

The most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects and those that fragment and degrade habitats, such as proliferation of roads and highways, off-highway vehicle (OHV) activity [including military training], wildfire, and habitat invasion by non-native invasive plant species.

Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow and Lancaster, California; Las Vegas, Nevada; and St. George, Utah; etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-highway vehicle use (e.g., portions of off-road management areas managed by the BLM and *unauthorized use in areas such as east of California City, California). Since 2010, the U.S. Fish and Wildlife concluded that the distribution of the Desert tortoise had not changed substantially in terms of the overall extent of its range, although desert tortoises have been removed from several thousand acres because of solar development, military activities, and other project development (USFWS 2010). In 2014, the U.S. Fish and Wildlife Service accounted for acres of non-habitat for the species (i.e., impervious surfaces that included paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises. Within California, impervious surfaces totaled 3,325,979 acres, or 19.2% of the total acres of modeled habitat for the species.*

Other anthropogenic factors affect the physical and biological features of critical habitat in more subtle ways. Surface disturbance from OHV vehicle activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs.

Sharifi et al. (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact [native] desert annuals, an important food source for desert tortoises.

Invasion of non-native plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency. Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a substantial threat to desert tortoise habitat."

Substantial alteration of Agassiz's desert tortoise Critical Habitat occurred with the expansion of the U.S. Army's National Training Center at Fort Irwin in 2002, 13 years after listing of the species as Threatened by the California Fish and Game Commission. This federal action resulted in the transfer of approximately 99,000 acres of public land managed by the BLM in the Superior-Cronese Critical Habitat Unit of the Western Mojave Recovery Unit in California to the U.S. Army. (Charis 2005). The Army is now conducting mechanized warfare training, which directly impacts tortoise habitat, on approximately 18,000 of these acres in the Southern Expansion Area, and indirectly impacts additional habitat by creating large amounts of dust that are deposited in adjacent and downwind areas. The dust covers plants and reduces their ability to photosynthesize. It also reduces maximum leaf conductance, transpiration, and water-use efficiency (Sharifi et al. 1997). Thus, plant survival, growth, and reproduction are reduced. This reduces the availability of important forage plants (USFWS 2010) and cover for the tortoise from predators and temperature extremes. Military training activities spread the seeds and plant propagules of nonnative plant species in the tracks and tires of their vehicles and in their equipment. The remaining 62,000 acres of Critical Habitat in the Western Expansion Area have not been used for mechanized training to date, but the Army intends to utilize them at some future date (USFWS 2012a).

Prior to use of the 18,000 acres in the Southern Expansion Area, the Army in 2002 captured a total of 650 adult and sub-adult desert tortoises and translocated them to specific non-training lands within and adjacent to the installation. Roughly half of tortoises translocated died during or immediately after translocation. To date, tortoises have only been removed from the Southern Expansion Area where mechanized warfare training takes place (USFWS 2012a). Surveys in the 62,000 acre Western Expansion Area revealed that approximately 1,100 individuals would have to be captured and translocated before mechanized training could commence.

A second significant impact to Agassiz's desert tortoise habitat occurred in 2013, when the U.S. Navy expanded the U.S. Marine Corps Air Ground Combat Center (MCAGCC) into the eastern Johnson Valley by acquiring 154,000 acres of public land managed by the BLM and 13,971 acres of non-federal land (U.S. Marine Corps et al. 2016). Approximately 1,000 desert tortoises were captured and translocated from the area planned for active mechanized warfare training exercises into the adjacent Ord-Rodman CHU. The same direct and indirect impacts to tortoises and tortoise habitat from the National Training Center's expansion also occurred on the expansion lands of MCAGCC.

Between 2009 and 2019, ten solar energy generation projects were also approved on public lands supporting Agassiz's desert tortoise habitat in California, 20 years following state listing of the species as Threatened. As a result, a total of 31,578 acres of Agassiz's desert tortoise habitat on public land has been removed during this time, although none of these projects are located in Critical Habitat. Additional private land with significant tortoise habitat have also been developed for renewable energy projects. The estimated incidental take of Agassiz's desert tortoises for these projects total over 2,298 individuals to date, based on USFWS biological opinions and CESA Section 2081 incidental take permits. Authorization for additional incidental take in the future is anticipated due to continued development of solar energy facilities, primarily on federal land managed by the BLM.

Roads have been described as the single most destructive element in the process of habitat fragmentation (Noss 1993) and their ecological effects are considered "the sleeping giant of biological conservation" (Forman 2002:viii, as cited in van der Ree et al. 2011). Though roads comprise only 1% of surface area, an estimated 19% of the total land within the United States is ecologically affected by roads due to indirect effects that extend beyond the physical footprint of the road (Forman, 2000, as cited in Nafus et al. 2013).

There are approximately 15,000 miles of paved and maintained roads within the range of the Agassiz's desert tortoise in California (BLM 1999); and 5,997 miles of authorized off-highway vehicle routes within the western Mojave Desert (BLM 2005, 2019). These roads and routes and their use by vehicles have numerous adverse impacts on the desert tortoise and its habitat. They include (1) wildlife mortality from collisions with vehicles, collecting, and vandalism (McLellan and Shackleton 1988, Kilgo et al. 1998) (2) hindrance/barrier to animal movements thereby reducing access to resources and mates [fragmentation], (3) degradation of habitat quality [spread of non-native invasive plant species] (Parendes and Jones 2000), (4) habitat loss caused by disturbance effects in the wider environment and from the physical occupation of land by the road, and (5) subdividing animal populations into smaller and more vulnerable fractions (at higher risk of localized extirpation from stochastic events or from inbreeding depression) (Jaeger et al. 2005a, 2005b, Roedembeck et al. 2007) (USFWS 1994a, Boarman 2002). A summary of the miles of routes and disturbed areas associated with motorized vehicle use within CHUs in the Western Mojave Recovery Unit is provided in Attachment 3.

For a herbivorous species such as the desert tortoise, roadside vegetation is often more robust and diverse because water that becomes concentrated along roadside berms promotes germination. This attracts tortoises and puts them at higher risk of mortality as road-kill (Boarman et al. 1997).

LaRue (1993) and Boarman et al. (1997) reported observing depauperate desert tortoise populations along highways. Subsequent research shows that populations may be depressed in a zone at least as far as 0.4 kilometers (0.25 miles) from the roadway on each side (Boarman and Sazaki 1996). The greater the distance from the road, the more desert tortoise sign is observed (LaRue 1993; Boarman et al. 1997; von Seckendorff Hoff and Marlow 2002; Boarman and Sazaki 1996). Similarly, the cover and richness of non-native plant species decreases as distance from the road increases (Boarman and Sazaki 1996).

In summary, the distribution of Agassiz's desert tortoise has been shrinking since its listing as threatened because of the myriad of land use projects throughout much of the tortoise's range in California. The larger individual projects (e.g., the expansion of the National Training Center at Fort Irwin and MCAGCC, and numerous large-scale renewable energy projects) and collectively, smaller development projects in/near the growing cities/communities of Palmdale-Lancaster, Victorville-Hesperia-Adelanto-Apple Valley, and Barstow-Lenwood continue to reduce the distribution of the tortoise near these communities. Thousands of miles of roads and routes of travel crisscross desert tortoise habitat effectively eliminating tortoises from thousands of acres of habitats adjacent to their corridors and fragment tortoise populations.

3. **ABUNDANCE**

Provide available historic and current population estimates/trends, densities, vigor, sex and age structures, and explain population changes relative to human-caused impacts or natural events. Compare current and historic abundance in terms of overall population size or size of occurrences, populations or portions of populations, as appropriate. Describe current population trends (with numbers and rate) and relate these to viable population numbers. Explain survey methodology used to arrive at numbers or estimates and what assumptions, if any, were involved.

As stated above in the Executive Summary and Section 1 (Population Trends), adult tortoise populations in Recovery Units in California have declined by 51.3% from 2004 through 2014 (i.e., from 119,029 tortoises in 2004 to 65,726 tortoises in 2014) (USFWS 2015). These declines were within tortoise Critical Habitat Units where there is a higher level of habitat protection expected to occur compared to lands outside these areas.

Densities of adult tortoises in CHUs within the Western Mojave Recovery Unit were estimated in 2004 to average 5.7 tortoises per square kilometer, in contrast to an average density of 2.8 tortoises per square kilometer estimated in 2014 – a decline similar to those occurring in all three Recovery Units in California (USFWS 2015). Historical survey data from permanent study plots in the Western Mojave Recovery Unit in the late 1970s and early 1980s were used to estimate adult tortoise densities in the 1994 Recovery Plan, which ranged from 2 to 96 per square kilometer at that time (USFWS 1994a) – indicating that adult tortoises in the Western Mojave Recovery Unit may have declined by as much as 85-95% from roughly 1980 to 2014. During this time Agassiz's desert tortoise had been state-listed as Threatened for 15 years.

These trend data indicate that under current management, Agassiz's desert tortoise populations within Critical Habitat Units in California continue to decline rapidly, which is inconsistent with the goals in the Recovery Plans of stabilizing and recovering depleted tortoise populations and halting habitat degradation – a situation that endangers the continued viability of wild tortoise populations in California. Still higher tortoise population declines, and greater degrees of habitat degradation, are known to occur outside of these Critical Habitat Units, possibly due to less restrictions placed on various public land use activities and private land development through regional and county land use plans [e.g., California Desert Conservation Area (CDCA) Plan (BLM 1980), as amended by the Desert Renewable Energy Conservation Plan (DRECP)].

Darst et al. (2013) developed a tortoise threats assessment that ranked the relative importance of threats to Agassiz's desert tortoise and its populations. These researchers determined that urbanization, human access, military operations, disease, and illegal use of off-highway vehicles were, and continue to be, the most significant threats on a range-wide basis.

In the 1994 rule designating Critical Habitat for the Mojave population of the desert tortoise, the USFWS (1994b) stated:

"*OHV use in the desert has increased and proliferated since the 1960s. As of 1980, OHV activities affected approximately 25 percent of all desert tortoise habitat in California*."

Various researchers have studied threats to tortoises and their populations. Tuma et al. (2016) conducted a detailed analysis of threats present in the Superior-Cronese Critical Habitat Unit in the Western Mojave Recovery Unit in California. These researchers concluded human presence was associated with significantly greater declines in tortoise populations because it was associated with habitat degradation and higher animal mortality on a continuous basis. This conclusion was reached even though human presence had a patchy distribution in the study area. Land use activities, such as vehicle use on/off authorized roads/trails, camping, mining, and livestock grazing; as well as habitat loss associated with housing subdivisions, freeways, transmission lines and railroads were identified in this study as a current suite of threats to Agassiz's desert tortoise. The second highest-ranked threat was subsidized predators, which contribute to tortoise mortality on a continuous, widespread basis but without causing habitat loss or degradation.

The USFWS (2011) concluded in its revised recovery plan for the Mojave Population of the Desert Tortoise that:

"*The vast majority of threats to the desert tortoise or its habitat are associated with human land uses. The threats identified in the 1994 Recovery Plan formed the basis for listing the tortoise as a threatened species and continue to affect the species today*."

As stated in Section 1 ("Population Trends"), the USFWS (1994) has determined the minimum viable density of adult tortoises is 3.9 tortoises per square kilometer, and that populations with densities below this number are in danger of extirpation. Based on extensive (2001-2014) line distance sampling, the USFWS (2015) determined that the estimated density of adult tortoises within Critical Habitat within the Western Mojave Recovery Unit in California in 2014 had declined to 2.8 tortoises per square kilometer, which is below the minimum density to ensure population viability or persistence. For the Colorado Desert Recovery Unit, the estimated density of adult tortoises was 4.0 tortoises per square kilometer. Although just above the minimum viable density of 3.9 calculated for desert tortoises in 1994, this CHU had a declining trend of 36.25 % from 2004 to 2012. This declining trend likely means that the density of adult tortoise will be below the minimum viable density in the foreseeable future. The Eastern Mojave Recovery Unit in California had an estimated adult tortoise density of 2.3 tortoises per square kilometer and the estimated density for the entire Recovery Unit in California and Nevada was 1.9 tortoises per square kilometer. Like the Colorado Desert Recovery Unit, the Western Mojave and Eastern Mojave Recovery Units had declining trends of 50.7% and 63.7%, respectively (see Table 3 in Section 1 – "Population Trends"). Tortoise densities in 8 of 10 Critical Habitat Units in California are also below minimum viability (see Table 3 in Section 1 – "Population Trends").

In addition to these threats, there is the overarching threat of climate change. Regional climate change models for the southwest United States show that the area is already experiencing the effects of climate change. The average daily temperatures for the 2001–2010 decade were the highest in the southwestern United States from 1901 through 2010 (Overpeck et al. 2012) with temperatures almost 2.0 degrees Fahrenheit (1.1 degrees Celsius) higher than historic averages, with fewer cold snaps and more heat waves (Overpeck et al. 2012). Climate change models for the southwestern United States for the 21st century predict seasonal air and surface temperatures in all seasons will increase (Overpeck et al. 2012), with greater warming in summer and fall than winter and spring. Droughts in parts of the southwestern United States are projected to become greater in intensity (Overpeck et al. 2012) (i.e., more frequent and/or longer in duration) with a precipitation decrease westward through the Sonoran and Mojave Deserts. With precipitation decreasing as one moves farther west in the southwest U.S., this would mean that the western portion of the range of Agassiz's desert tortoise (i.e., the tortoises in California) would be most affected by this decrease in precipitation from climate change.

Perennial vegetation is being impacted by prolonged drought conditions in the Mojave Desert. The negative effects of long-term drought on Sonoran, Great Basin, and Mojave Desert perennial plants are well documented (Goldberg and Turner 1986; Turner 1990; Bowers 2005; Hereford et al. 2006; Miriti 2006; Hamerlynck and McAuliffe 2008; Hamerlynck and Huxman 2009; Ralphs and Banks 2009, as cited in Huggins et al. 2010), and include high shrub mortality, shrub canopy deterioration, and low plant recruitment.

In a portion of the Superior-Cronese CHU, die-offs of desert shrubs have been documented. Data from plant transects reveal that total shrub cover and volume have decreased significantly by roughly 10% between 2000 and 2009 (Huggins et al. 2010). Mortality of these long-lived shrubs has been high (48%), and the recruitment of new shrubs (5%) has been too low to maintain their populations at previous levels (Huggins et al. 2010).

If the climate models for the Southwest and Mojave and Colorado deserts are correct, as the westernmost deserts in the southwest, their drought periods will become longer and more frequent. These climatic conditions will result in reduced reproduction and recruitment and elevated mortality of native woody perennial vegetation needed by the desert tortoise for shelter from extreme weather conditions and cover from predators. It also means that the frequency and quantity of native annual and herbaceous perennial plants needed by the tortoise for adequate nutrition (see Section 5 “Kind of Habitat Necessary for Survival”) would be reduced further. Reductions in precipitation and availability of forage plants for tortoises would result in reduced tortoise survival, reproduction, and recruitment (Henen 1997; Henen 2002a; Henen 2002b; and Wallis et al. 1999) and reduced tortoise densities and abundance). Because 9 of the 10 tortoise populations in the three Recovery Units in California are below the population viability threshold, the tortoise cannot persist if its survival, reproduction, or recruitment will be reduced. The tortoise’s downward trend toward extirpation will continue.

Based on the best available scientific information (presented above), Agassiz’s desert tortoise is in danger of extirpation in Critical Habitat Units in California from a variety of human-related threats. Because line distance sampling represents estimates of desert tortoise densities and abundance rangewide, the data and analysis from line distance sampling shows that Agassiz’s desert tortoise is in danger of extirpation in the three Recovery Units in California - the Western Mojave Recovery Unit, the Colorado Desert Recovery Unit, and the Eastern Mojave Recovery Unit.

Defenders of Wildlife, the Desert Tortoise Council and the Desert Tortoise Preserve Committee believe changing the regulatory status of Agassiz’s desert tortoise from Threatened to Endangered under CESA provisions will result in a higher level of impact analyses for proposed land use activities and greater long-term protection of occupied habitats. Mitigation requirements to avoid, minimize, and compensate for adverse impacts under Endangered vs. Threatened status would likely be greater and more effective in halting population declines and habitat loss/degradation, and in contributing to recovery of the species. Funding available for conservation projects for recovery of Endangered vs. Threatened species would also likely be greater.

4. LIFE HISTORY (SPECIES DESCRIPTION, BIOLOGY, AND ECOLOGY)

Include pertinent information that is available on species identification, taxonomy and systematics, seasonal activity or phenology, reproductive biology, mortality/natality, longevity, growth rate, growth form, food habits, habitat relationships and ecological niche or ecological attributes, interactions with other species or special habitat requirements that may increase vulnerability of the species to certain natural or human-caused adverse impacts (e.g., obligate wetland or riparian habitat species, low birthrate, colonial species).

This information is available in the supporting documents for the 1989 listing of the desert tortoise as Threatened by the Commission, as well as in the supporting documents for federal listing as Threatened by the USFWS. Additional information is available in the 1994 Recovery Plan (USFWS 1994a) and the 2011 Revised Recovery Plan (USFWS 2011). A summary is provided below from the Status of the Desert Tortoise (USFWS 2019b) and Andersen et al. (2000), and the two desert tortoise recovery plans.

The desert tortoise is a large, herbivorous reptile that reaches 20 to 38 centimeters (8 to 15 inches) in carapace (upper shell) length and 10 to 15 centimeters (4 to 6 inches) in shell height. Hatchlings emerge from eggs at about 5 centimeters (2 inches) in length. During the first 5 to 7 years of life, the tortoise shell is incompletely ossified; it is soft and easy to puncture and rip open (Boarman 2002). This makes small tortoises highly vulnerable to predation by a variety of mammals and birds. Adult desert tortoises weigh 3.6 to 6.8 kilograms (8 to 15 pounds). The forelimbs have heavy, claw-like scales and are flattened for digging. Hind limbs are more elephantine (Ernst et al. 1994).

Desert tortoise behavior is well adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows that they excavate, even during their seasons of activity. Burrows are made under rocks or in soil and may be as much as 5 m in length but are usually 1 m deep (Burge 1978, Bulova 1994). Patterns of burrow use are sex specific (Bailey et al. 1995) and may reflect complex social interactions among individual tortoises (Bulova 1994). Burrow living can make tortoises difficult to find, particularly in drought years when the animals seal themselves behind a wall of dirt and stay underground to conserve water.

In late winter or early spring, they emerge from overwintering burrows and typically remain active through fall. Activity decreases in summer, but tortoises often emerge after summer rain storms to drink (Henen et al. 1998). During activity periods, desert tortoises eat a wide variety of herbaceous vegetation, particularly perennial grasses and the flowers of annual plants (Berry 1974; Luckenbach 1982; Esque 1994). Tortoises are selective in the plant species and plant parts that they eat. Oftedal et al. (2002) reported that plant species and plant parts of species eaten by desert tortoises were higher in water, protein, and potassium excretion potential (PEP), and lower in potassium than uneaten species and parts. During periods of inactivity, they reduce their metabolism and water loss and consume very little food by remaining in their burrows. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water (obtaining it from their food, if available) and can apparently tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986; Peterson 1996; Henen et al. 1998) at least for a limited time.

Desert tortoises are essentially “K-strategists” (MacArthur and Wilson 1967), with delayed maturity and long life. Eggs and hatchlings are quite vulnerable, and pre-reproductive adult mortality averages 98% (Wilbur and Morin 1988, Turner et al. 1987). Adults, however, are well protected against most predators (other than humans) and other environmental hazards and consequently can be long-lived (Germano 1992, Turner et al. 1987). Their longevity helps compensate for their variable annual reproductive success, which is correlated with environmental conditions.

Mating occurs both during spring and fall (Black 1976; Rostal et al. 1994). In drought years, the availability of surface water following rains may be crucial for desert tortoise survival (Nagy and Medica 1986). During these unfavorable periods, desert tortoises decrease surface activity and remain mostly inactive or dormant underground (Duda et al. 1999), which reduces water loss and minimizes energy expenditures (Nagy and Medica 1986). Duda et al. (1999) showed that home range size, number of different burrows used, average distances traveled per day, and levels of surface activity were significantly reduced during drought years.

The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and also serves as an indicator of resource availability and opportunity for reproduction and social interactions (O’Connor et al. 1994). Females have long-term home ranges that may be as little or less than half that of the average male, which can range to 80 or more hectares (200 acres) (Burge 1977; Berry 1986a; Duda et al. 1999; Harless et al. 2009). Core areas used within tortoises’ larger home ranges depend on the number of burrows used within those areas (Harless et al. 2009). Over its lifetime, each desert tortoise may use more than 3.9 square kilometers (1.5 square miles) of habitat and may make periodic forays of more than 11 kilometers (7 miles) at a time (Berry 1986).

Tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner et al. 1984; Bury 1987; Germano 1994). Growth rates are greater in wet years with higher annual plant production (e.g., desert tortoises grew an average of 12.3 millimeters [0.5 inch] in an El Niño year compared to 1.8 millimeters [0.07 inches] in a drought year in Rock Valley, Nevada (Medica et al. 1975). The number of eggs as well as the number of clutches that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner et al. 1986, 1987; Henen 1997; McLuckie and Fridell 2002). The success rate of clutches has proven difficult to measure, but predation, while highly variable (Bjurlin and Bissonette 2004), appears to play an important role in clutch failure (Germano 1994).

Although Agassiz's desert tortoise occurs from the western Mojave Desert in California east to southwestern Utah, it consists of populations that show differences in genetics, morphology, ecology, and behavior (USFWS 2011). The USFWS used differences in genetic, ecological, and physiological characteristics to help delineate boundaries or other differences between Recovery Units. The designation of Recovery Units ensures that local adaptation as well as critical genetic diversity are maintained for Agassiz's desert tortoise (USFWS 2011). Hence, there are three Recovery Units for the desert tortoise in California.

5. KIND OF HABITAT NECESSARY FOR SURVIVAL

Describe habitat features that are thought to be important to the species' ability to maintain viable population levels. Any or all of the following features may be included, as appropriate:

Plant community; edaphic conditions; climate; light; topography/microtopography; natural disturbance; interactions with other plants or animals; associated species; elevation; migration or movement corridors; wintering habitat; breeding habitat; foraging habitat; other habitat features.

Suitable habitat for the species has been previously described in a U.S. Geological Survey (USGS) tortoise habitat model, as cited above in this Petition. However, we are providing a description of habitat characteristics below (from Nussear 2009, USFWS 1994a, USFWS 1994b, and USFWS 2011).

The habitat requirements of Agassiz's desert include sufficient suitable quantity and quality of plants for forage and cover, suitable substrates for burrow and nest sites, and low occurrence of predators. Throughout most of the Mojave region, desert tortoises occur primarily on flats and bajadas with soils ranging from sand to sandy-gravel, characterized vegetationally by scattered shrubs and abundant inter-shrub space for growth of herbaceous plants. Desert tortoises are also found on rocky terrain and slopes in parts of the Mojave region, and there is significant geographic variation in the way desert tortoises use available resources.

In the Mojave Desert, annual precipitation within known habitat ranges from 100 to 210 mm (Germano et al. 1994), mostly occurring during the winter months (> 50-75%) and infrequently as snow below 1,200 m. The temperature range within known habitat is extreme, with average daily low temperatures in January typically at or slightly below 0 ºC and average daily high temperatures in July ranging from 37 to 43 ºC (Germano et al. 1994).

In California, the desert tortoise uses the following vegetation communities:

- In the Colorado Desert Recovery Unit, vegetation communities include Succulent Scrub *(Fouquieria, Opuntia, Yucca),* Blue Palo Verde-Smoke Tree Woodland, Creosote Bush Scrub (lava flows), Blue Palo Verde-Ironwood-Smoke Tree Woodland, and Creosote Bush Scrub (rocky slopes).
- In the Eastern Mojave Recovery Unit, vegetation communities include Big Galleta-Scrub Steppe, Succulent Scrub *(Yucca, Opuntia* species), Creosote

Bush Scrub, Cheesebush Scrub (east Mojave type), and Indian Rice Grass Scrub-Steppe.

- In the Western Mojave Desert, vegetation communities include Mojave Saltbush- Allscale Scrub (endemic), Indian Rice Grass Scrub-Steppe, Hopsage Scrub, Big Galleta Scrub Steppe, Cheesebush Scrub (west Mojave type), Desert Psammophytes, and Blackbush Scrub.

The USFWS has determined that the physical and biological features (referred to as the primary constituent elements) of critical habitat that support nesting, foraging, sheltering, dispersal, and gene flow are essential to the conservation of the desert tortoise. The specific physical and biological features of Mojave desert tortoise critical habitat are:

- sufficient space to support viable populations within each of the recovery units and to provide for movement, dispersal, and gene flow;
- sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species;
- suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and
- habitat protected from disturbance and human-caused mortality.

Forage quantity and quality is limited in the range of the Mojave desert tortoise. In the Mojave and Colorado deserts, many food plants are high in potassium (Minnich 1979), which is difficult for desert tortoises to excrete due to the lack of salt glands that are found in other reptilian herbivores such as chuckwallas (*Sauromalus obesus*) and desert iguanas (*Dipsosaurus dorsalis*) (Minnich 1970; Nagy 1972). Reptiles are also unable to produce concentrated urine, which further complicates the ability for desert tortoises to expel excess potassium (Oftedal and Allen 1996). Oftedal (2002) suggested that desert tortoises may be vulnerable to disease as a result of physiological stress associated with foraging on food plants with insufficient water and nitrogen to counteract the negative effects of dietary potassium. Only high quality food plants (as expressed by the Potassium Excretion Potential, or PEP, index) allow substantial storage of protein (nitrogen) that is used for growth and reproduction, or to sustain the animals during drought. Non-native, annual grasses have lower PEP indices than most native forbs (Oftedal 2002; Oftedal et al. 2002). Oftedal et al. (2002) found that foraging juvenile tortoises favored water-rich, high-PEP, native forbs. Much of the nutritional difference between available and selected forage was attributable to avoidance of abundant, non-native split grass (*Schismus* spp.) with mature fruit, which is very low in water, protein, and PEP. Of the species eaten, *Camissonia claviformis*, a native Mojave desert primrose, accounted for nearly 50 percent of all bites, even though it accounted for less than 5 percent of the biomass encountered, and was largely responsible for the high PEP of the overall diet. Impacts to vegetation (such as livestock grazing, invasion of non-native plants [from use of roadways], and soil disturbance) that reduce the abundance and distribution of high PEP plants may result in additional challenges for foraging desert tortoises (Oftedal et al. 2002).

Non-native grasses are not as nutritious as native forbs. Recent studies have shown that calcium and phosphorus availability are higher in forbs than in grasses and that desert tortoises lose phosphorus when feeding on grasses but gain phosphorus when eating forbs (Hazard et al. 2010).

As previously stated in Section 1 "Population Density," for the desert tortoise to survive and recover, its habitat should be managed with reserve level protection (USFWS 1994a). A reserve has a primary goal of protecting biodiversity from harmful activities and processes, both natural and anthropogenic. Thus, reserve level protection for Agassiz's desert tortoise requires substantially reducing the direct and indirect impacts to the tortoise and its habitats that cause/contribute to its mortality and its recruitment if lambda is less than 1. Section 6 "Factors Affecting the Ability to Survive and Reproduce" includes a figure of the human-caused impacts to the habitat of the desert tortoise that results in mortality.

6. **FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE**

Discuss the basis for the threats to the species or subspecies, or to each population, occurrence or portion of range (as appropriate) due to one or more of the following factors:

(1) present or threatened modification or destruction of its habitat;
(2) overexploitation;
(3) predation;
(4) competition;
(5) disease; or
(6) other natural events or human-related activities.

Identify the direct, indirect, and cumulative adverse impacts and discuss how these are contributing to the decline of the species. Indicate whether the species is vulnerable to random catastrophic events.

Information on these factors (e.g., habitat modification/destruction, predation, disease, etc.) has been provided in the above responses. A summary of these anthropomorphic threats and their interactions is provided in Figure 2 (below).

In addition, the desert tortoise is vulnerable to catastrophic events such as wildfire and flooding. Wildfire threat has increased dramatically over the past 100 years due to colonization of tortoise habitat by invasive, non-native species such as cheatgrass (*Bromus tectorum*), red brome (*Bromus madritensis* ssp. *rubens*) and Mediterranean splitgrass (*Schismus barbatus*). These annual grasses germinate early, compete with and displace native species of forbs and grasses for moisture and nutrients (Brooks 1999a, Brooks 1999b).

These non-native plants also form a dense and expansive layer of dry plant material in shrub communities at the end of the growing season that is highly flammable – substantially contributing to an area's wildfire fuel load. Affected native plant communities can sometimes recover from wildfire over an extensive time period; but many become type-converted to a flammable grass community following intense fire, resulting in a modified tortoise habitat of generally low quality which generally lacks constituent elements of this species' native habitat (Brooks and Esque 2002, Brooks and Matchett 2003).

While flooding due to intense monsoon thunderstorms is relatively common in the eastern half of the species range in California, and rare in the western half, recent climate models predict that more frequent and intense thunderstorms are anticipated over time as a result of climate change. Overall rainfall is expected to decrease, but intense storms will likely become more common. Three climate model projections for the California Desert region show increased precipitation during winter months over the entire area, but one model predicts the greatest rainfall increase in winter and also a large increase in summer precipitation. One climate change model projects increasing precipitation throughout the 21st century with a much wetter future overall despite a decline in spring and, to a lesser extent, fall rains (Bachelet et al. 2016).

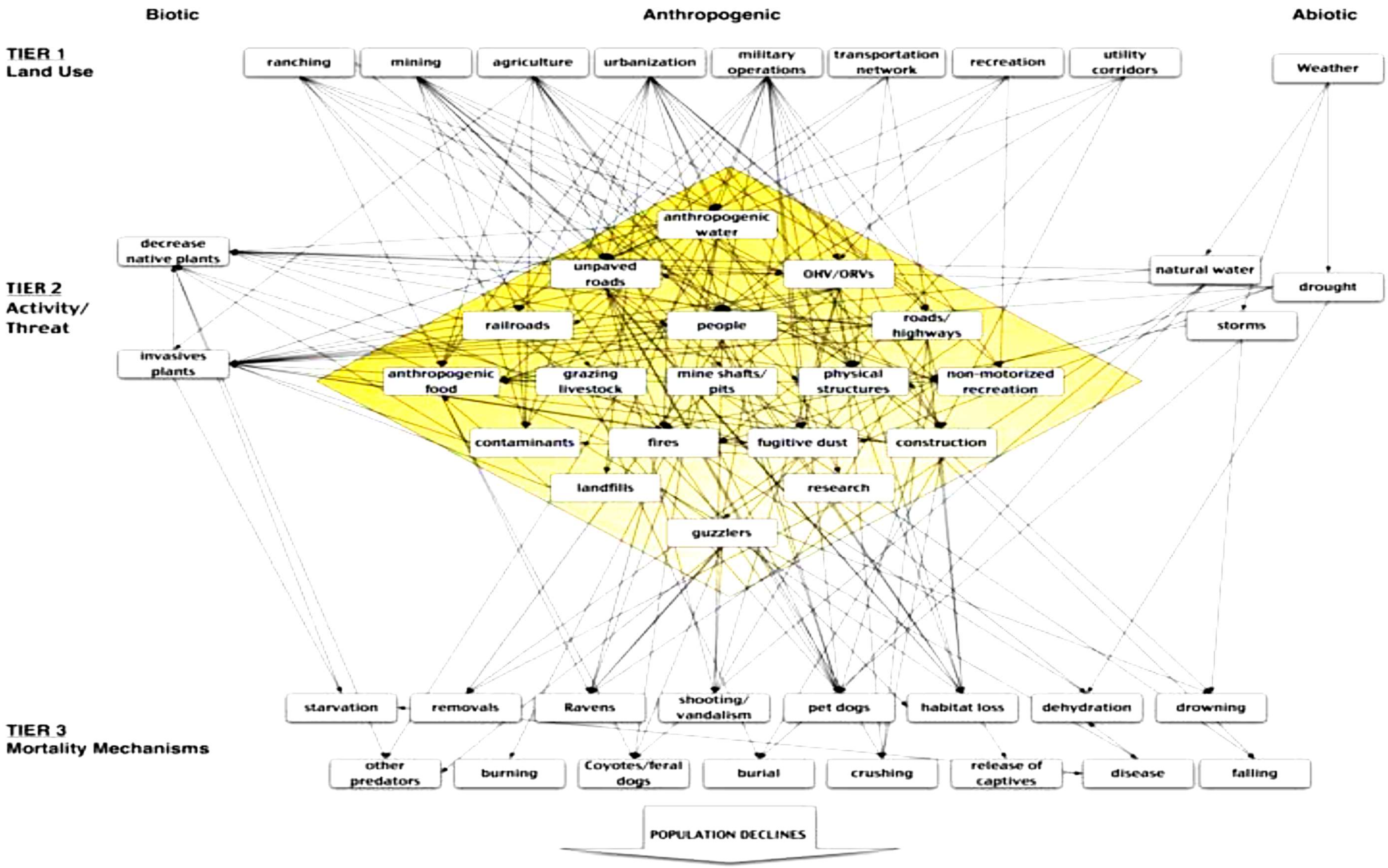

Figure 2. Network of threats demonstrating the interconnectedness between multiple human activities that interact to adversely impact tortoise populations. Tier 1 includes the major land use patterns that facilitate various activities (Tier 2) that impact tortoise populations through a suite of mortality factors (Tier 3). (From Tracy et al. 2004)

7. **DEGREE AND IMMEDIACY OF THREAT**

Indicate the immediacy of the threat and the magnitude of loss or rate of decline that has occurred to the present or is expected to occur without protective measures.

Desert tortoise populations in California have declined by approximately 90% since surveys were initially conducted starting in 1975, and also declined by over 50% since line-distance sampling began in 2004. Nine out of 10 populations in critical habitat units are now below the minimum viable density of adult tortoises ($3.9/km^2$ or $10/mi^2$), and the steep population declines are continuing. This situation results in populations that have little or no resilience to stochastic events (e.g., drought, disease, fire, etc.) and are likely to become extinct in the foreseeable future.

Additional protective measures need to be implemented immediately to prevent desert tortoise populations from becoming extinct in California. Conservation and recovery actions funded and implemented to date have proven ineffective as demonstrated through line-distance sampling and the annual reports published by the Desert Tortoise Recovery Office. There is an urgent need to ensure the survival of adult tortoises, and especially reproductive females, so that populations can slowly recover; and to drastically reduce loss of hatchling and immature individuals due to predation by excessive raven populations.

Detailed information on threats to Agassiz's desert tortoise are described above in Sections 1 ("Population Trends"), 2 ("Range and Distribution"), 3 ("Abundance") and 6 ("Factors Affecting Ability to Survive and Reproduce").

8. **IMPACT OF EXISTING MANAGEMENT EFFORTS**

Describe any ongoing protective measures or existing management plans for the species or its habitat. Information on species or land management activities that are impacting populations or portions of the range and information on proposed land-use changes should be included. This may be best accomplished by discussing populations or portions of the range, where a chart display may be useful.

Include available information on any or all of the following:

(1) property ownership/jurisdiction for known populations or portions of the range;

The following information on property ownership/jurisdiction for populations of the desert tortoise in California is from the USFWS Federal Register Notice on designation of critical habitat (USFWS 1994B) and additional land acquisition and jurisdictional changes occurring after 1994:

4,754,000 acres of critical habitat was designated in California with the following ownership/jurisdictions and acreage:

- BLM: 2,968,300 acres
- National Park Service: 828,000 acres

- Department of Defense: 450,200 acres
- State of California: 132,900 acres
- Private: 1,051,500 acres

Current and historic desert tortoise habitat loss, deterioration, and fragmentation is largely attributable to urban development, military operations, and multiple-uses off public land, such as off-highway vehicle (OHV) activities and livestock grazing.

(2) current land use;

Federal land managed by the BLM: These federal lands are managed by BLM under provisions in the CDCA Plan, most recently amended by the DRECP and the West Mojave Plan, and are managed to provide a variety of multiple uses including livestock grazing, utility rights of way, livestock grazing, OHV use, wildlife habitat management, wilderness and wild and scenic rivers. The CDCA Plan prohibits or restricts some lands uses within desert tortoise conservation areas, such as renewable energy projects and pipelines, but the plan has been amended many times to allow for these uses to occur. We anticipate that the BLM will propose to significantly diminish biological resources conservation lands and conservation actions in the near future when it releases an amended DRECP.

Federal land managed by the National Park Service: These federal lands are located within the Mojave National Preserve and Joshua Tree National Park. They are managed under provisions of General Management Plans, which emphasize natural and cultural resources protection.

Lands managed by the State of California: These lands are managed primarily by the California Department of Parks and Recreation and state parks and preserves, and by the California Department of Fish and Wildlife as State Wildlife Areas and State Ecological Reserves. High quality habitat for the desert tortoise occurs in the Western Mojave and Fremont Valley Ecological Reserves. The are managed for conservation with limited public use allowed, but unauthorized OHV use frequently occurs due to limited law enforcement capability.

Federal land managed by the Department of Defense: These federal lands are located within four large installations (China Lake Naval Air Weapons Station, Edwards Air Force Base, Fort Irwin, the Marine Corps Air Ground Combat Center, and the Chocolate Mountains Gunnery Range). They are used primarily for weapons development and testing, aircraft testing and research, and military training. Natural resources within these installations, including the desert tortoise, are managed under provisions of Integrated Natural Resource Management Plans.

Private lands: Private lands designated as critical habitat are typically interspersed among federal lands managed by the BLM and National Park Service. They are managed by local agencies under county General Plans for a variety of land uses that include residential development, agriculture, open space, mining, etc. Activities that would impact the desert tortoise or adversely modify critical habitat would require the project proponent to obtain an incidental take permit from the

CDFW and USFWS, the latter of which would require preparation and implementation of a Habitat Conservation Plan.

(3) protective measures being taken, if any, and effectiveness of current management activities;

Federal lands have a variety of protective measures in place to minimize or compensate for adverse impact to the desert tortoise and its habitat. The most protective measures are associated with National Park Service General Management Plans for the Mojave National Preserve and Joshua Tree National Park where conservation of natural and cultural resources is paramount. However, with high public visitation, these park units have experienced loss of desert tortoises due to mortality due to vehicle strikes. Speed limit signing and law enforcement patrols have had little effect in reducing threats due to vehicle strikes.

Department of Defense lands have a wide range of effects on the desert tortoise and its habitat. Installations used for large-scale mechanized training and live-fire of weapons (e.g., Fort Irwin and the Marine Corps Air Ground Combat Center) have resulted in loss and fragmentation of habitat and loss of tortoise hatchlings and juveniles that were not detected during capture and translocation operations. However, activities at the China Lake Naval Air Weapons Station and Edwards Air Force Base typically do not disturb significant amounts of habitat because their weapons development and testing activities occur within designated military airspace, with very limited use of habitat for weapons impact sites.

In order to minimize direct mortality of desert tortoises from large-scale projects, such as solar energy generation facilities, the CDFW and USFWS typically require that desert tortoises be captured and translocated to secured habitat as close to the site as possible, and that the project site be fenced to prevent tortoises from entering the facility. Translocation is considered an experimental technique to minimize mortality, but it has undergone improvements over time, resulting in higher levels of tortoise survival following translocation in the short-term. Long term effects are being studied. Short-term adverse impacts documented through field studies include mortality due to environmental exposure, elevated predation, dehydration and lower reproductive activity.

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(4) current research on the species;

Current research on the desert tortoise includes:

1) annual population estimates in Critical Habitat Units using line distance sampling;

2) disease occurrence and related mortality;

3) toxic elements in blood and liver tissue;

4) experimental translocation,

5) captive breeding and survival of young individuals into natural settings; and

6) existing management/recovery plans and the extent of their implementation.

The initial and subsequent recovery plans include recommendations for management of the species and its habitat that will contribute to the goal of recovery and eventual delisting, provided recovery goals are met.

With regard to the 1994 recovery plan, the USFWS stated in its 1994 rule (USFWS 1994b) for designation of Critical Habitat, that "*Desert tortoise populations have declined substantially throughout the Mojave Region in the last 2 decades, primarily due to habitat loss. These populations grow slowly, and significant improvement in the status of the Mojave population will be a very long process, measured in decades or centuries in most parts of the Mojave Region*."

Although the USFWS designated Critical Habitat for the Mojave population of the desert tortoise in 1994, it stated in the final rule (USFWS 1994b):

"*Designating critical habitat does not create a management plan, it does not establish numerical population goals, it does not prescribe specific management actions (inside or outside of critical habitat), nor does it have a direct effect on areas not designated as critical habitat. Specific management recommendations for critical habitat are more appropriately addressed in recovery plans, management plans, and section 7 consultations*."

Of the 4,754,000 acres of Critical Habitat in California, 2,968,300 acres are public lands managed by the BLM. Recovery of the species is largely dependent on provisions in that agency's CDCA Plan that protect Critical as well as non-Critical Habitat (e.g., linkage habitats between CHUs) through effective and timely implementation of specific management actions that reduce threats, and protect and restore elements of the habitat that Agassiz's desert tortoise requires for survival, growth and reproduction.

Subsequent to the federal listing of the desert tortoise as threatened in 1990, the CDCA Plan was amended through several regional plan amendments that added goals and objectives and specific management actions intended to contribute to the recovery of the species. A few of these regional plan amendments included:

1) Northern and Eastern Mojave Plan (BLM 2002);
2) Northern and Eastern Colorado Desert Plan (BLM and CDFG 2002);
3) Western Colorado Desert Plan (BLM 2003):
4) West Mojave Plan (BLM et al. 2006); and
5) Desert Renewable Energy Conservation Plan (BLM 2016)

BLM's 2002, 2003 and 2006 regional plan amendments to the CDCA Plan established Areas of Critical Environmental Concern (ACECs) and associated land use restrictions to protect tortoise habitat; largely corresponding to Critical Habitat designated for the species in 1994. These amendments allowed off-highway vehicle use to continue on designated open routes, as well as livestock grazing with limitations on season of use and forage utilization.

These plan amendments did not envision renewable energy development demand on public lands, an issue that emerged in approximately 2007 when right-of-way applications for large-scale solar energy and wind energy projects were filed with the BLM on over 100,000 acres of public land. As a result, 10 large-scale solar energy projects were approved in occupied tortoise habitat, outside of Critical Habitat in the Ivanpah Valley, Chuckwalla Valley, Blythe Mesa and the central Mojave of California, totaling 31,578 acres.

Off-highway vehicle routes were also designated in these regional plan amendments within Agassiz's desert tortoise habitat as open, closed or, in rare instances, as limited to certain types of vehicles. BLM's route designation on 3 million acres of public land in the West Mojave Plan (WEMO) area was found to have violated the provisions of the National Environmental Policy Act, Executive Orders, and regulations governing the use of off-highway vehicles on public land, and the CDCA Plan.

Subsequently, BLM (2019) revised the WEMO Plan route designation to address these legal deficiencies. Defenders of Wildlife urged the CDFW to review and comment on this plan when it was being developed, but that did not happen. Unfortunately, the final plan established open routes and livestock grazing in Critical Habitat that were largely the same as in the 2006 WEMO Plan, with a few deleterious additions, including promoting unrestricted motorized vehicle use on

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dry lake beds in Critical Habitat and introducing competitive event corridors through Critical Habitat.

In its request for formal consultation with the USFWS, the BLM determined the DRECP amendments of 2016 to the CDCA Plan would adversely affect both Agassiz's desert tortoise and its Critical Habitat. It is noteworthy that the DRECP established "development caps" within tortoise ACECs ranging from 0.1% - 0.5%; the latter of which applies to all Critical Habitat Units. However, these development caps do not include the effects of livestock grazing or indirect effects of off-highway vehicle use and development projects whose impacts extend beyond the direct footprint of the projects and vehicle routes. Standardized compensatory mitigation ratios were also established at 5:1 in Critical Habitat and 1:1 outside of Critical Habitat; and 2:1 within mapped tortoise habitat linkages that connect conservation areas (i.e., ACECs).

Although these various amendments to the CDCA Plan were intended to contribute to the recovery of Agassiz's desert tortoise (e.g., BLM 2016, BLM et al. 2005), the results of line distance sampling conducted by the USFWS DTRO show those intentions have not been met. They show tortoise populations in all Critical Habitat Units within California as continuing to decline rapidly, with most below the minimum viable density of 3.9 adults per square kilometer.

In its biological opinion for the DRECP adopted by the BLM in 2016, the USFWS (2016b) stated:

"*Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat (which overlap the desert wildlife management areas for the most part and are the management units for which most data are collected) to the extent that the conservation value and function of critical habitat is, to some degree, compromised*."

And that,

"*Unauthorized off-road vehicle use continues to disturb habitat and result in loss of vegetation within the boundaries of critical habitat (e.g., Coolgardie Mesa in the Western Mojave Recovery Unit); although we have not documented the death of desert tortoises as a direct result of this activity, it likely occurs. Additionally, the habitat disturbance caused by this unauthorized activity exacerbates the spread of invasive plants, which displace native plants that are important forage for the desert tortoise, thereby increasing the physiological stress faced by desert tortoises*."

The USFWS (2016b) also concluded that under the DRECP amendments:

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"…*development of renewable energy facilities …would remove or degrade up to 11,290 acres of desert tortoise habitat within the action area*."

Of these, 4,734 acres are within Critical Habitat. However, the biological opinion does not address the effects of future renewable energy projects that may be proposed outside of Development Focus Areas (DFAs) for renewable energy; namely public lands now termed General Public Lands and Variance Process Lands.

The only documented exception to these ongoing declines is in the DTRNA in the Western Mojave Recovery Unit. The USFWS did not designate Critical Habitat for Agassiz's desert tortoise in this area because the existing reserve-level protection provisions largely eliminated threats to the species and its habitat, including:

1) closure to all off-highway vehicle use;
2) closure to all livestock grazing;
3) closure to mineral development; and
4) a protective perimeter fence to prevent trespass of vehicles and livestock.

Recent field research has confirmed that these protective actions have been effective in reversing ongoing declines in the Agassiz's desert tortoise population within the DTRNA compared to adjacent areas lacking these protective measures.

Berry et al. (2014) surveyed 260 km^2 in the Western Mojave Desert to evaluate relationships between condition of tortoise populations and habitat on lands that have experienced three different levels of management and protection. The DTRNA was most protected; Critical Habitat designated for the desert tortoise in the Western Rand Mountains Area of Critical Environmental Concern was considered moderately protected; and private lands were considered to have no protection.

The researchers found that live tortoise density was:

1) Six-times greater inside the DTRNA compared to adjacent Critical Habitat where intensive off-highway vehicle use occurs on a designated route network; and
2) Four-times greater than on adjacent private lands.

The crude annual death rates for adult tortoises was lowest in the DTRNA (2.8% per year), followed by private lands (6.3% per year) and Critical Habitat (20.4% per year). The high death rates in Critical Habitat were of particular concern. When causes of death could be determined, they included vehicle crushing, gunshot, and predation by ravens and mammals.

(6) *Proposed land-use changes (include knowledge of forthcoming California Environmental Quality Act documents that may or should address impacts, and lead agencies involved);*

On 2/1/2018, the BLM issued a notice it intended to amend the DRECP in response to President Trump's executive orders requiring federal agencies to review regulations that unnecessarily impede energy development and deployment of broadband telecommunication facilities. We anticipate that BLM will propose amendments to the DRECP that reduce conservation lands designated in 2016, allow renewable energy development in ACECs and eliminate compensatory mitigation for land uses that adversely impact habitat for various focal species, including the desert tortoise. Proposed amendments to the DRECP are expected to be released for public review and comment in the spring of 2020. The BLM's notice is available here: https://www.blm.gov/california/BLM-to-consider-changes-desert-renewable-energy-conservation-plan.

(7) *County general plans, federal and State agency plans/actions or other plans/actions that address or should address the species*.

At this time, we are aware of only one local agency plan that places restrictions on development of renewable energy projects on private land, the Renewable Energy and Conservation Element of the San Bernardino County General Plan. That element of the General Plan restricts utility-scale solar energy development to private lands within DFAs designated by the BLM.

9. SUGGESTIONS FOR FUTURE MANAGEMENT

Describe activities that may be necessary to ensure future survival of the species after listing or delisting. Include recommendations for any or all of the following:

Although the desert tortoise is currently listed as threatened under the CESA and ESA, we provide recommendations for additional management actions that would promote its recovery under applicable items, below.

(1) *activities that would protect existing populations (site maintenance, preserve design establishment, etc.);*

While a majority of Agassiz's desert tortoise Critical Habitat in California has been designated as ACECs by the BLM for habitat protection and to promote recovery of the species, the types and intensity of land use activities allowed and

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authorized on a regular basis within these areas continue to adversely impact the species. These ACECs should be managed as biological reserves in a manner similar to the DTRNA, where activities that adversely impact the species are largely prohibited (e.g., off-highway vehicle use, use of unlicensed motorized vehicles, and livestock grazing). This management level was stated in the 1994 Recovery Plan as a recovery action. However, this is not occurring.

Fencing highways and roads with tortoise exclusion fence would eliminate these linear features as population sinks and greater reduce the “road effect zone.” This action would reduce tortoise mortality. Fencing highways is occurring in Nevada.

(2) *monitoring programs and studies;*

Science-based systematic monitoring of the impacts of off-highway vehicle use and livestock grazing is needed to assess the magnitude and extent of impact these activities have on Agassiz’s desert tortoise, which would be used to develop additional protective measures or restrictions through the adaptive management process. Such systematic monitoring has not been initiated in California.

However, the BLM and others have developed an extensive bibliography of reliable information on the known adverse impacts of both recreational vehicle use and livestock grazing upon Agassiz’s desert tortoise, some of which follows:

D.S. Ouren, et al. 2007. Report prepared for U.S. Geological Survey. Environmental Effects of Off-highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated Bibliographies, Extensive Bibliographies, and Internet Resources. Open File Report 2007-1353. https://pubs.usgs.gov/of/2007/1353/report.pdf.

R.H. Webb. H.G. Wilshire. 1983. Environmental Effects of Off-highway Vehicles. Impacts and Management in Arid Regions. https://www.springer.com/gp/book/9781461254560.

H.G. Wilshire, J.E. Nielson, and R.W. Hazlett. 2008. The American West at Risk. Science, Myths, and Politics of Land Abuse and Recovery. https://onlinelibrary.wiley.com/doi/full/10.1002/ldr.1070.

D.L. Donahue. 1999. The Western Range Revisited. Removing Livestock from Public Lands to Conserve Native Biodiversity. https://digitalrepository.unm.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1572&context=nrj.

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(3) *needed amendments to existing management and land-use plans, including county general plans;*

The CDCA Plan is the primary document guiding management of public lands and was initially adopted in 1980 and amended many times over the past 39 years, such as by the DRECP in 2016 and by earlier regional plan amendments, identified above. The BLM finalized the West Mojave Plan Route Network and Livestock Grazing amendments to the CDCA Plan in 2019. (https://www.blm.gov/programs/planning-and-nepa/plans-development/california/west-mojave-plan-route-network).

Based on a thorough review of the CDCA Plan, we recommend that it be further amended to:

- eliminate livestock grazing in desert tortoise Critical Habitat and habitat linkages;
  restrict the use of unlicensed or non-street legal off-highway vehicles to BLM-designated Open Areas;
- close and restore all redundant vehicle routes in desert tortoise Critical Habitat and habitat linkages;
- establish a 15 mile per hour vehicle speed limit in all desert tortoise Critical Habitat;
- establish seasonal and/or temporary closure of motorized vehicle routes to off-highway vehicle use during the spring season and during precipitation events when standing water is on dirt roads and trails; and
- enforce existing restrictions and the restrictions suggested above in Critical Habitat areas.

(4) *agencies/organizations that should be involved in planning and implementing management and recovery actions;*

BLM (California Desert District and Field Offices); Department of Defense (Fort Irwin, MCAGCC, China Lake, Edwards Air Force Base, Chocolate Mountain Aerial Gunnery Range); California Department of Parks and Recreation; CDFW; Caltrans; respective planning departments in Kern County, San Bernardino County, Riverside County, Imperial County, and Inyo County.

(5*) other activities that would help protect existing habitat or ensure survival of the species;*

Plan for and implement effective and timely control of common raven populations within all Desert Tortoise Recovery Units with priority given to Critical Habitat Units within the Western Mojave Recovery Unit.

(6) *how other sensitive species (listed and unlisted) may benefit from protection of this species*; and

(7); *how other species/habitats may be impacted by management and recovery activities for this species*.

The state-listed Threatened Mohave ground squirrel would benefit because its declining range overlaps with the Agassiz's desert tortoise in large portions of the Western Mojave Recovery Unit. In addition, several federal and state-listed and sensitive plant species would benefit, such as the Barstow woolly sunflower, Desert cymopterus, Lane Mountain milk-vetch, Mojave monkeyflower, Mojave tarplant, Parish's daisy, and Triple-ribbed milk-vetch.

(8*) at what point this species would be considered stable and sustainable.*

The U.S. Fish and Wildlife established recovery criteria for the desert tortoise in its 1994 and Revised 2011 Recovery Plans. Recovery criteria include the management or elimination of threats, and addressing the five statutory delisting factors. However, at the time the Revised Recovery Plan was finalized, the USFWS considered the following three criteria applicable due to lack of information on the degree of threat posed by certain activities.

<u>Recovery Objective 1 (Demography)</u>. Maintain self-sustaining populations of desert tortoises within each Recovery Unit into the future.

> *<u>Recovery Criterion 1</u>. Rates of population change (λ) for desert tortoises are increasing (i.e., λ > 1) over at least 25 years (a single tortoise generation).*

<u>Recovery Objective 2 (Distribution)</u>. Maintain well-distributed populations of desert tortoises throughout each Recovery Unit.

> *<u>Recovery Criterion 2</u>. Distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years (i.e., ψ [occupancy] > 0).*

<u>Recovery Objective 3 (Habitat)</u>. Ensure that habitat within each Recovery Unit is protected and managed to support long-term viability of desert tortoise populations.

> *<u>Recovery Criterion 3</u>. The quantity of desert tortoise habitat within each desert TCA is maintained with no net loss until tortoise population*

viability is ensured. When parameters relating habitat quality to tortoise populations are defined and a mechanism to track these parameters established, the condition of desert tortoise habitat should also be demonstrably improving.

The Revised Recovery Plan estimated that if all the recovery actions were implemented and were successful, desert tortoise recovery would be expected to occur by the year 2025. However, since none of the recovery criteria have been met, especially positive rates of change in populations over at least 25 years, recovery will take much longer, likely multiple decades or perhaps over 100 years.

10. **AVAILABILITY AND SOURCES OF INFORMATION**

Cite literature, available specimen collection records, and other pertinent reference materials. Attach documents critical to the recommended action. Be sure to include recent status surveys. List names, addresses, and telephone numbers of persons providing unpublished information and list those supporting the recommended action.

All cited literature used in this petition are identified above and full citations are included in Attachment 4 (Literature Cited), with many having website links to documents. Additional sources of information in support of this petition include:

U.S. Fish and Wildlife Service, Desert Tortoise Recovery Office. https://www.fws.gov/nevada/desert_tortoise/dtro/

Desert Tortoise Council Symposium (1976-2019) Text-searchable Proceedings https://deserttortoise.org/annual-symposium/symposium-proceedings/

Desert Tortoise Council Plans and Best Management Practices https://deserttortoise.org/library/plans-bmps/

Berry, K.H., Lyren, L.M., Mack, J.S., Brand, L.A., and Wood, D.A., 2016, Desert tortoise annotated bibliography, 1991–2015: U.S. Geological Survey Open-File Report 2016-1023, 312 p., http://dx.doi.org/10.3133/ofr20161023.

J.P. Hohman, R.D. Ohmart, and J. Schwartzmann. 1980. An Annotated Bibliography of the Desert Tortoise, Gopherus agassizii. Desert Tortoise Council Special Publication No. 1. https://deserttortoise.org/ocr_DTCdocs/1980.1AnnotatedBibliography-DesertTortoise-OCR.pdf.

11. **DETAILED DISTRIBUTION MAP**

Delineate on appropriate maps the historic and present distribution (estimated if not known). Include one map of California showing general distribution, and U.S. Geological Survey topographical maps (or equivalent) of appropriate scale, for more detailed distribution information, including locations of occurrences, populations or portions of populations, as appropriate. Include historic and current distribution as documented by literature, museum records, California Natural Diversity Data Base and other California Department of Fish and Wildlife records, and testimony of knowledgeable individuals. All maps must be suitable for black and white reproduction and fully labeled, including borders, base map name, map scale and species name, and should not exceed 11" x 14" in size.

Distribution maps of the desert tortoise are available on the following website links:

https://www.fws.gov/nevada/desert_tortoise/dt/images/tortoisemap-large.jpg

https://www.fws.gov/nevada/desert_tortoise/documents/publications/2013-Conserving-popln-linkages-mdt.pdf

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2660&inline=1

CONCLUSION

Thirty years after its listing as Threatened under provisions of the California and federal Endangered Species Acts, Agassiz's desert tortoise is in much worse condition than it was in 1990, and the number and severity of threats have increased. Threats to the species at the time of the 1990 federal listing as Threatened have not abated; they are becoming more widespread and intense.

Tortoises and their habitats are impacted by a myriad of authorized and illegal human activities that degrade or eliminate suitable creosote bush scrub and other vegetation communities needed as habitat, subsidize predators whose increased numbers prey on tortoises, and facilitate invasion of non-native species of plants that degrade habitat quality and displace native forbs and grasses needed for adequate nutrition and reproduction/recruitment.

Based on systematic USFWS-funded line distance sampling conducted by the Service's Desert Tortoise Recovery Office, from 2004 through 2014, adult tortoises in the three California Recovery Units declined by 51.3 percent over 10 years; and 9 of the 10 populations in these Recovery Units in California were below viability density. This decline is a continuation of an ongoing decline since the 1980s as documented by the data from permanent study plots on the CHUs and Recovery Units for the tortoise in California.

Based on the best available scientific information, as identified and summarized in this petition, naturally-occurring populations of Agassiz's desert tortoise are on the verge of extirpation in California from a variety of human-related threats. Defenders of Wildlife,

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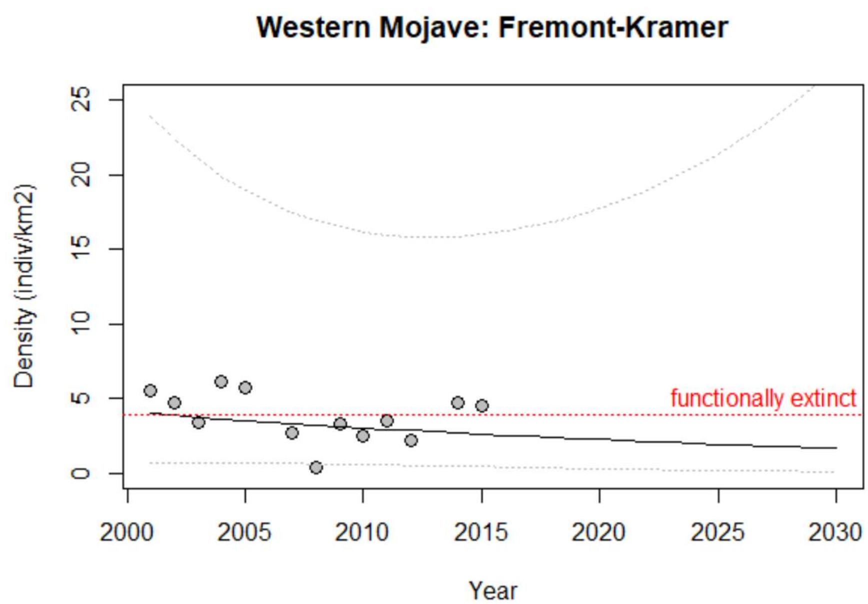
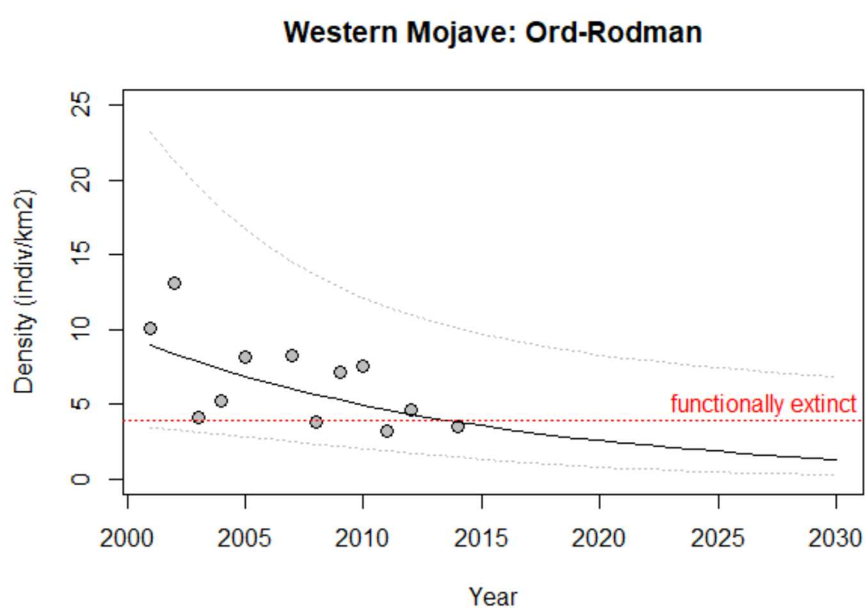
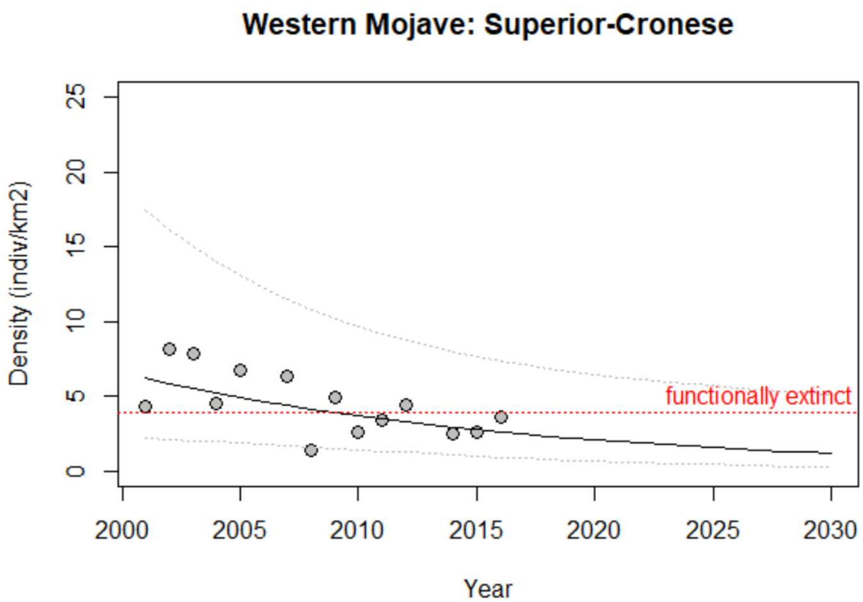
Desert Tortoise Council and Desert Tortoise Preserve Committee believe changing the status of Agassiz's desert tortoise from threatened to endangered under provisions of the California Endangered Species Act will more accurately reflect the status of the species under CESA; result in a higher-level of analysis of impacts from land use activities by CDFW; will result in more effective measures to avoid and minimize incidental take; and will result in higher levels of compensatory mitigation for unavoidable impacts. Combined, these outcomes will contribute to halting the decline of Agassiz's desert tortoise in California and provide conditions conducive to its recovery.

Attachment 1: Graphs of adult desert tortoise populations in Critical Habitat Units (CHU) in California, including minimum viable population density threshold (red dotted line = functionally extinct) and projected extirpation or extinction date. Population data are from USFWS line distance sampling reports.

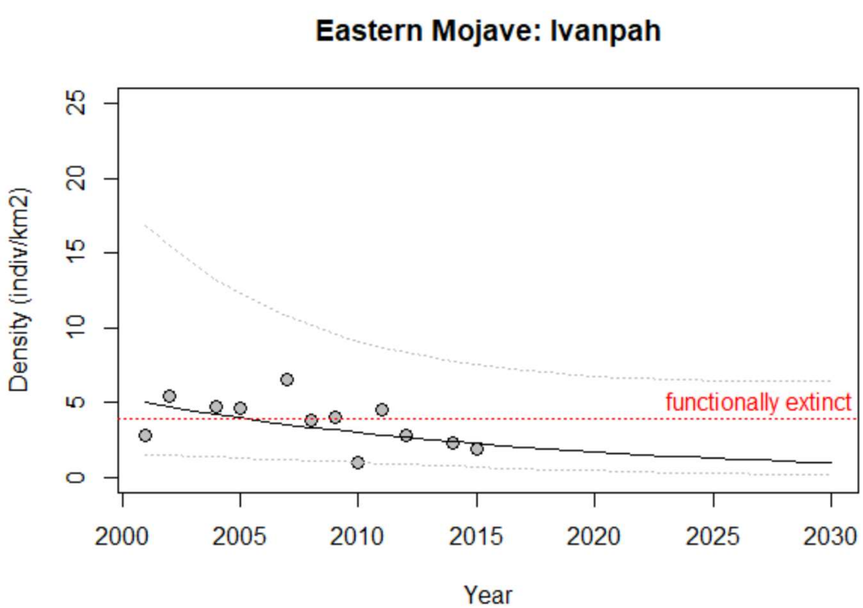
Western Mojave Recovery Unit



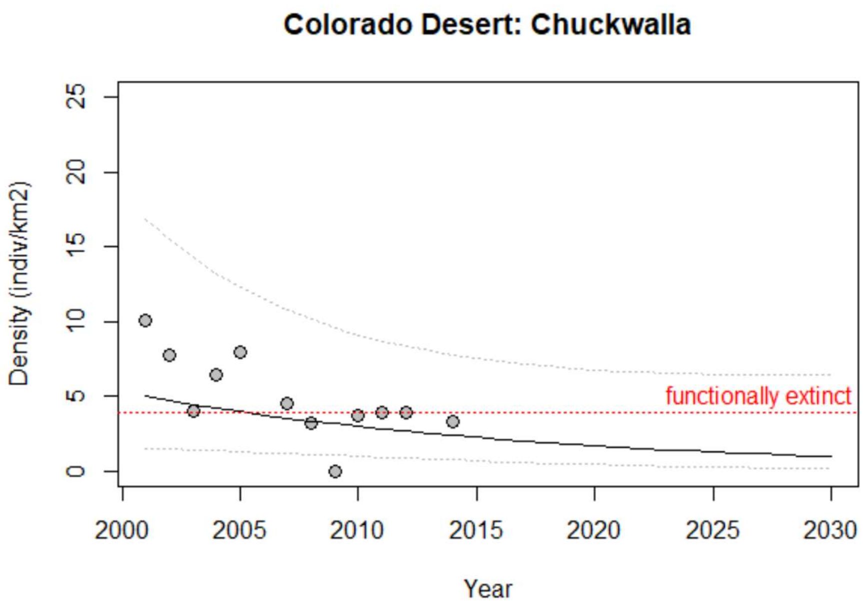


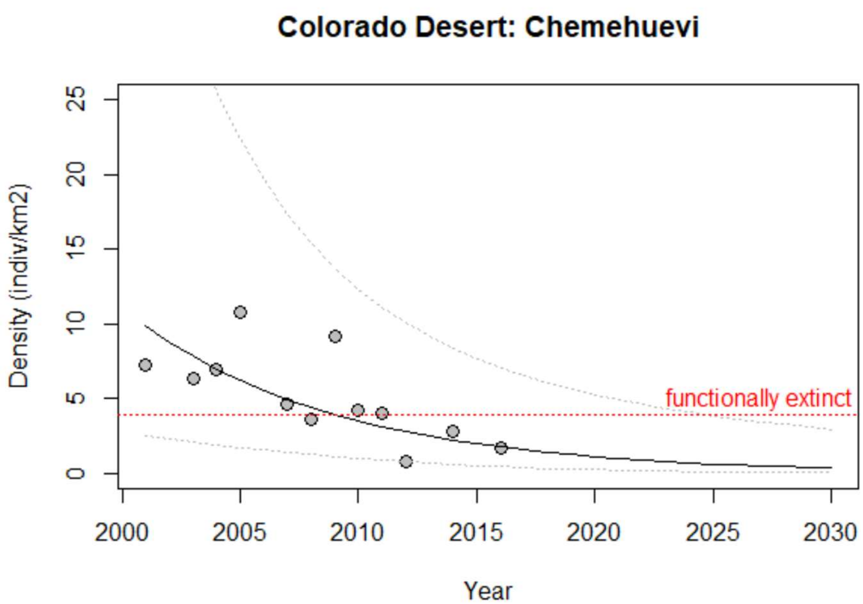


Eastern Mojave Recovery Unit

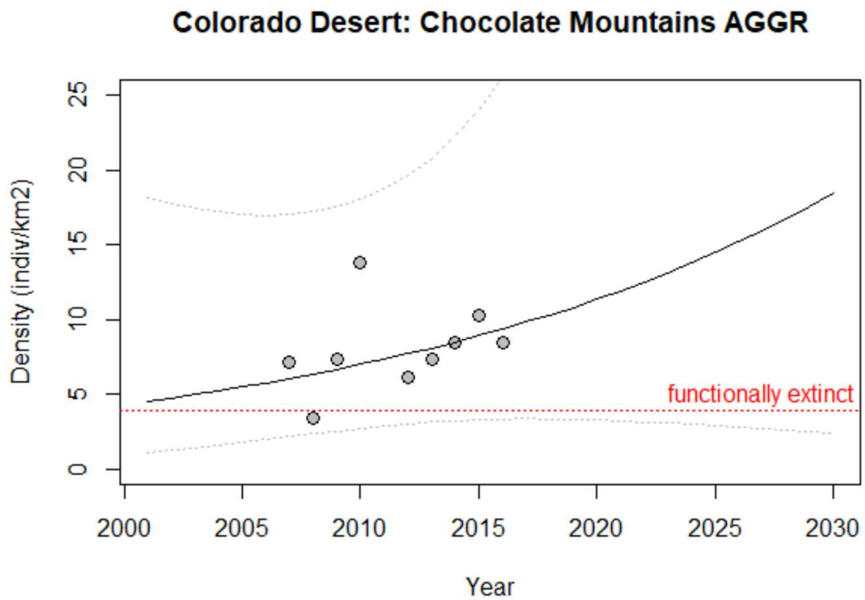


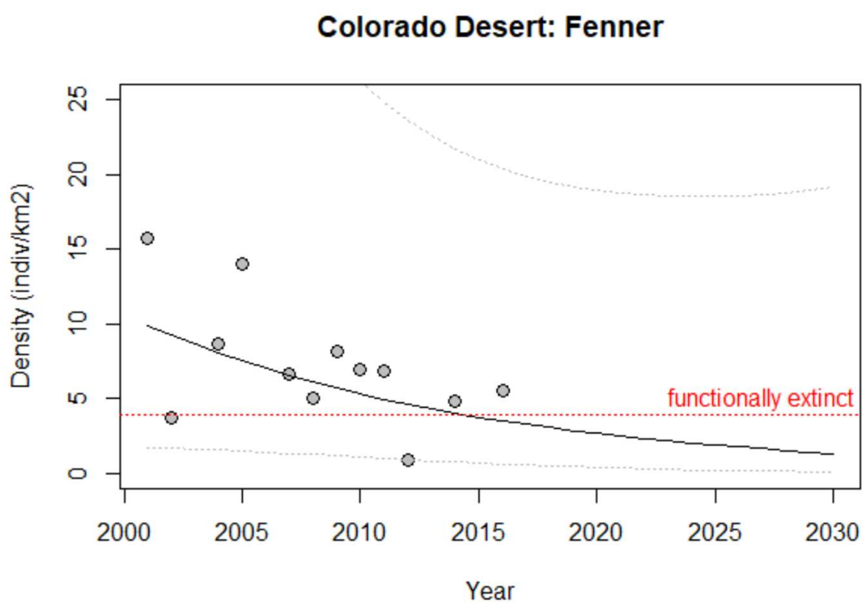
Colorado Desert Recovery Unit



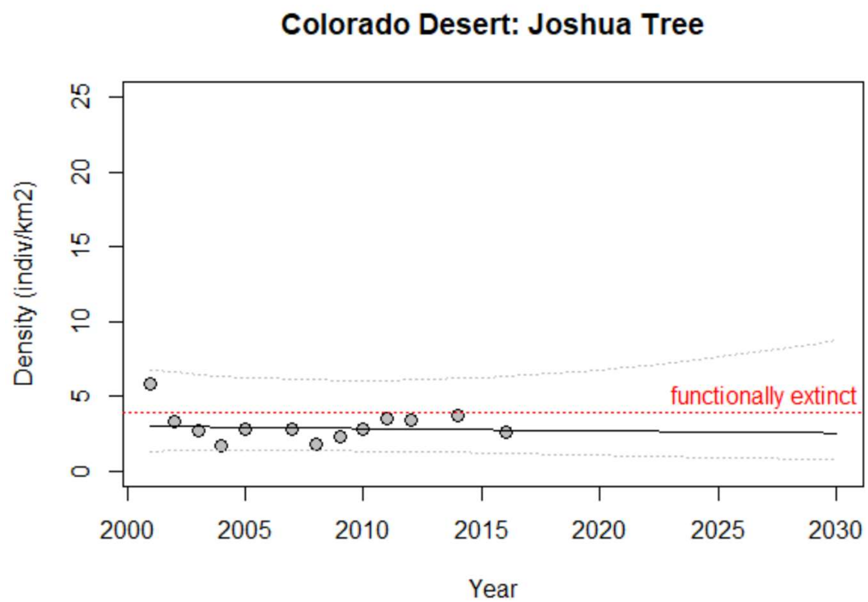


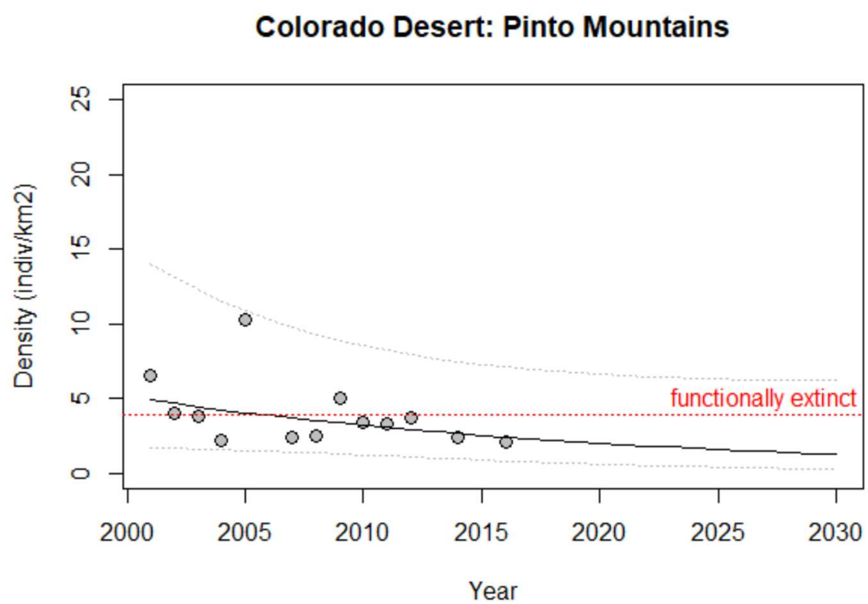
Colorado Desert Recovery Unit (continued)



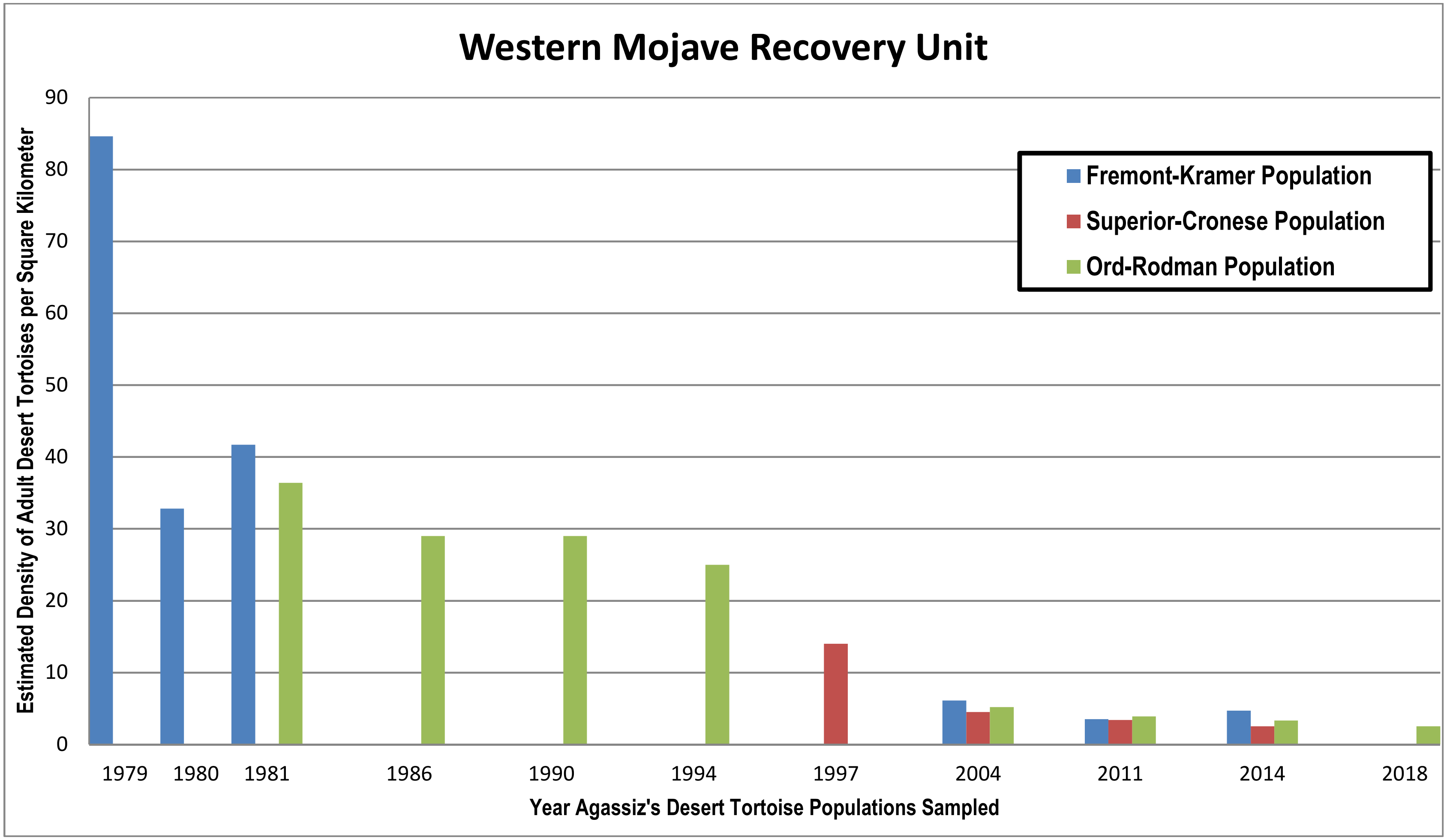


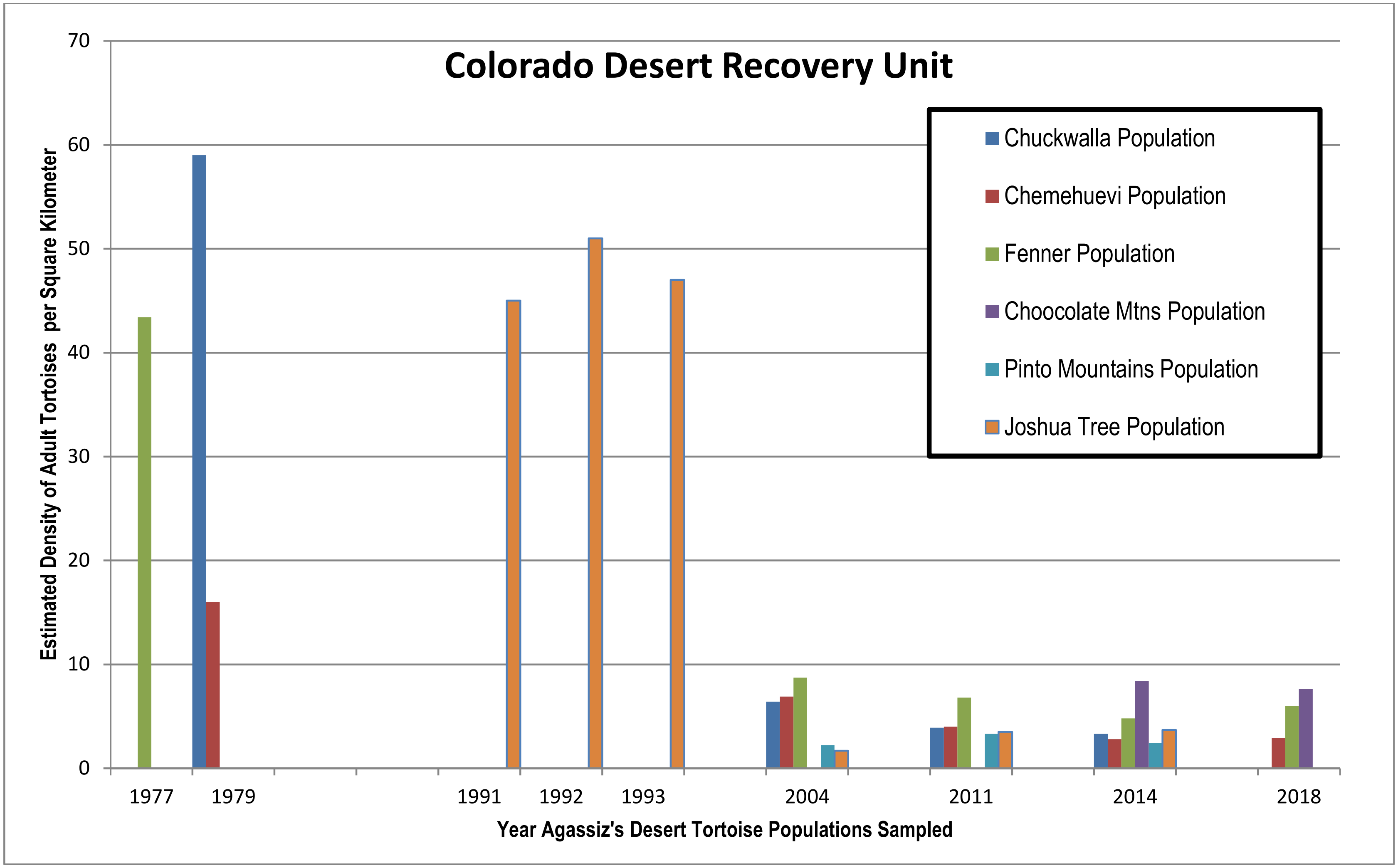
Colorado Desert Recovery Unit (continued)

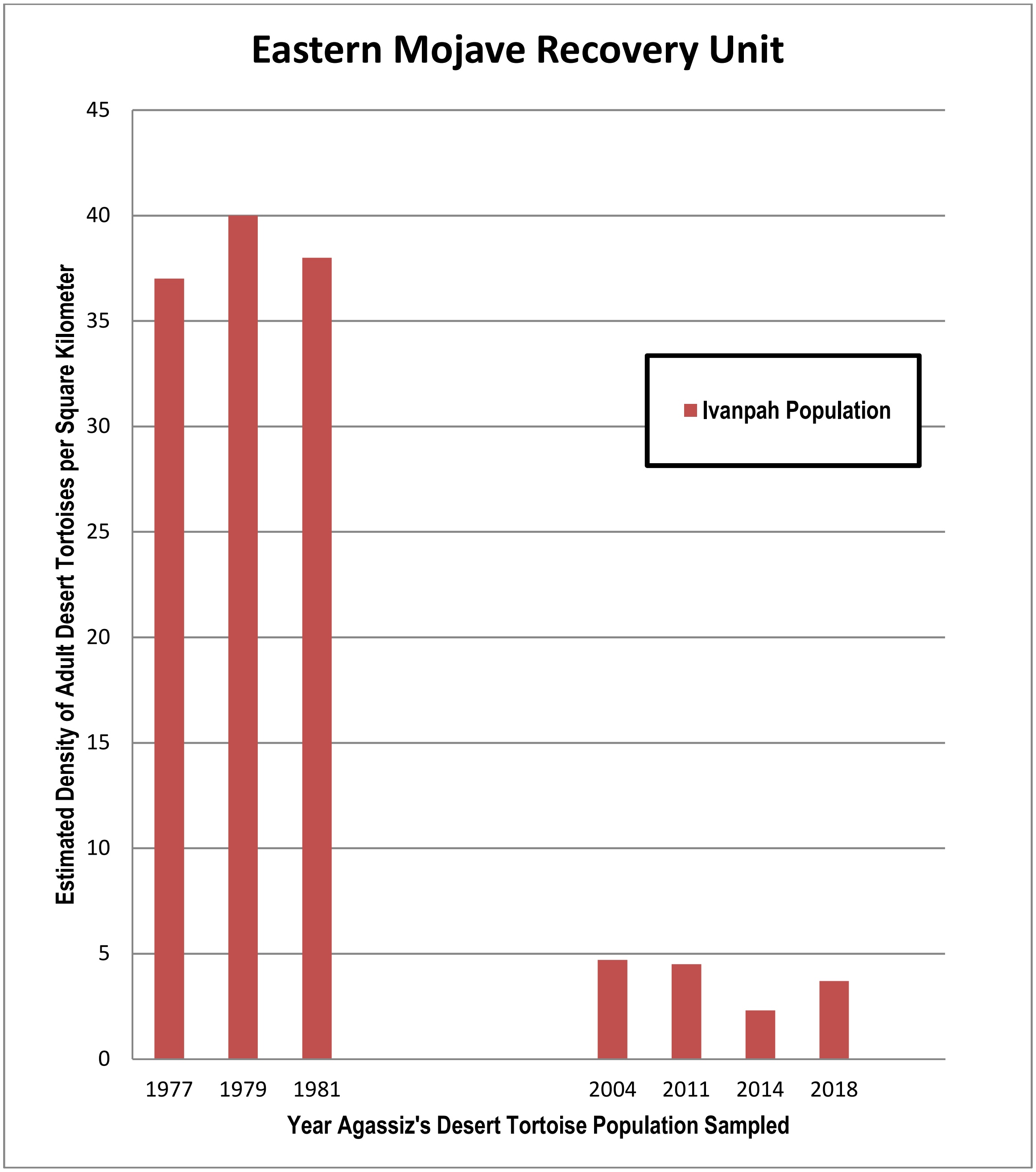




Attachment 2. Density estimates for adult Agassiz's desert tortoises for three Recovery Units (Western Mojave, Colorado Desert, and Eastern Mojave) in California. Data prior to 2001 is from permanent study plots and after 2001 is from line distance sampling.




Colorado Desert Recovery Unit
Chuckwalla Population
Chemehuevi Population
Fenner Population
Choocolate Mtns Population
Pinto Mountains Population
Joshua Tree Population
Estimated Density of Adult Tortoises per Square Kilometer
70
60
50
40
30
20
10
0
1977
1979
1991
1992
1993
2004
2011
2014
2018
Year Agassiz's Desert Tortoise Populations Sampled



Eastern Mojave Recovery Unit
45
40
35
30
25
20
15
10
5
0
Ivanpah Population
Estimated Density of Adult Desert Tortoises per Square Kilometer
1977
1979
1981
2004
2011
2014
2018
Year Agassiz's Desert Tortoise Population Sampled

Attachment 3: Roads, Trails and Disturbance Associated with Motorized Vehicle Use in Selected Desert Tortoise CHUs in the Western Mojave Recovery Unit [1]

The following provides an account of the miles of unpaved roads and trails; and acres of disturbance associated with vehicle camping, parking and stopping areas within desert tortoise CHUs in the Western Mojave Recovery Unit.

Critical Habitat Unit	Roads and Trails Open to Vehicle Use	Roads and Trails Closed to Vehicle Use[i]	Acres of Camping, Parking and Stopping Areas
Fremont-Kramer	897	1397	136
Ord-Rodman	317	488	42
Pinto Mountains	143	66	18
Superior-Cronese	832	765	111
Total	**2,189**	**2,716**	**307**

[i] Note: Although roads and trails are closed to vehicle use, a majority of these routes continue to be subject to unauthorized vehicle use due to the limited ability of law enforcement officers (BLM Rangers, CDFW Wardens, County Sheriffs Deputies) and the extremely high number of vehicle users.

[1] From: Bureau of Land Management. 2019. West Mojave Route Network Project Final Supplemental Environmental Impact Statement (BLM/CA/DOI-BLM-CA-D080-2018-0008-EIS).

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State of California
Department of Fish and Wildlife

Original on file, received January 9, 2024

Memorandum

Date: December 29, 2023

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Status Review Report for the Mojave Desert Tortoise (Gopherus agassizii)

The California Department of Fish and Wildlife (Department) has prepared the attached status review for the Mojave Desert Tortoise (Gopherus agassizii) for the California Fish and Game Commission (Commission) pursuant to the California Endangered Species Act, Fish and Game Code section 2050 et seq. The Commission published the Notice of Candidacy Findings on October 19, 2020, directing the Department to prepare a status review. On October 14, 2021, the Commission approved a Department request for a 6-month extension to further analyze the petition and complete its status review in accordance with Fish and Game Code section 2074.6.

The Department completed the attached status review as required by Fish and Game Code section 2074.6. The status review contains the Department's review of the best scientific information available to the Department on the status of the Mojave Desert Tortoise and serves as the basis for the Department's recommendation to the Commission that the petitioned action to list the Mojave Desert Tortoise as endangered is warranted. The Department finds that the Mojave Desert Tortoise is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

If you have any questions or need additional information, please contact Scott Gardner, Branch Chief, Wildlife Branch at (916) 801-6257 or by email at wildlifemgt@wildlife.ca.gov.

Attachment

ec: *California Department of Fish and Wildlife*

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Status Review for Mojave Desert Tortoise (*Gopherus agassizii*)

Report to the Fish and Game Commission

February 2024

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LIST OF ABBREVIATIONS, ACRONYMS, AND TERMS

BLM – Bureau of Land Management
CEQA – California Environmental Quality Act
CESA – California Endangered Species Act
CHU – Critical Habitat Unit
CNDDB – California Natural Diversity Database
Commission – California Fish and Game Commission
Department – California Department of Fish and Wildlife
DoD – Department of Defense
ESA – Endangered Species Act
et al. – "and others"
ITP – Incidental Take Permit
MCAGCC – Marine Corps Air Ground Combat Center Twentynine Palms
NEPA – National Environmental Policy Act
NPS – National Park Service
RU – Recovery Unit
TCA – Tortoise Conservation Area
USFWS – United States Fish and Wildlife Service

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This status review was prepared by Department scientific and technical staff, with substantial contributions from Anne Hilborn, Katrina Smith, and Wendy Campbell. Laura Patterson, Madeline Weiland, Neil Clipperton, and Pete Figura provided valuable feedback on a draft version of the status review. The Department is extremely grateful for the valuable comments provided on this status review by the following peer reviewers: Jeffery Lovich, Kristina Drake, Kerry Holcomb, Corey Mitchell, and Kenneth Nussear. The conclusions in this status review are those of the Department and do not necessarily reflect those of the reviewer

EXECUTIVE SUMMARY

This status review contains the most current information available on the Mojave Desert Tortoise (*Gopherus agassizii*) and serves as the basis for the California Department of Fish and Wildlife's (Department) recommendation to the California Fish and Game Commission (Commission) on whether to change the status (i.e., uplist) of the species from threatened to endangered under the California Endangered Species Act (CESA).

The Mojave Desert Tortoise was designated a threatened species under CESA in 1989 and designated as threatened under the federal Endangered Species Act (ESA) in 1990. On March 23, 2020, Defenders of Wildlife, Desert Tortoise Council, and Desert Tortoise Preserve Committee submitted a petition to the Commission to change the status of the Mojave Desert Tortoise from threatened to endangered. At its public meeting on October 14, 2020, the Commission considered the petition, and based in part on the Department's petition evaluation and recommendation, found sufficient information exists to indicate the petitioned action may be warranted and accepted the petition for consideration. The Commission's decision initiated this status review to inform the Commission's decision on whether the change in status is warranted. The Department's recommendation is that uplisting the Mojave Desert Tortoise is warranted.

Species Description, Biology, and Ecology

The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile that uses behavioral and physiological adaptations to avoid extreme temperatures and dehydration, and to budget stored energy. Mojave Desert Tortoises primarily regulate their temperature by using underground burrows where the air is cooler and higher in humidity in summer, and warmer in winter. They can spend more than 90% of their lives underground.

Females become sexually mature at 12–20 years old and typically lay one or two clutches of eggs (about 6 eggs per clutch) per year. Nest predation is common, with 12–47% of nests lost to predators annually. Incubation time in the wild varies from 67 to 104 days and incubation temperatures determine the sex of the hatchlings, with hotter temperatures producing female-skewed clutches.

In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Sonoran and Great Basin deserts. Desert tortoise habitat typically consists of alluvial fans and plains that facilitate the digging of burrows. Tortoises need sufficient forage plants as well as larger shrubs and bushes for shade and protection of burrows. Tortoises feed on annual forbs, annual and perennial grasses, herbaceous perennial plants, and some cacti. Tortoises occur in very low densities or are absent where shrub cover is sparse, precipitation is low, and annual food plants are available only intermittently (e.g., lower elevations of Death Valley). They also occur at low densities in areas that are moderately to severely disturbed by human activity.

Status and Trends

The most robust estimates of densities come from annual systematic surveys done in the USFWS-designated Tortoise Conservation Areas (TCAs) which are grouped into Recovery Units. These surveys began in 2001 and cover large areas of the best habitat for tortoises. The 1994 USFWS Recovery Plan for desert tortoise identified 3.9 adult tortoises/km^2 as the minimum density necessary for population viability. Only two of the ten TCAs in California had mean densities above that threshold in 2001, and all the TCAs were below the threshold in 2020. Between 2001 and 2020, densities declined an average of about 1% per year in the Colorado Desert and Eastern Mojave Recovery Units (17% decline over 19 years), and about 4% per year in the Western Mojave Recovery Unit (54% decline over 19 years). In 2001, the Western Mojave was the area with the highest densities of tortoises, but experienced the steepest decline in abundance, losing >50% of adults from 2001 to 2020. However, there is still a large amount of available habitat in California and there were estimated to be more than 90,000 adult tortoises in the Western Mojave Recovery Unit in 2020.

The available population data indicate that there were widespread sharp drops in density before the tortoise was listed as threatened, and those losses have continued to the point where most surveyed areas no longer support viable tortoise populations. Despite 30 years of state and federal protection as a threatened species, tortoise populations do not show consistent signs of recovery.

The slow maturation and low reproductive rates of tortoises means that if past and current management is successful at addressing threats and stemming the decline of tortoise populations, it would still take at least 25 years of positive population growth to reach the USFWS Recovery Criteria. For example, the USFWS 1994 Recovery Plan estimates that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Annual survival rates for both adults and juveniles are much lower than 98% in most areas, and since the late 1970s, the number of juveniles detected on surveys has also fallen sharply, to the point that in some recent surveys in the western Mojave Desert almost no juveniles were found.

Threats

The declines of Mojave Desert Tortoise populations are likely due to extensive and interconnected threats. The important threats fall into two categories, those that directly kill adults and juveniles, and those that cause longer-term changes to habitat availability and quality.

In long-lived species that are slow to reproduce, decreased survival has long lasting impacts on population viability and can alter demographic rates for decades. Predation pressure from ravens and coyotes reduces the survival of juvenile and adult tortoises. Development within the tortoise range often creates or increases traffic on paved roads, and extensive networks of unpaved roads and trails for off highway vehicles occur on public land. Tortoises are killed by vehicles on paved and unpaved roads and trails. Moreover, road infrastructure increases the amount of roadkill and garbage available, creating food subsidies for ravens and coyotes which encourages their presence near tortoises. Well-designed fences and culverts can help prevent tortoises and other wildlife from being killed by vehicles along major roads, but little fencing has been built in California tortoise habitat since 2011.

Habitat modification, fragmentation, and destruction reduces the amount of habitat that can support tortoises in the long-term and reduces the size of remaining habitat patches. Although a large proportion of desert tortoise range is under federal control, renewable energy, housing, offroad vehicle use, and other types of development reduce the amount of habitat available. Concerningly, predators like the raven and coyote that receive food subsidies in fragmented and disturbed habitats can also occur at higher densities in nearby "undisturbed" habitats.

Additional factors have direct and indirect impacts on tortoises and their habitat. Climate change is likely to cause hotter and periodically drier conditions in the desert tortoise range that will increase their physiological stress and change activity patterns. The nutritious native vegetation tortoises feed on is being outcompeted by nutritionally poor invasive grasses, which can lower tortoise survival rates. Fires fueled by invasive grasses decrease the amount of native vegetation available for tortoises to feed on and remove other important vegetation components of tortoise habitat. In combination, the impacts of climate change will likely result in less available suitable habitat.

Some threats appear to be declining since the species was listed. Upper respiratory tract diseases were a major concern when tortoises were listed as threatened. Encouragingly, the prevalence of diseased tortoises is lower than in previous decades, and these diseases do not currently appear to be an acute threat to wild populations. The prevalence of gunshot deaths has also decreased in the past several decades.

Historical and current conservation and management efforts such as the prohibition on take, creation of land use plans, required mitigation, and translocation and head-starting efforts have not proven sufficient to halt the population declines of desert tortoise. Given that there are multiple interacting threats that are reducing the amount and quality of viable habitat and lowering survival rates of adults and juveniles, the available information suggests that tortoises populations will continue to decline for the foreseeable future. However, several of the major threats like raven predation on juveniles and the lack of tortoise exclusion fencing on highways are issues that can be addressed with appropriate resources and policy changes. Implementing these actions where appropriate to improve survival in the short term is critical to give desert tortoises populations the resilience to weather longer term habitat and climactic effects.

Several recommended management actions are described in this status review. Improved coordination and communication between the Department and other state and federal agencies would help the implementation of these actions. We also point to several needs for increasing capacity at the Department to better track the impact of threats and conservation actions on tortoise populations.

Recommendation—In consideration of the scientific information contained herein, the Department has determined that listing the Mojave Desert Tortoise as endangered under CESA is warranted at this time.

1. REGULATORY SETTING

1.1 Petition Evaluation Process

On March 23, 2020, the Commission received a petition from Defenders of Wildlife, the Desert Tortoise Council, and the Desert Tortoise Preserve Committee to change the status of Mojave Desert Tortoise from threatened to endangered. On April 13, 2020, the Commission referred the petition to the Department for evaluation pursuant to Fish and Game Code section 2073 and published a formal notice of receipt of the petition (Cal. Reg. Notice Register 2020, No. 18-Z, p. 693). At its meeting on April 16, 2020, the Commission officially received the petition.

A petition to list, delist, or change the status of a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant" (Fish & G. Code, § 2072.3).

The Department's charge and focus in its advisory capacity to the Commission is scientific, and it evaluates petitions based on the best scientific information available regarding potential listing factors including those listed above. At its meeting on August 20, 2020, the Commission received the Department's petition evaluation report, which is intended to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information (Fish & G. Code, §§ 2073.5 & 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d) & I). Focusing on the information available to the Department relating to each of the required information categories listed above, the Department recommended to the Commission that the petition be accepted.

At its public meeting on October 14, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. Upon publication of the Commission's notice of its findings, the Mojave Desert Tortoise was designated a candidate species on October 19, 2020 (Cal. Reg. Notice Register 2020, No. 44-Z, p. 1445).

The Commission's decision to designate the Mojave Desert Tortoise as a candidate species triggered the Department's process for conducting a 12-month status review to inform the Commission's decision on whether the change in status is warranted (Fish & G. Code, § 2074.6

and Cal. Code of Regs., title 14, § 670.1). At its meeting on October 14, 2021, the Commission granted the Department a six-month extension to complete the status review and facilitate external peer review.

1.2 Status Review Overview

This status review is based upon the best scientific information available to the Department and serves as the basis for the Department's recommendation to the Commission on whether the petitioned action to list the Mojave Desert Tortoise as endangered is warranted. It is not intended to be an exhaustive review of all published scientific literature on Mojave Desert Tortoise; rather it is intended to summarize key points relevant to the status of the species and address regulatory report requirements.

All of the required elements in Fish and Game Code sections 2072.3 and 2074.6, as well as in California Code of Regulations Title 14 section 670.1, are included and addressed in this status review. These elements include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map" (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). Sections are named and organized according to each of the required petition components and the listing factors that the Commission must consider in making its determination. However, in some instances, the Department has renamed and grouped similar elements to create a more cohesive and readable report.

A species shall be listed as endangered or threatened "if the Commission determines its continued existence is in serious danger or is threatened by any one or any combination of the following factors: present or threatened modification or destruction of its habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities" (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)).

An endangered species under CESA is one "which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species under CESA is one that "although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (id., § 2067).

Receipt of this report is to be placed on the agenda for the next available meeting of the Commission after delivery. At that time, the report will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition.

2. BIOLOGY

2.1 Taxonomy

Desert tortoises are members of the order Testudines, family Testudinidae, genus *Gopherus*. When the Commission listed Desert Tortoise as threatened in 1989, *Gopherus agassizii* was understood to range from southeastern California, across southern Nevada, through western Arizona, and south into Sonora and Sinaloa, Mexico. In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the species complex formerly known as “Desert Tortoise” in fact consists of two separate species, Mojave Desert Tortoise and Sonoran Desert Tortoise (*Gopherus morafkai*) (Murphy et al. 2011, Iverson et al. 2017). Mojave Desert Tortoise, also known as Agassiz’s Desert Tortoise or Mohave Desert Tortoise, retains the binomial *G. agassizii*, and ranges across the deserts of southeastern California, southern Nevada, and small areas of Arizona and Utah north of the Colorado River as well as southwestern Utah. There is an “anomalous" population of *G. agassizii* east of the Colorado River in the Black Mountains of Arizona (Edwards et al. 2015). Apart from that population, desert tortoises east of the Colorado River in Arizona and in northern Mexico are now classified as Sonoran Desert Tortoise, also known as Morafka’s Desert Tortoise. More recent work by Edwards et al. (2016) separates desert tortoises living in the thorn scrub and tropical deciduous forests of southern Mexico into another species, *Gopherus evgoodei*. Only the Mojave Desert Tortoise occurs in California. This status review uses the common name Mojave Desert Tortoise when referring to *G. agassizii* as the species is currently understood. Any reference to Agassiz’s or Mohave Desert Tortoise in this document should be considered synonymous with Mojave Desert Tortoise.

2.2 Species Description and Life History

Much of the information in this section is summarized from a Berry and Murphy (2019) monograph on *Gopherus agassizii*. The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile. The upper shell or carapace of adults ranges in size from 178mm to over 370mm in length. Shell color varies from light yellow to dark charcoal in hatchling tortoises and from light to dark brown in adults (Berry and Murphy 2019). Generally, males are larger than females (Ernst and Lovich 1994) but the largest measured wild individual was a female in 1986 whose carapace length was 374 mm (Berry and Murphy 2019). The largest male measured in the wild had a 330 mm carapace length (Berry and Murphy 2019).

Figure 1. Mojave Desert Tortoise. Pictures by Dana Wilson BLM (left) and Roy Averill-Murray USFWS (right).

Desert tortoises make extensive use of underground burrows to regulate body temperature and as protection from predators. Temperatures in burrows can be up to 20°C (36°F) cooler than summer air temperatures, especially very deep in the burrows (Berry and Murphy 2019). Home range size depends on sex, age, and environmental conditions. Over a 2-year study in the western Mojave Desert, male home range size was 39–47 ha and female home range size was 14–17 ha (Harless et al. 2009). Home ranges of individuals can overlap (O'Connor et al. 1994) and in the western Mojave Desert Harless et al. (2009) found that males overlap more with other tortoises than do females. They also found that the overlap of an individual's home range from one year to the next was about 35% and did not vary significantly by sex. Individuals tend to have fidelity to home ranges and activity centers, even after a fire (Drake et al. 2015, Lovich et al. 2018).

Tortoises are long-lived and females are thought to become sexually mature at 12–20 years old (mean 18.8; Medica et al. 2012), depending on locality (Woodbury and Hardy 1948, Turner et al. 1986, Curtin et al. 2009). Generation time is estimated to be around 25 years (U. S. Fish and Wildlife Service 1994). Mating occurs in late summer and fall, and females can mate with multiple males (Davy et al. 2011). Female tortoises store sperm/delay implantation so that nesting and egg laying occurs in April–July depending on the region (Berry and Murphy 2019). Females typically lay one or two clutches of eggs (about 6 eggs per clutch) per year; however, some females have been documented to lay more than two clutches (Ennen et al. 2012, Mitchell et al. 2021). Tortoise nests are typically placed near entrance to the burrow or within suitable soil (Ennen et al. 2012), and there is no parental care once eggs have hatched (Berry and Murphy 2019). Reported incubation time in the wild varies from 67–104 days (McLuckie and Fridell 2002) and incubation temperatures determine the sex of the hatchlings. Sex ratios were 1:1 at an incubation temperature of 31.3°C (88.3°F), while eggs incubated at under 30°C (86°F) produced only male hatchlings and those incubated at over 32.5° (90.5°F) produced only females (Rostal et al. 2002). Nest predation is common, with 12–47% of nests destroyed by predators annually (Bjurlin and Bissonette 2004, Ennen et al. 2012). When nests are not depredated, hatchling success is about 80% (Bjurlin and Bissonette 2004). Newly hatched tortoises are about 4–5 cm in length (Bjurlin and Bissonette 2004) and their shells do not fully ossify until they are 5–7 years old.

Tortoises feed on annual and perennial forbs, grasses, and will consume cacti during droughts (Berry and Murphy 2019). Much of the range of the desert tortoise is highly invaded by nonnative plants, including grasses like red brome (*Bromus rubens*) and cheatgrass (*Bromus tectorum*). Experimental studies found that grass diets that included no forbs were detrimental to tortoises, leading to weight loss, poor body condition, or even death (Hazard et al. 2009, Drake et al. 2016). This was the case even when the diet included native grasses (Drake et al. 2016). In addition, the seeds of *B. rubens* can cause injury to the oral mucosa of juveniles (Drake et al. 2016). According to Berry and Murphy (2019), tortoises "favored species of forbs or herbaceous perennials from several plant families: Asteraceae, Boraginaceae, Cactaceae, Fabaceae, Malvaceae, Nyctaginaceae, Onagraceae, and Plantaginaceae (Burge and Bradley 1976; Avery and Neibergs 1997; Jennings and Berry 2015)."

Tortoises are ectotherms whose body temperature is closely linked to the temperature in the environment around them. Mojave Desert Tortoises live in places that can fluctuate up to 40°C (104°F) seasonally and they primarily regulate their temperature by using underground burrows or rock shelters (Cummings et al. 2020) where the air is cooler and moister than the outside air in summer and warmer in winter (Ernst and Lovich 1994). Depending on the type, length, and depth of burrow, average temperatures inside vary from 33.7–36.6°C (92.6–97.8°F) in the summer and 8.9–13.5°C (48–56.3°F) in the winter (Mack et al. 2015). Berry and Murphy (2019) reported that desert tortoises spend >90% of their lives underground. Tortoises are active when their body temperatures are between 19.0°C and 37.8°C (66.2–100°F), they retreat to shade when body temperatures are 35–38°C (95–100.4°F), and body temperatures of 43°C (109.4°F) are deadly (Brattstrom 1965, Zimmerman et al. 1994). However, tortoises can be active above ground at any time of year, especially if it has rained and they can drink, or if they need to move between shelters (Ernst and Lovich 1994). They generally are underground or in rock shelters in late fall and winter, and in late spring through the hot summer. In early spring and fall they are more active above ground, feeding, travelling, and interacting with other tortoises (Berry and Murphy 2019). In the cooler late winter and spring, they are active late morning to mid-afternoon. In the hotter summer and fall, if activity occurs, it tends to be in the cool of the morning and late evening. Smaller juvenile tortoises can be active at cooler temperatures than larger tortoises so tend to be active more days per year (Berry and Murphy 2019). Available water and forage have an impact on activity and movement. Tortoises moved less, used fewer burrows, and had smaller home ranges during drought years as compared to wet years in the mid-1990s (Duda et al. 1999). However, at a different site in the late 1990s, the relationships between precipitation and activity area, rate of movement, and burrows used were less clear (Ennen et al. 2012), suggesting that there are many interacting forces that determine tortoise activity and movement levels.

Tortoises also have additional behavioral and physiological strategies to deal with extremes of temperature and resource availability. During droughts, tortoises can lose up to 40% of their body mass. They can resorb water from their bladders and store sodium, chloride, and urea in their blood and in the bladder. When it rains, they drink, void their bladders, and rapidly increase their body weight (Ernst and Lovich 1994, Peterson 1996, Berry and Murphy 2019).

2.3 Habitat Associations

Figure 2. Mojave Desert Tortoise in the Mojave Desert. Photo by Rachel London via USFWS

Mojave Desert Tortoises in California can be found in part of the southern Great Basin, Mojave, and western Sonoran deserts in southeastern California (Berry and Murphy 2019, Figure 2). Due to their dependence on burrows, they require soils, topography, geological features, and vegetation that facilitate the creation of burrows or dens (Andersen et al. 2000). Therefore, desert tortoise habitat typically consists of alluvial fans and plains, but they can be found on rocky hillsides (Germano et al. 1994). Tortoises also need appropriate vegetation communities for forage and shelter. Most burrows are found beneath shrubs, though they can also be dug into the sides of ephemeral streams.

The vegetation types that tortoises use vary across their range and by altitude. As Berry and Murphy (2019) put it:

> "Within the Mojave Desert ecosystem, tortoises occur in several vegetation associations. At lower elevations or adjacent to dry lake beds, saltbush associations (*Atriplex* spp.) and other members of the Chenopodiaceae provide habitat. The most common associations contain creosote bush (*Larrea tridentata*), usually with white bur-sage (*Ambrosia dumosa*) or cheesebush (*A. salsola*) and several other species of shrubs, cacti, and perennial grasses. With increasing elevation, multiple species of woody shrubs and tree yuccas (Joshua tree, *Yucca brevifolia,* and Mojave yucca, *Y.*

schidigera) become more common, with blackbrush (*Coleogyne ramosissima*) associations present in higher elevations.

The western Sonoran Desert is a warmer, hotter desert with a higher proportion of precipitation occurring in summer. This desert is also characterized by creosote bushes, but a major difference is the presence of microphyll woodlands of blue palo verde (*Parkinsonia florida*), smoke tree (*Psorothamnus spinosus*), and ironwood (*Olneya tesota*) in ephemeral stream channels separated by desert pavements or open desert with ocotillo (*Fouqueria splendens*) mixed with creosote bush, other shrubs, and cacti (Berry 1984).

Tortoises occur in very low densities or are absent where shrub cover is sparse, precipitation is low and timing erratic, and annual food plants are available only intermittently (e.g., the lower elevations in Death Valley). They are also in low densities in moderately to severely disturbed areas, regardless of desert or region (e.g., Bury and Luckenbach 2002; Keith et al. 2008; Berry et al. 2013)."

2.4 Range and Distribution

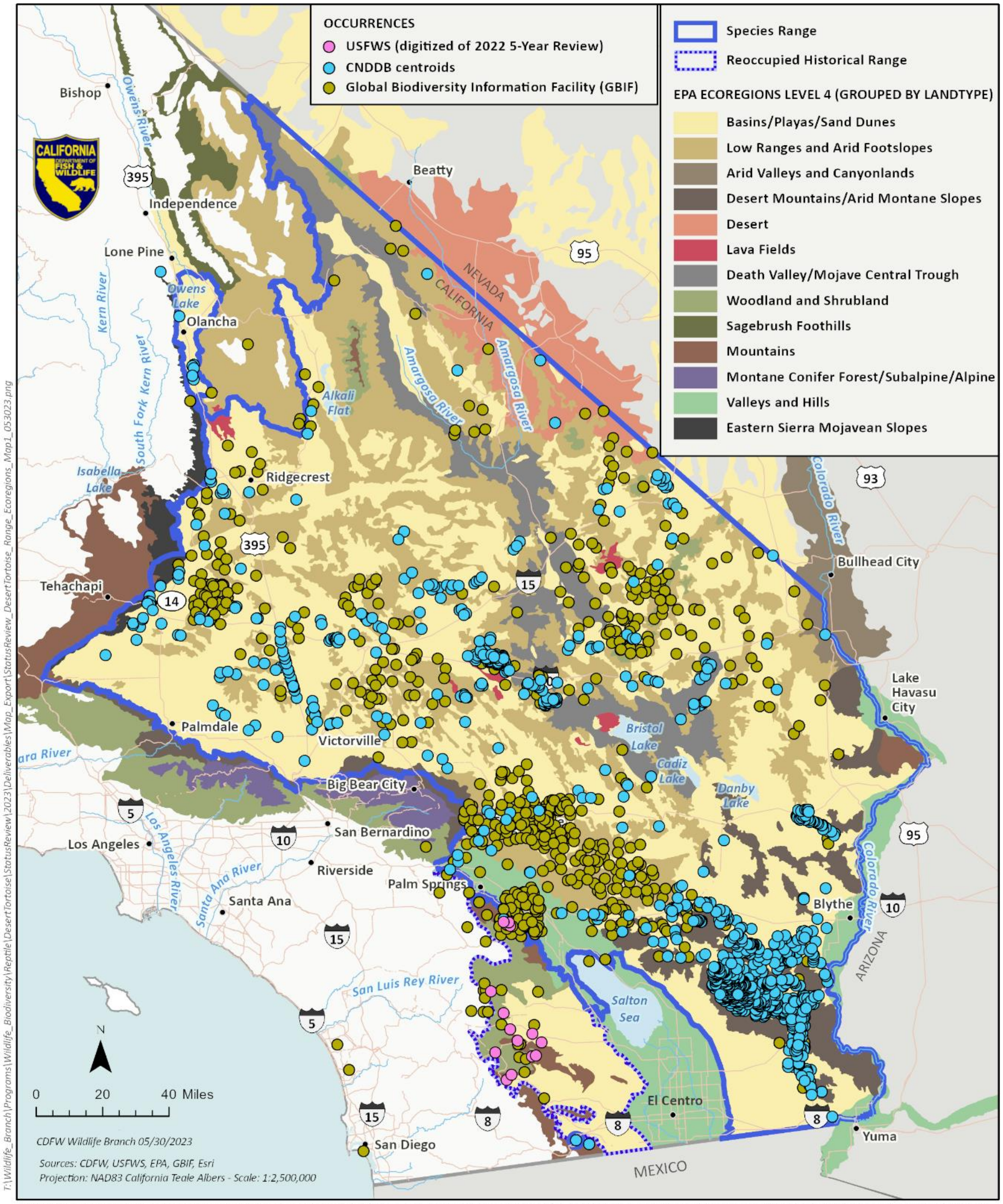
Range is the general geographical area in which a species occurs. For purposes of CESA and this status review, we are describing and evaluating the tortoise's range in California. Distribution describes the sites where individuals and populations of the species occur, and the spatial arrangement of individuals within the species' range.

In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Colorado subunit of the Sonoran and Great Basin Deserts from the southern end of the Owens Valley south of the town of Lone Pine in Inyo County to the Mexican border near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Sierra Nevada, Transverse, and Peninsular mountains in the west (Berry and Murphy 2019).

The distribution of desert tortoises within California is uneven, and portions of the range no longer provide suitable tortoise habitat due to agriculture, development, and military activity. Data on tortoise occurrences from the California Natural Diversity Database (CNDDB) and the Global Biodiversity Information Facility (GBIF) were used to plot the distribution of observations in California (Figure 3). These datasets do not represent exhaustive and comprehensive inventories of desert tortoises in California and are largely presence-only datasets. While caution should be used in using these types of data, there appear to be fewer occurrences in the northern part of the range and in the Death Valley/Mojave Central Trough (see grey area on Figure 3), and few occur in low areas near the Salton Sea (Lovich et al. 2020).

Desert Tortoise distribution has been dynamic due to the release of captive tortoises and potential immigration into areas from which they were previously extirpated. For example, tortoises were largely extirpated from the area of Anza Borrego Desert State Park by the 1940s (Manning 2018). In the early 1970s, taking tortoises from the wild became illegal, and people began turning in their captive tortoises to the Department. Between 1970 and 1972 the

Department released about 65 previously captive tortoises into the park. There were occasional sightings in the decades since, with more sightings since 2010. The tortoises there today could be descendants of released tortoises, however natural immigration to the park may also have occurred as there is a tenuous corridor of suitable habitat that connects the park to habitat occupied by tortoises to the north. In 2016, park staff began surveying for tortoises and formally collecting incidental observation data, and subsequent genetic analysis of tortoise blood and scat suggested "evidence of a naturally reproducing Mojave desert tortoise population in Anza Borrego Desert State Park" (Manning 2018). These tortoises extend "the distribution of reproducing Mojave Desert Tortoises greater than 60 km south of Palm Springs and beyond the southern edge of the Colorado Desert Recovery Unit boundary depicted in the recovery plan (Service 2011a)" (USFWS 2022*a*). We show this reoccupation of historical range in Figure 3, delineated using suitable ecoregion boundaries.



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

Figure 3. Map of the California range of the Mojave Desert Tortoise, occurrence locations, and Ecoregions. CNDDB data are sightings from 1935 to 2011. The GBIF occurrences are from 1978 to 2022, and only include sightings that are confirmed by a photograph. The pink dots are the locations of tortoises in the reoccupied historical range as reported in USFWS (2022a). Range boundary is from the California Wildlife Habitat Relationship System (CDFW 2014).

2.5 Population Genetic Structure

For imperiled species, understanding the genetic structuring of their populations is important for effective management. Head-starting and translocation are two actions used in desert tortoise conservation (see section 9.1 for more details), and the efficacy of both depends on knowledge of genetic boundaries to avoid the potentially negative impacts of artificially mixing individuals from different genetic populations (Sánchez-Ramírez et al. 2018).

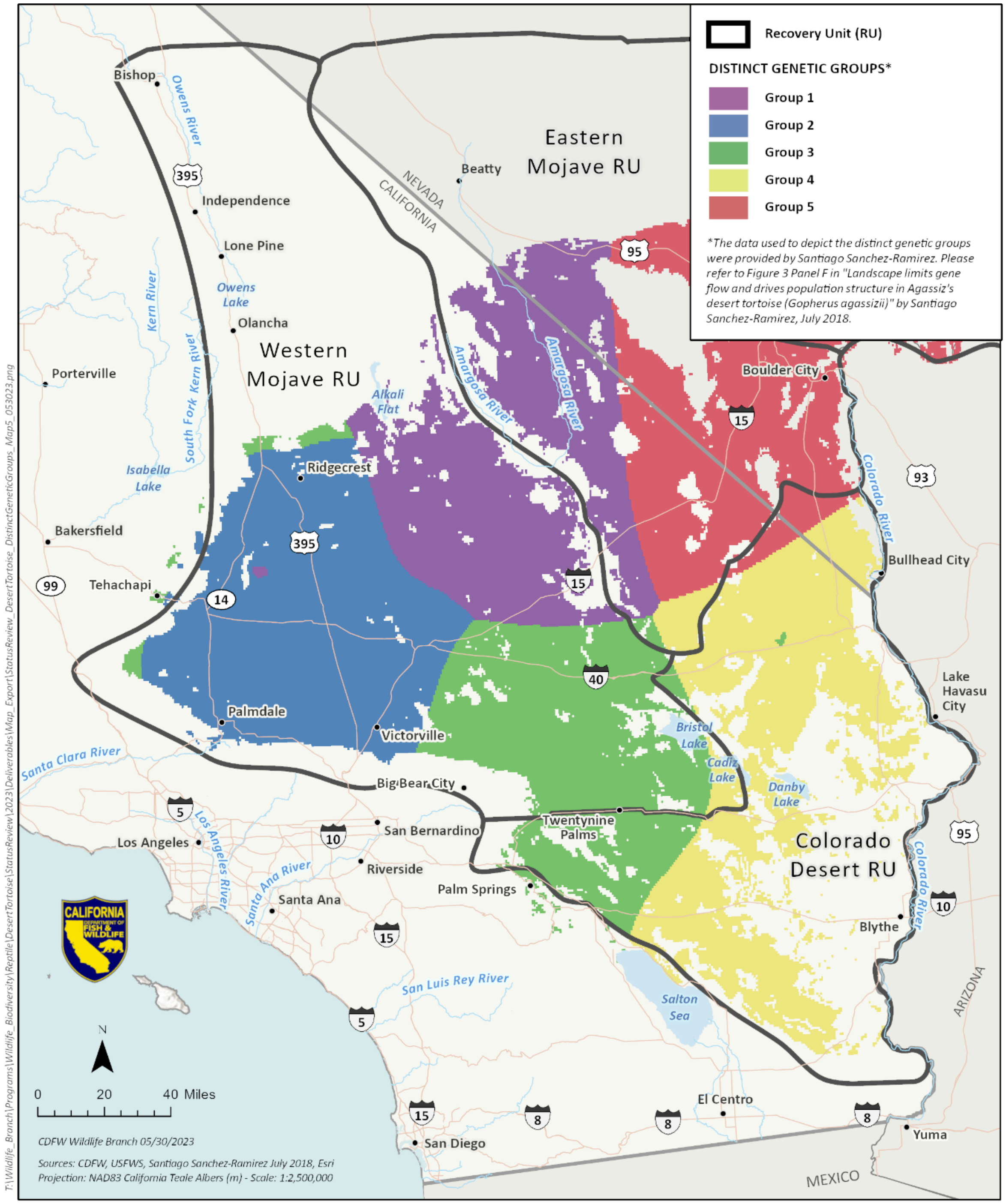
The 1994 U.S. Fish and Wildlife Service (USFWS) Recovery Plan outlined recovery units consisting of "evolutionarily distinct" populations, with three recovery units occurring in California: Western Mojave, Eastern Mojave, and Colorado Desert Recovery Units (see section 3.1 for details). However, a recent study found that the best supported number of genetic clusters in California was five, with the Western Mojave Recovery Unit in the northern and western part of the tortoise range in California containing three genetic groups (Sánchez-Ramírez et al. 2018) (Figure 4). This differs from the earlier work of Hagerty and Tracy (2010) which found the Western Mojave Recovery Unit to be one genetic group. This means that populations within 200–300 km of each other which were previously considered genetically similar and a single genetic unit for management purposes may actually be several genetically identifiable populations. Outbreeding depression has not been well studied in *G. agassizii*; however, the potential negative impacts of outbreeding are expected to occur at long time scales (~600 years; Averill-Murray and Hagerty 2014). This suggests that habitat quality and predator numbers are more important than outbreeding depression when evaluating suitable recipient sites for translocation. Despite this, Sánchez-Ramírez et al. (2018) advise caution when moving tortoises long distances for translocation or population augmentation. For more details about translocations see section 5.2.

3. STATUS AND POPULATION TRENDS IN CALIFORNIA

3.1 Administrative Status

The Mojave Desert Tortoise has been protected as a threatened species under the California Endangered Species Act (CESA) (Title 14, §670.5) since 1989 and under the federal Endangered Species Act (ESA) since 1990. Unauthorized "take" of threatened and endangered species is prohibited. "Take" is defined under CESA as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (*Id.*, § 86).

The 1994 USFWS Desert Tortoise Recovery Plan designated six federal recovery units that cover desert tortoise range in California, Arizona, Nevada, and Utah. The recovery units were based on genetics, morphology, behavior, ecology, and habitat use, and each was considered an "evolutionarily distinct" population. These recovery units were revised in the 2011 Recovery Plan with better information and mapping tools. Of the six, all the Western Mojave, the majority of the Colorado Desert, and the western portion of the Eastern Mojave (formerly the Northeastern Mojave) Recovery Units are within California (Figure 4).



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

Figure 4. Map of genetic groups of the Mojave Desert Tortoise. Superimposition of the boundaries of the Recovery Units over Figure 3 panel F in Sánchez-Ramírez et al. (2018). The base map is the "spatial interpolation of ancestry coefficients of Agassiz's desert tortoises using Krig modeling…combines areas of maximal ancestry proportion for each of the five genetic groups".

The Western Mojave Recovery Unit is differentiated from the other recovery units by rainfall and vegetation (USFWS 2011). Summers are warm and winters are cold, with most rainfall occurring in fall and winter. Tortoises in the Western Mojave Recovery Unit dig deep burrows (usually located under shrubs on bajadas) for winter hibernation and summer estivation. Above-ground activity occurs primarily in spring when winter annuals provide food (USFWS 2011).

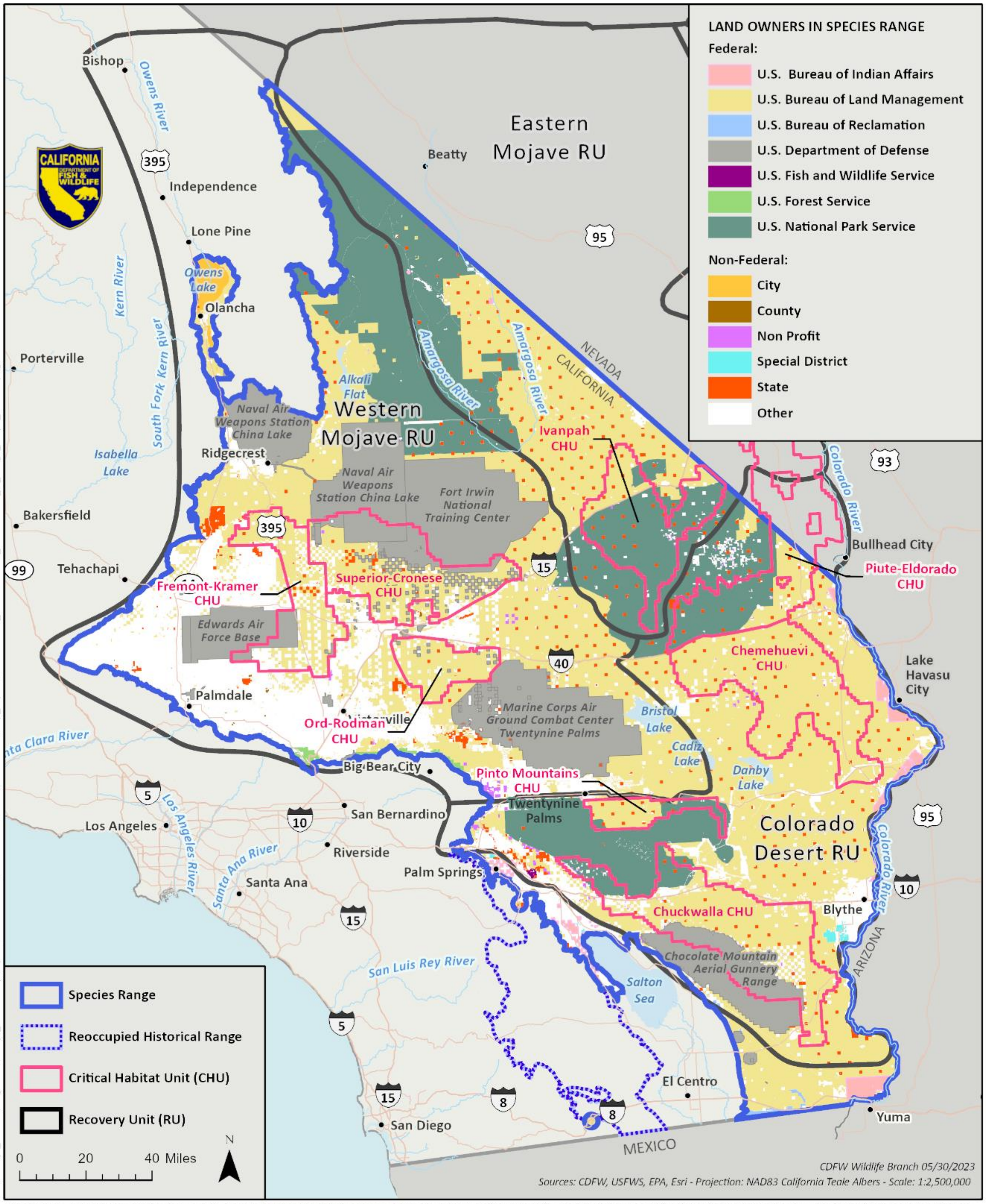
The Colorado Desert Recovery Unit receives about 1/3 of its annual rainfall in summer and supports distinct summer and winter annual plants that tortoises feed on. The climate is somewhat warmer than in other recovery units, with very few freezing days per year. Tortoises are found in the valleys, on bajadas, desert pavements, rocky slopes, and in the broad, well-developed washes (USFWS 2011).

The Eastern Mojave Recovery Unit is separated from the Western Mojave Recovery Unit by a mostly inhospitable barrier created by the Saline Valley, Death Valley, and Silurian Valley. Desert tortoises in the Eastern Mojave Recovery Unit are generally found in creosote bush scrub communities of flats, valley bottoms, alluvial fans, and bajadas. They are often active in spring, late summer, and early fall, as this region receives up to about 40% of its annual rainfall in summer and there are two distinct annual floras on which tortoises can feed (USFWS 2011).

Each recovery unit contains one or more Critical Habitat Units (CHUs). Under section 4 of the ESA, the Department of the Interior is directed to designate the specific areas supporting those physical and biological features that are essential for the conservation of the species. The Department of Interior designated critical habitat areas for the Mojave Desert Tortoise in early 1994 (59 FR 5820) that encompass over 24,281 km^2 in the Mojave and Colorado deserts (USFWS 2011). The critical habitat units are administrative areas managed to give reserve-level protection to desert tortoise populations while maintaining and protecting other sensitive species and ecosystem functions (USFWS 1994). According to USFWS (2019a):

> "The specific physical and biological features of desert tortoise critical habitat are (1) sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; (2) suitable substrates for burrowing, nesting, and overwintering; (3) burrows, caliche caves, and other shelter sites; (4) sufficient vegetation for shelter from temperature extremes and predators; and (5) habitat protected from disturbance and human-caused mortality."

In California, federal critical habitat designation totals 19,239 km^2. Of this, 13,465 km^2 are Bureau of Land Management (BLM) land, 980 km^2 are military land, 538 km^2 are state land, and 4,255 km^2 are private land (USFWS 1994) (Figure 5).



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

Figure 5. Landownership, RUs, and CHUs in the Mojave Desert Tortoise range in California.

Tortoise Conservation Areas (TCAs) are areas that mostly align with CHUs that the USFWS has designated for surveys to evaluate tortoise population status and recovery (see Figures 5, 6 and Table 1). They include "designated critical habitat as well as contiguous areas with potential tortoise habitat and compatible management" (USFWS 2019*b*). The TCAs have the same name as the CHU they encompass, with a few exceptions where there are multiple TCAs within a CHU

(USFWS 2015). Additionally, the Joshua Tree TCA is not within a CHU. See Figure 6 for boundaries of CHUs and TCAs, and Table 1 for overall size and amount of habitat within the CHUs and size of TCAs.

Table 1. Area of modeled desert tortoise habitat within California CHUs, and size of associated TCAs (USFWS 2019a). Note that there are two TCAs within the Chuckwalla CHU. Modeled habitat is suitable desert tortoise habitat per Nussear et al. (2009).

Recovery Unit	Critical Habitat Unit	Size (km^2)	Modeled Habitat (km^2)	Tortoise Conservation Area	Size (km^2)
Western Mojave	Fremont-Kramer	2,096	2,028	Fremont-Kramer	2,417
Western Mojave	Ord-Rodman	1,025	745	Ord-Rodman	1,124
Western Mojave	Superior-Cronese	3,104	2,934	Superior-Cronese	3,332
Eastern Mojave	Ivanpah	2,559	2,067	Ivanpah	2,567
Colorado Desert	Chuckwalla	4,130	3,275	Chocolate Mountain Gunnery Range	755
Colorado Desert	Chuckwalla	4,130	3,275	Chuckwalla	3,509
Colorado Desert	Chemehuevi	3,794	3,701	Chemehuevi	4,038
Colorado Desert	Piute-El Dorado	3,928	3,764	Fenner	1,841
Colorado Desert	Pinto Mountains	695	583	Pinto Mountains	751
Colorado Desert	NA	NA	NA	Joshua Tree	1,567

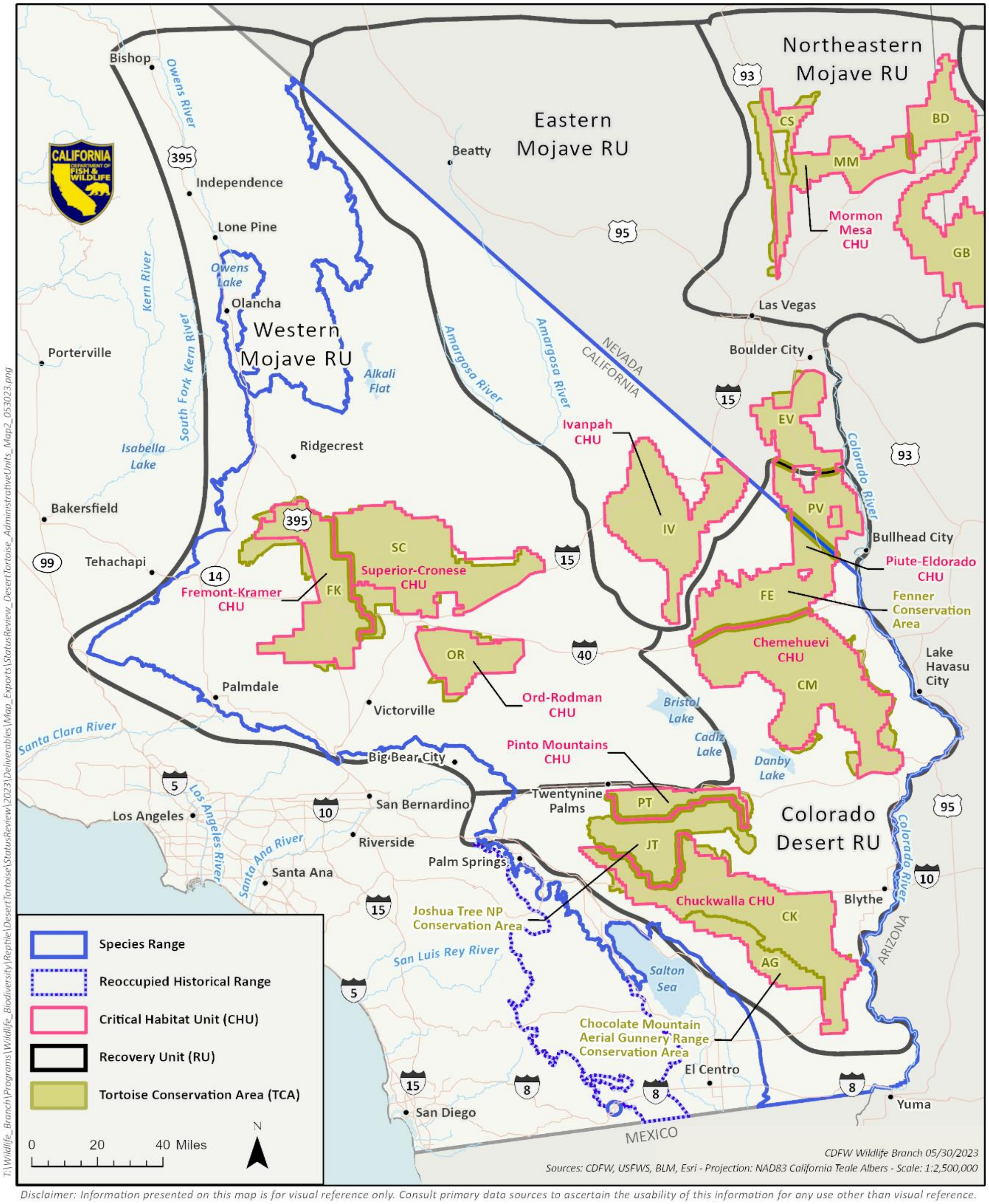


Figure 6. Mojave Desert Tortoise range, RUs, CHUs, and TCAs.

3.2 Trends in Density and Abundance

Tortoises are long lived, reach sexual maturity late, and may have decades of reproductive life. These life history characteristics make it difficult to assess trends in tortoise populations. For such species, short- and medium-term studies (1–10 years) may not be long enough to adequately understand population trends (Tracy et al. 2004). Also, studies that cover only very small, localized portions of the tortoise's range have limited value in assessing the overall population status. This makes long-term studies with consistent methodology that cover large portions of the range in California key to understanding the extent to which tortoise populations are declining or recovering over time.

Since the species was listed as threatened under CESA in 1989, the most robust estimates of density over time come from long-term surveys of TCAs within each CHU using line distance sampling. In 2001–2003, two person teams surveyed TCAs using line transect surveys. Transects were searched out to 8–10 m from the centerline. The shape and length of the transect changed year to year (USFWS 2006). Starting in 2004, square transects with 3 km sides were set up to provide good coverage of each TCA, and a random selection of these transects are surveyed each year. Two surveyors walk line transects along the boundary of the square or as close to it as is feasible. The lead surveyor walks in a straight line on a specified compass bearing, trailing 25 m of cord, and the second crew member follows at the end of the cord. They record the distance and bearing from the survey line to all tortoises seen and live tortoises are measured and sexed. In addition, data from tortoises carrying radio transmitters are used to estimate the proportion of tortoises that are above ground and detectable during the transects. Transects are scheduled in mid-March to May to maximize the chance tortoises will be active and above ground. Standard models are used to calculate density for the TCA from the line transect data in each sampling stratum. Funding for these efforts has varied, but in most years from 2001 to 2021 the USFWS has coordinated the distance sampling monitoring program for desert tortoises in the three recovery units that cover tortoise range in California (USFWS 2015, 2019b, 2020a, 2022a, b). The estimated densities in each TCA from 2004 to 2021 are presented in Appendix A.

Creating reliable estimates of density for desert tortoise is challenging not only due to their life history traits but also because "spatial variation in environmental features influences both population densities and the ability of observers to detect individuals" (Zylstra et al. 2023). Until recently, the best estimates of density and trends in density were the yearly estimates generated by USFWS and Allison and McLuckie (2018). However, the most up to date modelling comes from Zylstra et al. (2023) who used the line transect data to generate spatially explicit estimates of density and regional trends for desert tortoises in the three recovery units from 2001 to 2020. Their results differ from the earlier ones because their modelling framework is better able to account for sources of uncertainty in the estimates, and we use their results in the discussion below.

Despite the protections afforded though the federal ESA and CESA, tortoise populations have declined in recent decades. The 1994 USFWS Recovery Plan for desert tortoise identified 3.9 adult tortoises/km^2 as the minimum density necessary for population viability (U. S. Fish and Wildlife Service 1994, USFWS 2011). Only two of the ten TCAs in California had mean densities above that threshold in 2001, both of which were in the Western Mojave RU (Zylstra et al. 2023; Table 2). Despite the low densities in 2001, the estimated densities continued to decline across all California TCAs through 2020. Over this period, densities declined about 1% per year in the Colorado Desert and Eastern Mojave RUs, and about 4% per year in the Western Mojave RU (Zylstra et al. 2023; Figure 7). These rates of decline correspond to decreases in population density of 17% and 54% over 19 years, respectively. By 2020, all TCAs had densities that were below the population viability threshold.

Table 2. Predicted density of Mojave Desert Tortoises (number of adults/km^2) in each of the Tortoise Conservation Areas (TCAs) in the recovery units in California in 2001 and 2020. Total estimated area excludes impervious surfaces (which increased by <25 km^2 between 2001 and 2019 across all TCAs). Modified from Zylstra et al. (2023).

Recovery Unit	**TCA**	**Area (km^2)**	**Mean Density 2001**	**Min Density 2001**	**Max Density 2001**	**Mean Density 2020**	**Min Density 2020**	**Max Density 2020**
Colorado Desert	Chocolate Mountain Aerial Gunnery Range	866	3.74	2.18	5.52	3.1	1.81	4.58
Colorado Desert	Chuckwalla	3768	2.84	0.12	7.39	2.37	0.1	6.15
Colorado Desert	Chemehuevi	4281	2.7	1.01	4.9	2.24	0.84	4.1
Colorado Desert	Fenner	2009	3.56	0.47	4.77	2.95	0.39	3.96
Colorado Desert	Joshua Tree	1714	3.07	0.11	7.07	2.55	0.09	5.82
Colorado Desert	Pinto Mountains	848	3.59	0.61	5.35	2.99	0.52	4.47
Eastern Mojave	Ivanpah Valley	2755	1.75	0.16	2.94	1.59	0.15	2.68
Western Mojave	Fremont-Kramer	2590	7.29	0.51	12.4	3.33	0.23	5.24
Western Mojave	Ord-Rodman	1223	3.8	0.05	8.7	1.74	0.02	3.97
Western Mojave	Superior Cronese	3508	5.45	0.53	9.44	2.5	0.24	3.99

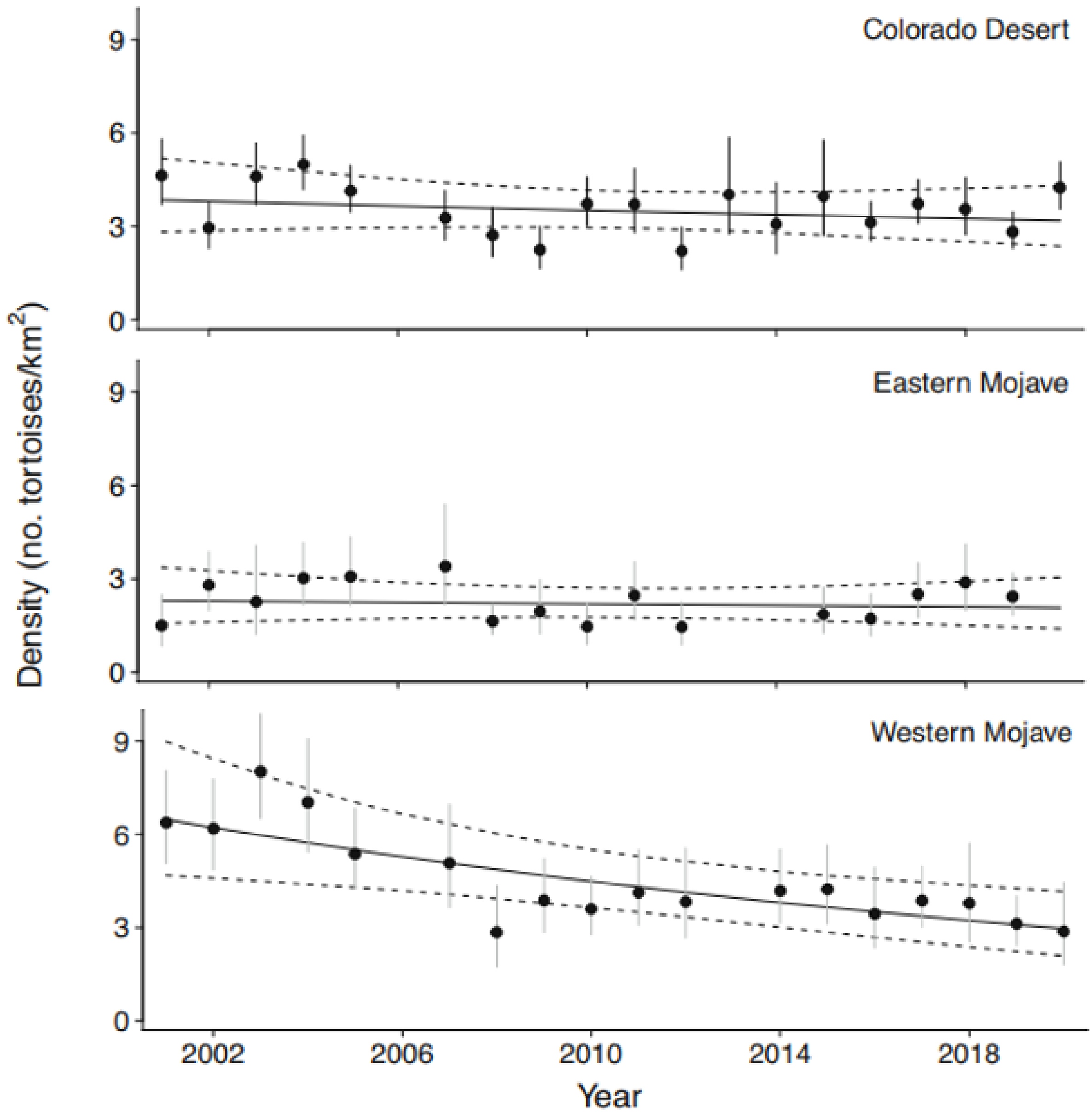


Figure 7. Estimates of density for adult Mojave Desert Tortoises (posterior medians [circles] and 95% credible intervals [CIs]) in each year a recovery unit was surveyed, with fitted log-linear trends (solid line) and 95% CIs for trends (dashed lines) in each recovery unit relevant for California. Modified from Zylstra et al 2023.

In 2001, the Western Mojave RU had the highest densities in California, but it has experienced the steepest decline in abundance since then, losing >50% from 2001 to 2020 (Zylstra et al. 2023; Table 3). The losses in abundance in the Colorado Desert and Eastern Mojave RUs were not as steep (with declines of about 17% and 9%, respectively), but overall, the three recovery units lost an estimated 130,000 tortoises over 19 years (Table 3). The Colorado Desert and

Eastern Mojave RUs each have one TCA outside of California, so the abundance estimates in Table 3 are likely an over-estimate for California.

Table 3. Predicted abundance (with associated standard error in parentheses) of adult Mojave Desert Tortoises in 2001 and 2020, and the difference between the two years, in the three California recovery units. For reference, the estimated areas within each recovery unit in 2001 and 2020 are included. The change in area between years is due to exclusion of areas with >40% impermeable surfaces. Modified from Zylstra et al. 2023.

Recovery Unit	Area (km²) 2001	Abundance (2001)	Area (km²) 2020	Abundance (2020)	Difference in Abundance
Colorado Desert	30,815	75,918 (12,458)	30,723	62,820 (9,862)	-12,782 (17,774)
Eastern Mojave	39,778	53,564 (10,784)	39,567	48,692 (9886)	-5,081 (16,925)
Western Mojave	50,623	206,540 (35,443)	50,444	94,433 (16,737)	-112,020 (42,490)

Predictions are based on a model that allowed for independent log-linear trends in each of the four recovery units. Differences in abundance between 2001 and 2020 were computed for each Markov chain Monte Carlo iteration and then summarized. Thus, calculated differences in the rightmost column do not equal the differences between summarized values in the Abundance columns.

Allison and McLuckie (2018) used different methods to estimate densities and declines in abundance from 2004 to 2014. Their density and abundance estimates were higher than those in Zylstra et al. (2023) but they also estimated a decline in abundance of about 50% in the Western Mojave RU in 2004–2014. Regardless, both techniques indicate broad scale, long-term declines in density and abundance for desert tortoise across their range in California. Currently all TCAs are estimated to be below the density necessary for population viability and have suffered declines for decades. These declines in the TCAs occurred despite state and federal listing and most of the land falling under federal land management agency ownership (Figure 5).

The long-term surveys in the TCAs provide robust data on declines in density since 2001. However, tortoise populations had been in decline for decades previously, and estimates of densities from before the species was listed under CESA in 1989 are important for understanding the scale of longer-term decline. While there were no large scale or frequent systematic population monitoring programs in the 20th century, multiple regional or short-term surveys gave snapshots of density in certain areas pre and post listing. These early monitoring programs sometimes relied on tortoise sign (tracks, scats, burrows, or carcasses) as well as observations of live tortoises, or employed mark-recapture methods to obtain estimates of abundance or density. It should be noted that survey methods that rely on sign to estimate numbers of live tortoises are not reliable. In addition, mark recapture methods contain several assumptions that are violated in surveys of tortoises (Corn 1994), and the lack of spatial information in conventional mark recapture analysis leads to inflated estimates of density (Mitchell et al. 2021*b*). Therefore, estimates of density before 2001 must be approached with caution and direct comparisons between density estimates from mark recapture and line transect density methods are not advised. However, we can use these studies to give a rough picture of the state of tortoise populations in the late 20th century.

Broad estimates of tortoise densities in California before the species was listed under CESA can be found in Berry (1986*a*):

> "Berry and Nicholson (1984a) developed a more detailed map of relative tortoise abundance throughout an area of over 100,000 km^2 using data from 1,808 strip transects. Transects, which were 2.4 km by 9.1 m, provided counts of tortoise signs (live individuals, carcasses, scats, cover sites, tracks, drinking sites, and courtship rings). Counts of signs were calibrated against counts along transects in areas where tortoise densities had been estimated by repeated censuses. The map prepared by this method showed five relative density classes: 0–8, 9–19, 20–39, 40–97, and >97 tortoises/km^2. Four major tortoise population centers or crucial habitats with densities of >77 tortoises/km^2 were identified: (1) Fremont-Stoddard in the western Mojave Desert (4,864 km^2), (2) Ivanpah in the eastern Mojave Desert (918 km^2), (3) Fenner-Chemehuevi in the eastern Mojave and northeastern Colorado deserts (3,881 km^2), and (4) Chuckwalla (1,333 km^2) in the southern Colorado Desert."

In addition, in the 1970s the BLM established 27 2.6 km^2 (1 $mile^2$) survey sites in California (Berry and Turner 1986). Using mark recapture methods, researchers surveyed the plots over 60-day periods in the spring every 2–10 years (Berry and Medica 1995). Berry (1986*a*) reported that of those 27 sites, "eight had estimated densities of $\leq$8 tortoises/km^2, six had 8–39 tortoises/km^2, and 13 sites supported 42–184 tortoises/km^2", though the years those estimates come from are not reported. Several of these sites are located within the current Ivanpah, Chuckwalla, Fenner, and Chemehuevi TCAs. The Desert Tortoise Natural Area overlaps with the northern border of the Fremont-Kramer TCA. Comparing the density estimates in Berry and Medica (1995) to the USFWS estimates in 2001–2021 is not appropriate due to the differences in methodology described above. However, comparing the mark recapture density estimates between 1979 and 1992 can give us a sense of the general scale of decline even if the estimates themselves are biased high (Berry and Medica 1995, Mitchell et al. 2021*b*). Estimates of densities in 1979–1980 vary from 36 adults/km^2 in Chemehuevi to a high of 73 adults/km^2 in Fenner and Chuckwalla (Figure 8). By the early 1990s, densities of adults had not fallen particularly dramatically except in Chuckwalla which had a 57% decline from about 73 adults/km^2 to about 31 adults/km^2, and the Desert Tortoise Natural Area which saw a 93% decline to 3.7 adults/km^2 (Figure 8).

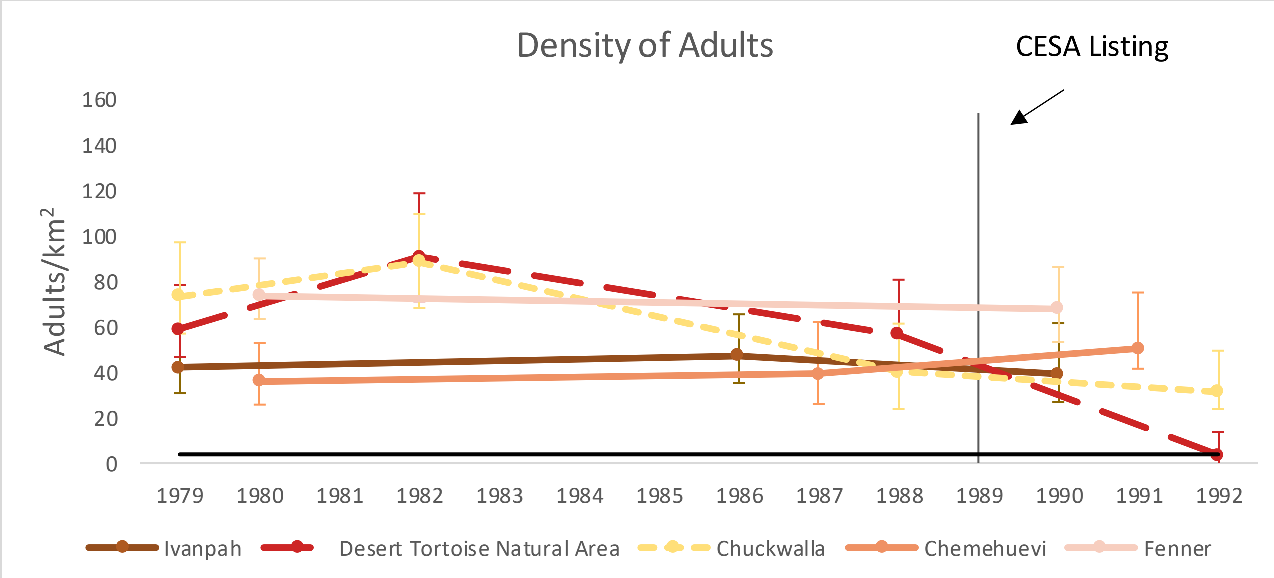


Figure 8. Estimated densities of adults/km^2 in plots surveyed 1979–1992 using mark recapture methods. Each dot represents the midpoint of the density estimate for a given year, bars are 95% confidence intervals. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. Redrawn from figures in Berry and Medica (1995).

Berry et al. (2020b) continued the work of surveying tortoises at Desert Tortoise Research Natural Area in the western Mojave Desert for decades. Part of the site was fenced to keep out sheep, vehicles, and humans but allow movement of tortoises, and surveys were done both inside and outside the fence. In 1979 when they started the surveys, estimated densities of tortoises were 103/km^2 inside the fence and 79/km^2 outside the fence. In 2002, densities had declined to 10.2/km^2 inside the fence and 4.17/ km^2 outside the fence. By 2012, densities had increased to 15.6/km^2 inside the fence, and to 4.9/km^2 outside the fence. Counts of tortoises (from which densities were estimated) followed an estimated overall linear decline of 9.1% per year over the 30+ years of the study.

Other studies give rough estimates of historical density in other parts of the range. In the Pinto Basin of Joshua Tree National Park in 1991–1996, Freilich et al. (2000) used mark recapture methods to resurvey a 1 mi^2 (2.59 km^2) plot that had been surveyed in the 1970s. Their methods were designed to estimate abundance rather than density; however, their estimate for the early 1990s was 42 adults/km^2. They reported that the density estimates were 29–31 adults and juveniles/km^2 in the 1970s. However, Lovich et al. (2014) reported that surveys in the Pinto Basin in 1987–1988 provided density estimates as high as 77 tortoises/km^2.

Medium-term tracking of densities occurred in four study sites in California at various times between 1977 and 1985 (Berry et al. 1986). At one site in the western Mojave Desert, Fremont Peak, sampling occurred three times (1977, 1980, and 1985) and the population density declined from 27/km^2 in 1980 to 15/km^2 in 1985 (Berry et al. 1986). However, at three other sites there were no significant changes in density during those years. At the Kramer Hills site in the Western Mojave Desert there were an estimated 42 adults/km^2 in 1980 and 44 adults/km^2 in 1982. The Chemehuevi Wash site in the Colorado Desert was surveyed in 1979 and 1982 and saw a nonsignificant increase from 18 adults/km^2 to 22 adults/km^2. The Chuckwalla Bench study site in the Colorado Desert had a non-significant increase in density from 75 adults/km^2 in 1979 to 87 adults/km^2 in 1982 (Berry et al. 1986); see Figure 8.

Although the density estimates from mark recapture surveys in the 1970s and 1980s only cover small areas and are biased high (Mitchell et al. 2021*b*), they provide a general picture of long-term decline and give context for more recent density estimates.

Juveniles

Juvenile tortoises are easier to overlook during surveys than adults, and the U.S. Fish and Wildlife Service does not include densities of juveniles in their yearly reports on density in the TCAs (but see Figure 10). However, Berry and Medica (1995) report on the density of adults and of all tortoises (including juveniles) using mark recapture surveys in BLM plots from 1979 to 1992. From those survey results, we can roughly calculate historical density of juveniles (density of all tortoises minus density of adult tortoises) in those specific plots to determine broad patterns of decline through 1992 (Figure 9).

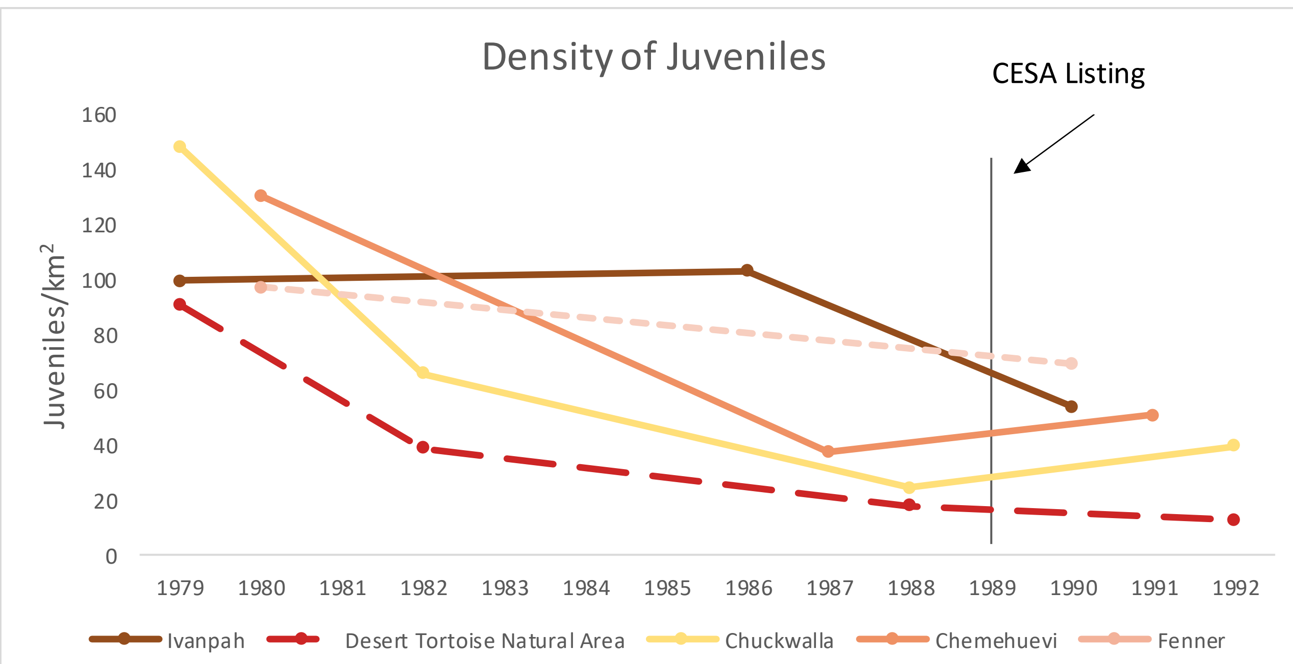


Figure 9. Density of juvenile tortoises in plots in California from 1979 to 1992. Juvenile density was calculated by subtracting density of adults from density of all tortoises presented in Berry and Medica (1995).

Between the late 1970s and early 1990s, the density of juveniles declined roughly 46% in Ivanpah, 86% in the Desert Tortoise Natural Area, 73% in Chuckwalla, 62% in Chemehuevi, and 29% in Fenner (Figure 9). While juvenile tortoises are expected to have low survival rates, this long-term loss of juveniles from the landscape is concerning, and there is evidence that it is continuing into recent years. In 2014 in the Western Mojave RU, the density of adult tortoises was 49% of what it had been in 2004, and the proportion of juveniles in the population declined by 9% (Allison and McLuckie 2018). In the yearly transect surveys done in the TCAs, the median midline carapace length did not change significantly between 2001 and 2015 (Figure 10). However, fewer juveniles small enough to be classified as outliers (the small circles below the lower 'whisker' in the box and whisker plot of Figure 10) were found in 2007–2015 compared to 2001–2005. In 2011, only one juvenile (midline carapace length <180 mm) was found, and in 2012 none were found. In some areas, the youngest tortoises found in recent years were at least 30 years old (Holcomb 2022*a*). Despite a steady median carapace length across 2001–2015, the range of carapace lengths decreased, with most of that change due to fewer smaller individuals found. Even with thousands of adults in a population, if sufficient juvenile tortoises are not surviving to breeding age, the population will decline without interventions like head-starting, although that decline may take decades to manifest (Lovich et al. 2018).

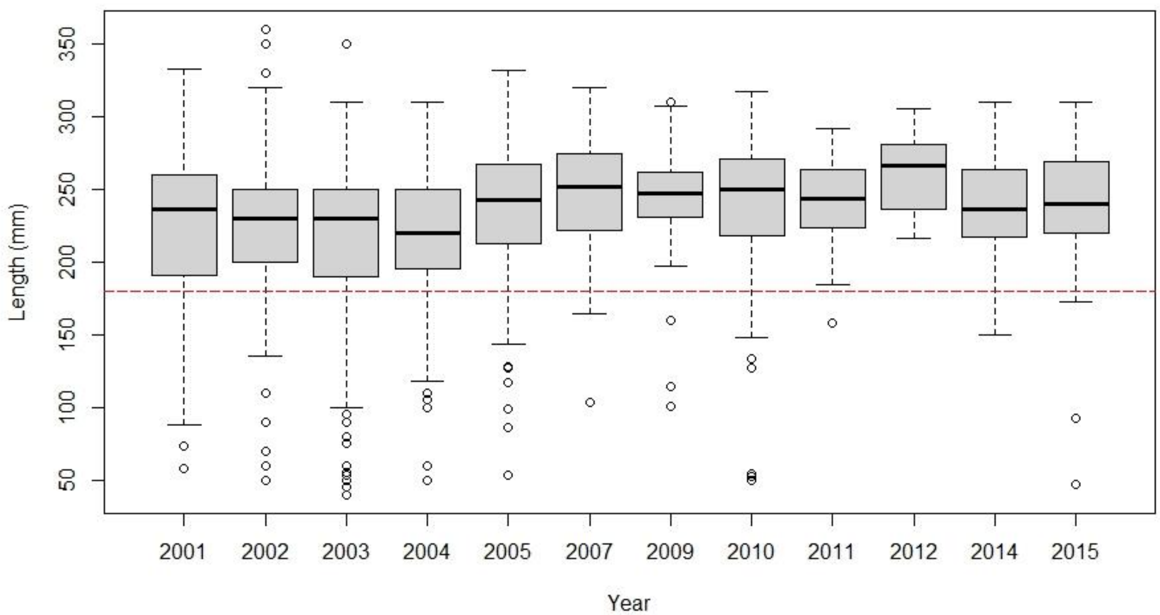


Figure 10. Midline carapace length of tortoises surveyed within the Western Mojave Recovery Unit Tortoise Conservation Areas, showing a reduction in observations of tortoises smaller than 180mm after about 2005. Described in Alison and McLuckie (2018), and figure made with USFWS unpublished data provided by K. Holcomb and used with permission. The horizontal dashed line at 180 mm represents the size over which tortoises are considered to be adults.

3.3 Mortality and Survival Rates

Adult and juvenile survival rates are important demographic factors that can affect whether a population is increasing, stable, or declining. Desert tortoises generally have low survival rates (i.e., high mortality rates) as hatchlings and juveniles, and relatively high adult survival rates (Berry and Murphy 2019). The adult survival rate needed for population stability depends on a number of factors, including population reproduction and/or recruitment rates, but the USFWS 1994 Recovery Plan estimated that an adult survival rate of 98% per year is needed for population growth of 0.5% per year. A more recent estimate that incorporated current adult densities and juvenile survival rates found that an adult survival rate of 93% per year was necessary for desert tortoise population stability (no growth or decline) (Holcomb 2022*a*). Estimates of survival/mortality rates come from a variety of studies within California, most of which were quite limited in geographic scale. When comparing survival rates to mortality/death rates, a broad rule of thumb is that mortality or death rate ≈ 1-(survival rate).

Adult tortoises are much easier to survey than juveniles and consequently most of the information about survival and mortality in the wild relates to adults. In the late 1970s and early 1980s, a study from four sites provided some limited information on annual mortality rates in stable and declining populations (Berry et al. 1986). At Fremont Peak in an area that later became the Fremont-Kramer TCA, densities of adults and subadults declined significantly between 1973 and 1985, and the estimated annual mortality rate of adults and subadults was 4.8% per year. In contrast, three other sites surveyed during that period that did not see significant declines in density had annual mortality rates of 2.2–2.9% (Berry et al. 1986). Berry et al. (2020b) estimated survival rates (1979–2012) of adults and juvenile tortoises inside and outside of the fenced portion of the Desert Tortoise Research Natural Area in the Western Mojave. As mentioned previously, in 1979 the estimated density of all tortoises was 103/km^2 inside the fence and 79/km^2 outside the fence. By 2012 densities had decreased to 15.6/km^2 inside the fence and to 4.9/km^2 outside the fence. During those years the population suffered an estimated 87.6% decline. Median annual survival probability (converted into percentages for ease of comparison) for adults inside and outside of the fenced area ranged from 79%–83% in 1979–1989, 71%–78% in 1989–2002, and 94%–96% in 2002–2012. These estimates are all well below the necessary survival rate identified in the USFWS 1994 Recovery Plan to achieve modest population growth. Juveniles had lower survival - their estimated median annual survival probability was 66%–73% in 1979–1989, 57%–65% in 1989–2002, and 90%-93% in 2002–2012.

In Eastern Joshua Tree National Park, tortoises were surveyed intermittently from 1978 to 2012 (Lovich et al. 2014). The authors tested the impact of rainfall on survival, and the best model of survival was based on the average estimated winter precipitation over the preceding three winters. They estimated a mean annual (apparent) survival rate of 0.87 (87%). Values below the mean occurred in 1991, 1997–2004 and 2008, which were years of lower rainfall (Lovich et al. 2014). Estimated survival was above the mean in 2010–2011. It should be noted that other factors that impact survival, such as predation, roadkill, and disease were not tested independently.

Between 2002 and 2004, Berry and Keith (2008) evaluated the status of desert tortoise populations in Red Rock Canyon State Park in Kern County. In the 1970s the population density had been estimated to be <8 tortoises/km^2. They estimated that 67% of the adult and subadult tortoise alive in 2000 were dead in 2004, and densities were between 2.7 and 3.6 tortoises/km^2.

In 2007–2008, Berry et al. (2020c) evaluated the status of a population of tortoises in the El Paso Mountains close to the Fremont-Kramer Critical Habitat Unit. Estimated density of adults was 4.8/km^2 and the annual death rate of adults in 2003–2008 was 6.9% (Berry et al. 2020*c*). The top causes of known death were mammalian and avian predators, gunshots, and vehicles. The authors concluded that "the high death rate of adults, low population density, high human visitor use, and ongoing decline in the adjacent critical habitat unit indicate that a viable population is unlikely to persist in the study area" (Berry et al. 2020*c*).

Esque et al. (2010) tracked several hundred adult tortoises before and after translocations from Fort Irwin National Training Center to neighboring public land in the Superior-Cronese Critical Habitat Unit. They monitored translocated tortoises, tortoises resident at the release sites, and control tortoises in nearby areas that were not affected by the translocations. In the first year (2008), 19% of control tortoises, 20% of resident tortoises, and 25% of translocated tortoises died. Most of the mortalities were thought to be due to coyote (*Canis latrans*) predation. As a comparison, at a different reference site in the Superior-Cronese Critical Habitat Unit, 8.3% of tracked tortoises died in 2008. At reference sites in other critical habitat units in California, percent mortality in 2008 ranged from 0% in Ivanpah and Ord-Rodman to 28–30% in Chemehuevi and Chuckwalla. Esque et al. (2010) also showed that mortality can vary greatly year to year in the same site. For example, at Soda Mountain outside of the Superior-Cronese Critical Habitat Unit, in 2006 there was no mortality, in 2007 mortality was 17%, and in 2010 mortality was 43%.

In 2009, Berry et al. (2020a) surveyed about 93 km^2 of BLM land within the eastern Chemehuevi Valley, adjacent to the Chemehuevi Critical Habitat Unit. Based on the number of live and dead tortoises found and the estimated age of the carcasses, they concluded that the density of adults was 2.0/km^2 (+/- 1.0), and that the annual death rate in the four years prior to the survey was 13.1%/year. These data led them to conclude that the population was probably nonviable (Berry et al. 2020*a*).

Collectively, these data suggest that adult survival rates in most recently surveyed areas are too low to support stable populations and have been below the thresholds established by the USFWS 1994 Recovery Plan and by Holcomb (2022a) for some time (Table 4). Although survival rates have not been estimated systematically across the tortoise's range in California, rates appear to be particularly low outside of CHUs.

Table 4. Survival and mortality rates of adult and subadult tortoises in various studies.

Life stage	Survival vs Mortality	Rate	Location	Time scale	Reference
Adults	Median annual survival probability	79%-83%	Desert Tortoise Research Natural Area	1979-1989	Berry et al. 2020b
Adults	Median annual survival probability	71%-78%	Desert Tortoise Research Natural Area	1989-2002	Berry et al. 2020b
Adults	Median annual survival probability	94%-96%	Desert Tortoise Research Natural Area	2002-2012	Berry et al. 2020b
All	Mean annual survival	87%	Eastern Joshua Tree National Park	1978-2012	Lovich et al. 2014
Adults & subadults	Annual mortality	4.5%	Fremont -Kramer TCA	1977-1985	Berry et al. 1986
Adults & subadults	Annual mortality	2.2%-2.9%	Kramer Hills, Chemehuevi, Chuckwalla	1977-1985	Berry et al. 1986
Adults & subadults	Death rate over 4 years	67%	Red Rock Canyon State Park	2002-2004	Berry and Keith 2008
Adults	Annual death rate	6.9%	El Paso Mountains near Fremont-Kramer CHU	2003-2008	Berry et al. 2020c
Adults	Annual mortality	13%	Chemehuevi Valley	2005-2009	Berry et al. 2020a
Adults	Annual mortality	0%	Ivanpah	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%	Ord-Rodman	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%-31%	Chemehuevi	2006-2008	Esque et al. 2010
Adults	Annual mortality	9%-29%	Chuckwalla	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%-44%	Soda Mountain	2006-2008	Esque et al. 2010
Adults	Annual mortality	6.3%-8%	Superior-Cronese	2007-2008	Esque et al. 2010

Juvenile Survival

In long-lived species like the tortoise, if adult survivorship drops, reproductive rates or juvenile survival would have to increase dramatically to keep populations stable. Analysis by the USFWS (1994) estimated that "a 10% increase in adult mortality can require a 300% increase in juvenile survivorship" to maintain a stable population. Many of the threats to adult survival also affect juveniles, making it unlikely that juvenile survivorship can naturally increase to the levels needed to compensate for the decreasing adult survival documented above.

Several factors limit the number of hatchlings that are produced in the wild each year. Temperature, precipitation, and body size influence the number eggs females lay (Henen 2002, Mitchell et al. 2021*a*), with the maximum being 12-18 eggs a year (J. Lovich Pers comm 2023). Incubation success depends on temperature, and nest predation is common (see section 2.2 for more detail) (Berry and Murphy 2019). In the Ivanpah Valley between 2011 and 2014, Tuberville et al. (2019) compared survival and growth of free ranging hatchlings to those reared in pens under different rainfall scenarios. Both groups were hatched from eggs laid by wild females and brought into captivity for the study. Free ranging hatchlings were released into the wild between 0 and 18 months old. Estimated annual survival rates for the free ranging hatchlings was 48%–49% compared to 94% of those reared in pens.

We have little information on historical juvenile survival rates, but the impact of recent low survival rates can be seen in demographic information. As mentioned previously, in the yearly surveys performed in the Western Mojave TCAs, many fewer tortoises with midline carapace length <180 mm were found in 2007–2015 compared to 2001–2005 (Figure 10). One factor influencing juvenile mortality is raven (*Corvus corax*) predation. Holcomb et al. (2021) estimated that annual survival rates for 1–10-year-old tortoises in 5 CHUs averaged 63% when within 500 m of a raven's nest, and ~76% when the median distance to a nest was 1.72 km. See section 4.4 for more detail on predation.

One strategy to improve juvenile survival is to raise tortoises in captivity and then release them once they reach a certain size (referred to as head-starting; for more details see section 5.2). A study at the Fort Irwin National Training Center on head-started juvenile tortoises (Nagy et al. 2015*b*) found that in the two years after release, survivorship was 76–79%, but in the third-year survivorship dropped to 53%, resulting in an overall three year survival rate of 32%. Survival was generally higher amongst tortoises with a carapace length of at least 100 mm (9 years old). Another study on head-starting found no significant difference in the survival rate of hatchlings released vs. those reared indoors for 7 months vs. those reared in outdoor pens for 7 months (Daly et al. 2019). Although the head-started tortoises grew quickly, the combined annual survival of the three groups was 44%, with the odds of survival increasing 51% for every 100 m away from a raven nest. They predicted that survival would be near 100% if the nearest nest was more than 1.6 km away (Daly et al. 2019).

Even with head-starting, juvenile survival rates can be lower than the 59% average annual juvenile survival rate estimated by Holcomb (2022a) to be necessary for population stability if adult annual survival rates are 93% (Table 5; see Table 4 for adult annual survival rates). The available information suggests that low juvenile survival is a likely contributor to widespread declines in density.

Table 5. Survival rates of juvenile tortoises in various studies.

Life stage	Survival rate estimated	Rate	Location	Time scale	Reference
Juveniles	Median annual survival probability	66%-73%	Desert Tortoise Research Natural Area	1979-1989	Berry et al. 2020b
Juveniles	Median annual survival probability	57%-65%	Desert Tortoise Research Natural Area	1989-2002	Berry et al. 2020b
Juveniles	Median annual survival probability	90%-93%	Desert Tortoise Research Natural Area	2002-2012	Berry et al. 2020b
Head started juveniles	Survivorship after 2 years	76-79%	Fort Irwin	2005-2007	Nagy et al. 2015
Head started juveniles	Survivorship after 3 years	53%	Fort Irwin	2005-2008	Nagy et al. 2015
Wild Hatchlings	Survival rate	48%-49%	Ivanpah Valley	2011-2014	Tuberville et al 2019
Head started juveniles	Annual survival after release	44%	Mojave National Preserve	2015	Daly et al. 2019
Juveniles	Annual survival close to ravens' nest	63%	Mojave Desert	2020	Holcomb et al. 2021
Juveniles	Annual survival far from a raven nest	76%	Mojave Desert	2020	Holcomb et al. 2021

For species like tortoise with slow growth, delayed maturation, and low reproduction rates Shine 2005), factors that lower adult survival rates can have long-term negative impacts on abundance/density. Snapping turtles have similar life history traits as desert tortoises, and in a population in Ontario Canada, river otters killed about 50% of the adults over three years in the late 1980s (Keevil et al. 2018). Female annual survival rates fell from 94% to 76–86% during those years, and the population was reduced by about 40% (Keevil et al. 2018). Twenty-three years later, survival rates had returned to early 1980s level, but abundance did not rebound. This suggests that even if threats are removed, and survival rates increase, for a long-lived species like the desert tortoise, populations may not recover for several decades. The problem is magnified if juvenile survival is very low as occurs in multiple survey areas in California. Having breeding adults on the landscape is vital for population viability, and low rates of juvenile recruitment create an unstable demographic structure that will make it less likely for populations to recover and makes them vulnerable to any additional sources of mortality (Holcomb 2022b).

4. FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

This section considers the factors affecting the ability of the population to survive and reproduce, and the degree and immediacy of threat (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). In addition, this section addresses the six listing factors identified in title 14 of the California Code of Regulations section 670.1, subdivision (d)(1): present or threatened modification or destruction of habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities. This section reviews the best available scientific information regarding each of these factors and assesses the degree of threat of each.

Desert tortoise life history traits, including delayed reproductive maturity, relatively low annual fecundity, and low survival rates of juvenile tortoises cause populations to be vulnerable to a multitude of threats (Berry et al. 2020*b*). Their vulnerability is increased because many of the threats are interactive and amplify each other. This document focuses on individual threats, but also recognizes that many of them are fundamentally intertwined. Many of the threats described in the initial desert tortoise status review and the USFWS Recovery Plans (U. S. Fish and Wildlife Service 1994, USFWS 2011) continue to affect the species.

4.1 Habitat Modification and Destruction

The Mojave Desert Tortoise range in California includes a variety of public and private land jurisdictions, the top three being BLM (39,251 km^2), National Park Service (NPS) (17,035 km^2), and Department of Defense (DoD) (13,018 km^2). Habitat management and allowable modification varies by jurisdiction. BLM land can be officially designated as Wilderness where mechanical transport is not allowed and there are many restrictions on use. In other areas BLM land is managed for a wide range of uses and stakeholders, and permitted activities that may impact tortoises include off-highway driving, mining, and renewable energy projects. On NPS land off-highway driving, mining, and renewable energy projects are not allowed. DoD land is not generally open to the public and uses range from extremely low impact to high impact live artillery use. See Figure 5 for more details on land ownership.

In the large majority of tortoise habitat, at least some alteration is allowed which can impact tortoises. Across all states, an estimated 66% of Mojave Desert Tortoise habitat has some development within 1 km, where development is defined as “urban development, cultivated agriculture, energy development (e.g., oil and gas well pads, solar energy facilities), surface mines and quarries, pipelines and transmission lines, and transportation (e.g., roads and railroads” (Carter et al. 2020). The direct impacts of development include removal of soil and vegetation, destruction of burrows, and creation of roads and other infrastructure that can kill tortoises or hinder their movements (Boarman and Sazaki 1996, 2006). An important indirect impact of development is subsidization of predators (see section 4.4) (Boarman et al. 2006).

Tortoises are less likely to occur in areas that have even a low level of development. Carter et al. (2020) found that “encounter rates of both live and dead Mojave Desert Tortoises combined decreased significantly with development levels” and that when “10% of the area within 1 km of that location has been altered by development” (10% development), it was rare to find live or dead tortoises at a location. The authors estimated that encounter rates for both live and dead Mojave Desert Tortoises decreased an average of 4% for every 1% increase in the development index (Carter et al. 2020).

While there is some development within 1 km of the majority of desert tortoise habitat range-wide, the three Recovery Units partially or wholly within California generally include little development. In the Western Mojave Recovery Unit (which is wholly within California) 47% of tortoise habitat has almost no development (<1% within 1 km), and 5% of habitat has >10% development (USFWS 2022*a*). For the Eastern Mojave Recovery Unit, the proportion of habitat with <1% development within 1 km is 58%, and 5% is at 10% development. In the Colorado Desert Recovery Unit, it is 65% and 4% respectively (USFWS 2022*a*). However, those two units extend outside of California (see Figure 6), and it is unclear whether those percentages are representative of the range in California. In their 2022 5-year review, the USFWS concluded that "space does not appear to be a limiting factor to tortoise recovery". However, these categories of development used above do not include unpaved roads and tracks for off-highway vehicles (OHVs) which are allowed on BLM land (see section 4.2). And given continued desert development, the conclusions may be less applicable in the future.

The human population in the inland deserts of California has increased significantly in the past 30 years. Between 1990 and 2022, the number of housing units increased 58% in Imperial County, 79% in Riverside County, and 37% in San Bernardino County (numbers calculated from State of California Department of Finance 2023). Not all of this growth happened in the desert portions of the counties, and the more urbanized areas tend to be in western parts of the counties that contain less desert habitat. Urban or suburban development typically expands along the edges of previously impacted habitats which generally contain few tortoises. Therefore, we focus discussion on other types of projects that are more likely to have large-scale impacts on areas with desert tortoise populations.

Department of Defense

The Department of Defense is a major landholder in the desert tortoise range. Military bases in California deserts include Fort Irwin, Naval Air Weapons Station China Lake, Edwards Air Force Base, George Air Force Base, Chocolate Mountain Aerial Gunnery Range, Marine Corps Air Ground Combat Center Twentynine Palms (MCAGCC), and Marine Corps Logistics Base Barstow. In total, these bases encompass over 3 million acres (14.78% of the total tortoise range in California, see Figure 5). A wide variety of land uses occur on DoD property, and some of those uses are compatible with desert tortoises while others are not. For example, MCAGCC has Restricted Use Areas, at least one of which (Sandhills TA) is 11,801 acres and "protects the installations water supply, archeological resources, and the desert tortoise" (Marine Air Ground Task Force Training Command and Center 2018). In contrast, active training areas are generally high impact and tortoises in those areas are translocated to other sites. For example, according to the USFWS (2022*a*), the "Department of the Army (Army) expanded training onto 18,197 acres (73.6 km^2) of designated critical habitat on the southern area of Fort Irwin that had previously been off-limits to training, thus requiring the translocation of approximately 650 adult desert tortoises. In addition, the Army plans to expand activities onto and displace tortoises from up to 62,045 acres (~250 km^2) of its western training area in the near future, which is designated critical habitat and currently off limits to training. The Department of the Navy (Navy) expanded training for the Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms into approximately 167,982 acres (680 km^2) of public and private land, which required translocating approximately 1,000 adult tortoises." Around 700 of the tortoises from Twentynine Palms were translocated into the Ord-Rodman TCA (see section 5.2 on Translocation).

Along with translocation of tortoises, other strategies used by the DoD to offset the impact of converting large areas of habitat into training grounds include acquiring land within a CHU (making it federal), buying out grazing allotments, increased law enforcement in tortoise habitat, predator monitoring and targeted control within translocation sites, rehabilitation of closed routes, installation of off-highway vehicle barriers and desert tortoise exclusion fencing, and constructing perimeter fences to prevent public trespass into tortoise habitat (USFWS 2022*a*). For more discussion of efforts to conserve tortoises, see section 5.2 Current Management Actions.

Given the relatively large amount of DoD land with land use practices that require translocation of tortoises, it is of interest whether and how quickly habitats might become suitable again for tortoises if they are no longer used for training. Recovery from disturbance can take a long time in desert ecosystems (Lovich and Bainbridge 1999). This has been documented in soils and vegetation of the Desert Training Center which spans parts of southern California, southern Nevada, and western Arizona. This area was used for military training exercises in the 1940s and 1960s, and 40–60 years later the soil in tank tracks remained compacted and rain infiltration rates were low (Prose and Wilshire 2000). These soil differences led to increased plant density in the tracks, but those plants had restricted growth. In addition, grass species with shallow fibrous root systems increased in density in the tracks while species with long tap roots had reduced density and cover (Prose and Wilshire 2000). USFWS (1994) estimated that areas where camps, roads, and parking lots were built would take "decades or centuries to recover."

Other documented direct negative impacts to tortoises on military property include "vandalism, predation, mycoplasmosis, and shell diseases" with "significantly more tortoises with shell disease…found on plots with current and recent military use than on plots with no history of military use" (Berry et al. 2006). For more detail on shell disease see section 4.7.

In the past 10 years, approximately 150,000 acres of the ~3,000,000 acres (~607 km^2 of ~12,140 km^2) of viable desert tortoise habitat under DoD jurisdiction in California have been eliminated (USFWS 2022*a*).

Renewable Energy Projects

Renewable energy projects, including solar farms and wind energy facilities, are a major source of development in desert tortoise habitat. These facilities are regarded as key to reducing CO_2 emissions, and their development has been prioritized on public land (e.g., American Reinvestment and Recovery Act 2008; National Energy Policy Act 2005, Infrastructure Investment and Jobs Act 2021, Inflation Reduction Act 2022). Unlike urban or suburban development, energy projects tend to be sited in mostly undeveloped public land, thus leading to the potential degradation and fragmentation of relatively high-quality tortoise habitat (Lovich and Ennen 2011).

Development of a wind power project results in a variety of disturbances that are classified as temporary or permanent. Permanent impacts include land occupied by wind turbine pads, access roads, substations, and transmission lines. Temporary direct impacts include temporary roads, staging areas, and substation/transmission construction (Denholm et al. 2009). However, in desert ecosystems, 'temporary' disturbances may have decades-long impacts if sites are not actively rehabilitated. Denholm et al. (2009) collated data on the size of several wind projects in California including total size (land associated with the complete wind plant project) and area of direct (permanent and temporary) impact. Of the four projects with complete data, direct impacts accounted for 1.5–7% of the total area of the project.

Data specifically evaluating the impacts of wind energy facilities on desert tortoises remains limited, however two studies suggest that tortoise survival rates on project sites are relatively high. A study near Palm Springs in Riverside County estimated tortoise survival rate within a wind energy facility (WEF) and a nearby wilderness area (NWA) using data from 1997–2000 and 2009–2014 (Agha et al. 2015). They found "long-term tortoise survivorship within the WEF (96.7%) was significantly higher than in the nearby NWA (92.1%)" (Agha et al. 2015). This counter intuitive result may have been due to tortoises at the WEF benefiting from "edge enhancement of vegetation (food resources), turbine pads (artificial rain catchments), reduced subsidized predators and low traffic." (Agha et al. 2015). Lovich et al. (2011) tracked tortoises at a wind energy facility near Palm Springs for six field seasons (1997–2000 and 2009–2010). The facility contained turbines, electrical transformers, and an extensive network of roads. Their estimated annual survivorship rate of 91.6% (confidence interval 90.5–93.5%) was based only on adult females, which is a much higher survival rate than has been reported in many areas across the range in California (see section 3.3). The authors suggested a few characteristics of the site that might have led to high survival rates including very restricted public access and fewer ravens. However, they cautioned that without before-and-after studies of the impact of wind energy facilities, of which there are very few, it is hard to draw conclusions about the long-term impacts of wind energy facilities on desert tortoise. A study in southern California compared windfarms with nearby areas and found that species richness, evenness, and diversity was lower on the farm sites for reptiles, birds, mammals, arachnids, and plants (Keehn and Feldman 2018). Renewable energy facilities are not sited within tortoise CHUs, however they can be close enough that the impacts listed above spill over into critical habitat (K. Berry USGS, pers. comm 2022).

Solar power plants have a different design and land use than windfarms. However, similar types of impact classifications occur. Direct impacts occur where land is cleared and occupied by solar arrays, access roads, substations, service buildings, and other infrastructure (Ong et al. 2013). Three types of solar power plants were evaluated in one study, and the percentage of total land that was directly impacted was between 38% and 100% of the project site (N=12 projects) (Ong et al. 2013). The impact of infrastructure to wildlife extends beyond the habitat that is directly modified, including fragmentation and barriers to gene flow, effects due to noise, vibration, and shadow flicker, electromagnetic field generation, macro- and micro-climate change, predator attraction, dust and dust suppressants, and increased fire risk (Lovich and Ennen 2011, 2013).

Renewable energy projects that could potentially cause 'take' of desert tortoises must apply for incidental take permits (ITPs) from the Department or from the USFWS depending on jurisdiction (see section 5.1 for more detail). Between 2010 and 2021, the Department issued

ITPs for desert tortoise for 49 renewable energy projects, the majority of which are solar farms. In 2022, the Department completed ITP permitting for six renewable energy projects within San Bernardino and Riverside counties that would have a total footprint of about 10,600 acres (43 km^2). As of October 2022, the Department was in the process of reviewing or issuing ITPs for 14 more renewable energy projects in Riverside and San Bernardino counties that could potentially have footprints of up to 20,750 acres (84 km^2). For solar farms in particular, CDFW assumes these sites will lose all of their biological resources. Not all of these projects are necessarily sited within the recovery units or will end up receiving permits from the Department. However, it does show that there is increasing demand to use land within the Mojave Desert for renewable energy projects, specifically high impact solar farms (for more information about ITPs, see Section 5.2).

Cannabis Operations

Illegal cannabis farms are an emerging threat to tortoises and their habitat in California's deserts. Habitat is destroyed to put up greenhouses, and there are potential associated spillover effects like chemical leakage into stream beds, trash dumps, and other land disturbances beyond the footprint of the greenhouses. In addition, water and trash may attract and increase densities of predators like coyotes and ravens, and guard dogs (*Canis familiaris*) are thought to kill tortoises (Holcomb 2022*a*, USFWS 2022*a*). In the Department's Region 6, which includes the majority of desert tortoise range, as of 2022 there had been 3,065 acres (~12 km^2) of illegal cannabis cultivation visited by law enforcement. However, the Department acknowledges that there are vastly more illegal sites within tortoise range for which a law enforcement response has not been possible, therefore these numbers likely underestimate the true impacts. The presence of illegal cannabis farms can have additional indirect impacts on tortoise conservation. For example, according to USFWS (2022a), "illegal cannabis farms have already led to the cessation of raven monitoring and management efforts in the Fremont-Kramer Critical Habitat Unit in 2021, with the likelihood that tortoise monitoring in the same unit scheduled for 2022 will be cancelled due to safety concerns for field workers."

Legal cannabis cultivation also occurs within the desert tortoise range. Currently in Region 6 there are 2,394 acres (~9.5 km^2) of legal cannabis cultivation that have Streambed Alteration Agreements. The Department evaluates each development project individually for the purposes of the California Environmental Quality Act, and there has not been a robust analysis of the cumulative impacts to the species resulting from cannabis development in the area. Due to the newness of the threat, the overall impact on tortoises from illegal and legal cultivation has not been quantified. However, it is a matter of increasing concern, and the current tools of permitting and law enforcement resources may not be sufficient to lessen the negative impacts on tortoises.

Summary

While the long-term impact of habitat modification and destruction resulting from the land uses described above, along with any associated mitigation measures, is not fully known, the USFWS (2019*a*) states the impacts of large-scale land use conversions are "unlikely to be positive, despite the numerous conservation measures that have been (or will be) implemented as part of the actions." Although there are multiple science-based measures enacted to manage and mitigate threats, USFWS (2019*a*) warns that they "have been unable, to date, to determine whether the expected benefits of the measures have yet been realized, at least in part because of the low reproductive capacity of the desert tortoise. Therefore, the conversion of habitat into areas that are unsuitable for this species continues the trend of constricting the desert tortoise into a smaller portion of its range".

Across the entire species range, it has been estimated that 7.4% of modelled tortoise habitat is now unsuitable for tortoise survival due to development and recent fire (Holcomb 2022*a*). Additionally, habitat is degraded in many additional areas by factors such as off-highway vehicle use, wildfire, invasive plant species, and increased temperature due to climate change. Therefore, focusing solely on the proportion of direct habitat loss in the desert tortoise range may be misleading and create an overly optimistic picture. With more than 90% of historical habitat still accessible, tortoise populations have declined severely in the past two decades.

4.2 Vehicle Strikes, Roads, and Fencing

Development of all types creates roads and other transport corridors that impact tortoises directly through vehicle strikes and as barriers to movement. Indirect impacts of transport corridors include habitat degradation including the spread of invasive species (Boarman et al. 1997, Brooks and Lair 2005).

Tortoises are often attracted to roads within their home ranges because the rain runoff collects and appropriate forage plants often grow along their edges (Boarman et al. 1997). However, impacts from direct mortality and increased access for predators near roads can result in the creation of reduced occupancy zones of variable width along roads (Boarman et al.1997). Two-lane paved roads in Mojave National Preserve had reduced occupancy up to 400 m away from the road (Hughson and Darby 2013). Boarman and Sazaki (1996) studied Highway 58 in California and found reduced occupancy up to 800 m away. If the roads occur at a sufficient density, these zones could impact enough habitat to affect tortoise density across large scales. Although these results are only correlative, the TCAs that have road densities above 0.75 km/km^2 all had declines in tortoise densities between 2004 and 2014, while TCAs with less dense roads had both increases and declines in tortoise density (USFWS 2022*a*).

Desert tortoises are particularly susceptible to being killed on roads due to their slow rate of travel. Human behavior also plays a role. Boarman et al. (1997) anecdotally reported drivers intentionally swerving to hit turtles and tortoises. Even if most drivers are not intentionally hitting tortoises, speeding on all types of roads can lead to deadly strikes on tortoises (A. Ellsworth pers. comm. Nov 2022). Boarman and Sazaki (1996) estimated a kill rate of one tortoise per 2.4 km of road per year on Highway 58 in the western Mojave Desert, but warned their estimate was likely low because carcasses disappear quickly in the desert (likely due to scavenging). Juvenile dispersing tortoises are more likely to be killed on roads compared to adults (Boarman and Sazaki 1996). Anecdotal evidence from the Mojave Desert Preserve indicates an average of 5.3 tortoises per year are found dead on the 216 km of paved road in the Preserve. Using 2008–2010 data from the Preserve, Hughson and Darby (2013) estimated that the loss of ~60 tortoises per year (on top of the low rates of natural adult mortality for such a long-lived species) would be unsustainable. They concluded that road mortalities could account for ~9% of this excess mortality per year.

Keeping tortoises off roads is a conservation priority (USFWS 2022*a*). Well-constructed fencing designed to stop tortoises from accessing roads can lead to 93% fewer tortoise carcasses along highways as well as reducing road kills of other small vertebrates (Boarman and Sazaki 1996). Properly designed culverts under roads facilitate tortoise movements and help prevent fences from fragmenting tortoise populations (Boarman and Sazaki 1996). However, proper design is key, as culverts can become death traps for tortoises if not properly designed and implemented (Lovich et al. 2011).

While fences are an important conservation measure, the pace of construction has slowed in recent years. According to the USFWS (2022*a*):

> "Through 2011 approximately 1,660 km of highway roadside (including both sides of roads for those fenced on each side) had tortoise exclusion fencing installed to prevent road mortalities. Unfortunately, only approximately 43 km of roadside have been fenced in the decade since 2011. Almost 500 km of roadside have been identified as priorities for fencing based on our current understanding of road-effect zone area, relative habitat potential, and locations of extant populations (Holcomb 2019)."

Considerations that can slow or prevent fence building include cost, maintenance, visual disruption of the landscape, and loss of habitat during construction. At the October 2022 Desert Tortoise Management Oversight Group Meeting, the BLM reported that 3.5 miles of I-40 in the Ord-Rodman CHU will be fenced and 5 miles of fence will be built in Mojave National Preserve. Other strategies to reduce tortoise mortalities on roads such as lowering speed limits, installing warning signs, and driver education have not been shown to be particularly effective (Hughson and Darby 2013).

Off-highway vehicles

Off-roading is a popular pastime in California's deserts. According to the BLM, in 2008 there were four times the number of off-highway vehicles in western states than in 1998 (Bisson 2008). In Desert Wildlife Management Areas and CHUs, OHVs are legally required to stay on established roads and trails, while on the remainder of BLM land they can travel cross-country, although local BLM offices can enact further restrictions. OHVs and their associated unpaved trails lead to habitat degradation, but the impacts are thought to be generally less severe than paved roads.

OHV trails are typically <4 m wide with a dirt surface, and are unimproved (i.e., they have never been bladed or filled) (Brooks and Lair 2005). When the trails are created, soils and vegetation are altered, and some types of wildlife may potentially be killed. Tortoises can be struck by OHVs on and off these trails. OHVs can crush burrows, depriving tortoises of refuge from extreme temperatures and drought. In areas of very frequent OHV use, multiple routes may merge into broad areas devoid of perennial vegetation 10–100 m or more across. These extremely high impact areas are rare, however there are large networks of OHV trails across the Mojave Desert which collectively can significantly change local habitat and soils (Brooks and Lair 2005). OHV trails change water runoff patterns (especially on slopes) and can lead to greater erosion (Brooks and Lair 2005). In addition, roads of all kinds can serve as pathways for invasive species. Inholdings of private parcels within BLM land are often set aside for conservation, and OHV trails formally stop and restart at the boundaries. However, drivers often trespass across those private parcels, creating negative impacts for the tortoises even in areas that are designated as protected (A. Ellsworth, CDFW pers. comm. Oct 2022). The ecosystem or landscape-wide impact of OHV use can be hard to tease out in areas like the Mojave Desert that have multiple land uses, and Brooks et al. (2005) warned that "dispersed landscape effects … should be generalized very cautiously".

The extent of OHV trails in desert tortoise habitat is hard to quantify, however the recent expansion of the Spangler, El Mirage, and Johnson Valley off-highway vehicle recreation areas under the 2019 John D. Dingell, Jr. Conservation, Management, and Recreation Act opened up an additional 60,000 acres (~242 km^2) of public land to OHV use (USFWS 2022*a*).

Closing and restoring illegal OHV routes can improve habitat for tortoises. At the October 2022 Desert Tortoise Management Oversight Group Meeting, the BLM reported that there is a multi-year restoration project in Fremont-Kramer CHU to monitor and restore OHV routes.

4.3 Impacts from Invasive and Non-Native Species

Like many of the processes threatening desert tortoise, the impacts of invasive species are often tied to and synergistic with other factors such as livestock grazing, drought, and wildfire. Invasive Mediterranean grasses have spread through much of the Mojave Desert. These grasses create fuel for wildfires (Drake et al. 2015) and outcompete native annual plants (DeFalco et al. 2003). In 1995, 34 plots in the Mojave Desert near Barstow had frequencies of occurrence of 17% for *Bromus* and 38% for *Schismus* (both invasive grasses) (Brooks 1999). A more recent study sampled 718 plots across the Mojave Desert in 2009–2013 to investigate invasive grasses (*Bromus* spp. and *Schismus* spp.) and an invasive forb *(Erodium cicutarium*). At least one of the invasive taxa occurred in 91% of the plots with herbaceous cover, and two or more of the species co-occurred in 77% (Underwood et al. 2019). Berry et al. (2020b) summarized the impacts of invasive grasses on desert tortoise:

> "Grasses are high in fiber, contain less digestible energy, and little protein (Hazard et al. 2009), causing juveniles to lose phosphorus and potentially shell volume (Hazard et al. 2010). Because of numerous human activities, invasive, non-native, and fire-prone grasses became established in tortoise habitat and now contribute substantially to the biomass of annual plants in late winter and spring, the principal feeding time for the tortoise (Brooks and Berry 2006, Brooks and Matchett 2006, Brooks et al. 2006, Minnich 2008). These grasses compete with native forbs for nutrients (Brooks 2000a). A diet of grasses is insufficient in

> nutrients and leads to water loss during digestion (Hazard et al. 2009, 2010). In experimental studies, 32–37% of neonates and yearlings did not survive on a diet of grasses, whereas individuals in these size groups fed native forbs or a mix of native forbs and grasses had better body condition, immune functions, growth, and survival rates exceeding 95% (Drake et al. 2016)."

In contrast to grasses, the alien forb *Erodium* provided sufficient nitrogen and is of similar nutritional quality as a native forb (Nagy et al. 1998), allowing juvenile tortoises fed on forbs to gain weight (Hazard et al. 2009).

4.4 Competition

Grazing by livestock is a major part of the recent history of the desert. While grazing on BLM lands was historically permitted in tortoise range (Berry et al. 2014) after federal listing in 1990 it was halted in the CHUs. However, grazing is allowed on private inholdings within the CHUs, which are often unfenced. The documented impacts of livestock on tortoises include competition for food, trampling to death, and causing the collapse of burrows (see Berry and Murphy (2019)). Livestock also degrade habitat by creating or expanding trails which reduces annual plant cover and can (but does not always) promote wind erosion and compaction (Webb and Stielstra 1979, Lovich and Bainbridge 1999). Livestock increase browsing pressure on the trees and shrubs that tortoises require for shade and for establishing burrows (Berry et al. 2020a). Artificial watering sites concentrate activity of wild and domesticated large herbivores, potentially modifying soil nutrients, compaction, seedbanks, and density of invasive species nearby. In a grazing allotment on BLM land in the west central Mojave Desert, cover of native plants decreased with increasing proximity to a water site, while cover of alien (but not necessarily invasive) species increased (Brooks et al. 2006). This change in plant composition was observed up to 800 m away from the watering site. Ninety-six percent of the alien plant cover was made up of three species, including the forb *Erodium cicutarium* and the alien grass *Schismus* spp. (Brooks et al. 2006).

4.5 Predation

Desert tortoises are preyed upon by several native species, with different predators targeting different tortoise age classes. The number and distribution of certain predators in tortoise habitats have increased in tandem with human development.

The best studied tortoise predators in California are ravens and coyotes. These species are generalist predators which utilize a variety of habitats including those modified by humans. Human residence and activity in tortoise habitat provide food resources such as unsecured trash, water, and road-killed carcasses, and buildings and other structures provide shelter (Boarman et al. 2006, Kristan and Boarman 2007). These 'resources bonanzas' (Kristan and Boarman 2007) allow predator populations to flourish, potentially increasing predation pressure on native prey.

Raven populations have drastically increased in the Mojave Desert in the past 50–100 years and ravens have become a major predator of juvenile tortoises. This contrasts with population trends for many other bird species. Between the early 20th century and 2013–16, survey sites in the Mojave Desert lost 43% of their bird species on average (Iknayan and Beissinger 2018). Ravens were the only bird species to substantially increase across survey sites. The probability that ravens would be detected at a survey site was on average 35% in the first half of the 20th century and 76% in 2013–2016 (Iknayan and Beissinger 2018). Between 1970 and 2020, the index of abundance of ravens inside Mojave Desert Tortoise range increased by a factor of 6 (Harju et al. 2021). In 2020, surveys in Fenner, Ivanpah, Fremont-Kramer, Ord-Rodman, and Superior-Cronese CHUs found average densities of 0.63 ravens/km^2 in Fenner in the east to 2.44 ravens/km^2 in Fremont-Kramer in the west (Holcomb et al. 2021). This expansion of raven presence in extent and abundance is due at least in part to increased anthropogenic subsidies (Boarman and Berry 1995). Ravens spend time near these subsidies (Boarman and Berry 1995, Boarman et al. 1995, 2006), which is one of the factors that leads to higher mortality for tortoises near human infrastructure than in open desert (Berry et al. 2006, Esque et al. 2010). As human infrastructure has increased in the Mojave Desert, the impact of raven predation on desert tortoise populations has likely increased.

Ravens are more likely to target juvenile tortoises rather than adults. Nagy et al. (2015b) released 53 tortoises on Fort Irwin National Training Center in 2005, and 78% of the mortality of smaller tortoises (carapace 45–80 mm) was due to ravens, while coyotes were a major source of mortality for larger (111–175 mm) tortoises. High levels of raven predation on juveniles are thought to have led to far fewer juveniles being observed in the annual TCA surveys. In an area with a raven density of 2.4/km^2, the USFWS estimated survival of 0–12-year-old tortoises at 51%, which is much lower than in areas without ravens (Holcomb 2022*b*). Distance to the nearest raven nest impacts the survival rates of 0–10-year-old tortoises. Using decoy tortoises, Holcomb et al. (2021) found that juvenile tortoises had an average annual survival rate of 63% at 500 m from a raven nest, while juvenile tortoises 1.72 km from a nest had an annual survival rate of about 76%. They estimated that in areas where there were more than 0.89 ravens/km^2, and tortoises were less than 1.72 km from a nest, high rates of juvenile mortality would lead to population decline. If these criteria were applied to the Fremont-Kramer CHU, raven predation alone would likely have caused “inadequate” recruitment of juvenile tortoises across the majority of the CHUs over the past 20 years (Holcomb et al. 2021).

Predation pressure by ravens is not even across the tortoise range. In a study in the El Paso Mountains east of Bakersfield between 2008 and 2009, avian predators (mostly ravens) accounted for only 2.5% (on plot) and 3.7% (off plot) of observed mortalities (Berry et al. 2020*c*). Ivanpah and Fenner CHUs are in the eastern part of the range and have fewer anthropogenic subsidies for ravens and therefore lower raven densities. However, the densities in those CHUs are high enough that predation pressure combined with drought, road mortality, and invasive species together permit sustained recruitment of juvenile tortoises only in a few places (Holcomb et al. 2021).

Coyotes are thought to be a major predator of adult tortoises. In a study of translocated tortoises in the Superior-Cronese CHU, between 2008 and 2018 an estimated 60% were killed by predators, likely coyotes based on nearby tracks and scat (Esque et al. 2010, Mack and Berry 2023). In an examination of the dead tortoises found in the El Paso Mountains east of Bakersfield between 2008 and 2009, 20% of the carcasses found on the survey plots and about 52% of those found off plots were killed by mammalian predators including coyote, kit fox (*Vulpes macrotis arsipus)*, and badger (*Taxidea taxus)* (Berry et al. 2020*c*). Lovich et al. (2014) surveyed tortoises in a plot in Joshua Tree National Park, and in 2012, about 30% of tortoise carcasses had signs of predation or scavenging, likely by coyotes or kit foxes.

There is some evidence that canid predators focus more on females than males. In the Superior-Cronese CHU in 2008, Esque et al. (2010) found that females were more likely to be predated than males. They also looked at reference sites across the Mojave Desert and found that coyote predation on tortoises was strongly associated with the size of nearby human populations (Esque et al. 2010). Like ravens, coyotes receive food subsidies from human populations, and according to scat surveys, are widespread in some areas (Cypher et al. 2014). However, there is not much data on coyote population trends in the Western Mojave (Cypher et al. 2014) so it is unclear if their numbers have increased in the past few decades or were particularly high in years of high tortoise mortality like 2008.

During periods of suppressed rodent and prey populations following dry years, it has been suggested that coyotes will switch to preying on tortoises (Esque et al. 2010). This may help explain the widespread high mortality rates due to predation in 2008 (Esque et al. 2010). However, work by Cypher et al. (2018) did not necessarily support that hypothesis. In a study following the 2008 translocation of tortoises to an area south of Fort Irwin, they collected data on the relative abundance of rodents and rabbits, as well as the contents of coyote scats in 2009–2014. The years 2011–2014 were very dry compared to the wetter years of 2009–2010. While the frequency of occurrence of rodents in scat was lower in dry years (24.3%–46.3%) than in the wet years (53%–65%), the frequency of tortoises in scat was also lower in dry years (2.4%–2.6%) compared to wet years (5.6%–5.8%). These results suggest that it is unlikely coyotes switched to tortoise prey because of lack of rodents. Instead, as coyotes ate fewer rodents in the dry years, their amount of anthropogenic food sources increased (Cypher et al. 2018). While 2008 may have been an anomalous widespread pulse in predation pressure (Esque et al. 2010), there is a lack of rigorous evidence that coyotes regularly prey switch to tortoises when rodent or lagomorph populations are low because of drought.

Badgers are thought to be partially responsible for high levels of mortality of tortoises in 2012-2013 on and near Ft. Irwin, and may be important predators in certain locales (Emblidge et al. 2015). Other predators of tortoises include fire ants, white-tailed antelope squirrels (*Ammospermophilus leucurus*), bobcats (*Lynx rufus*) (Nagy et al. 2015*a, b*), red-tailed hawks (*Buteo jamaicensis*) (Anderson and Berry 2019), rattlesnakes (*Crotalus* spp.) (Berry et al. 2016), and domestic dogs (Berry and Murphy 2019).

Summary

Predation, especially by ravens and coyotes, is a significant factor in desert tortoise population decline. Ravens (and to a lesser extent coyotes) are subsidized by the infrastructure, water, and food around human development, and raven populations have dramatically increased in recent decades. Ravens preferentially target juvenile tortoises, and since clutch sizes are low and tortoises can take 12–20 years to become sexually mature, decreased juvenile survival is likely an important factor in many areas with declining tortoise densities. Given the slow life history traits of tortoises, lower juvenile survival will be a long-term issue for the population, impacting populations for decades. Coyotes can kill older tortoises, and in some areas are a significant cause of death. Reducing raven and coyote predation is likely to be challenging and predation is likely to remain a significant challenge for rapid tortoise population recovery.

4.6 Climate Change and Drought

Anthropogenic climate change has led to higher annual average air temperatures in general as well as increased volatility of California's climate. Extreme events like drought and heat waves are more frequent, rainfall is increasingly variable, and flow regimes of rivers are changing (Bedsworth et al. 2018). These changes have led to observable shifts in species distributions and timing of life history events (OEHHA 2018). In California, Mojave Desert Tortoises inhabit the relatively cooler high Mojave Desert, and the hotter low Sonoran Desert. The western part of the tortoise range in the Mojave Desert gets most of its precipitation in the winter with only about 15% from summer monsoons, whereas the monsoons account for about 30% of yearly precipitation in the eastern deserts (Hopkins 2018).

Impacts of Increased heat

In the inland deserts of California, daily maximum temperatures warmed by 0.4–0.7°F (0.2–0.38°C) when 1976–2005 was compared to a historical base line of 1961–1990 (Hopkins 2018). Those temperatures are projected to see increases of up to 8–14°F (4.4–7.7°C) by 2070–2100, depending on the future emission levels of greenhouse gases (Hopkins 2018). It is projected that by 2070–2100 there will be up to 141 days a year in the Mojave Desert when the temperature exceeds 95°F (35°C), up from an average of 90 days per year in 1981–2000. Minimum daily temperatures are projected to rise 4–7°F (2.2–3.8°C) by 2070–2100 (Hopkins 2018).

Under warming scenarios described above, desert tortoises will have fewer areas where they can stay within their physiological limits. As habitat area shrinks, tortoises are already heading upslope in some areas to escape the heat of the valley bottoms (W. Campbell pers. comm. May 2022). This type of movement may become more difficult as temperatures increase and suitable upslope areas shrink. Sadoti et al. (2017) found that tortoises restrict their movements when it is hotter. While this is not necessarily surprising, if there are more days when it is too hot for tortoises to move, they might find it harder to move to avoid those hot temperatures and will have limited opportunities to disperse or find mates. However, the degree to which increased heat in the summer will shift mating season or impact reproductive success is unknown. Increased temperatures will make burrows as refugia from the heat more critical.

Since only certain types of soils and substrates allow for creation of adequately long tunnels, available tunnel sites may become a critical habitat concern in the future and should be taken into consideration in conservation efforts Mack et al. 2015).

As mentioned in the section on life history, the sex of the hatchling is heavily influenced by incubation temperature. As temperatures rise and heat extremes become more common due to anthropogenic climate change, it is likely that sex ratios at hatching will skew to be more female dominated, however the degree to which this will impact adult sex ratios is unknown, especially if drought increases adult female mortality.

Impacts of drought

Desert tortoises are adapted to drought and heat. However, increasing levels of both are likely to cause physiological stress and alter the availability of edible vegetation. Barrows (2011) lists some of the physiological and behavioral impacts of drought:

> "Drought conditions result in reduced tortoise activity (Duda et al., 1999) and lower metabolic and reproductive rates (Peterson, 1996a; Henen, 1997; Henen et al., 1998) although some breeding activity occurs even during periods of water stress (Henen, 1997). Despite these behavioral and physiological adaptations, during droughts tortoises experience as much as 40% loss of body mass and a 60% loss of water volume relative to body mass as well as large variations in blood osmolarity (Peterson, 1996b) and can have higher levels of mortality (Turner et al., 1984)."

California has undergone extreme drought recently with the 2000–2021 span being the driest in the southwestern U.S. in the past 1,200 years (Williams et al. 2022). Although there is significant uncertainty regarding projected precipitation changes, current models show that winter precipitation is likely to increase in the inland deserts, but the summer monsoon precipitation could decrease up to 40% if atmospheric CO_2 concentrations double (Pascale et al. 2017). Precipitation events are likely to be more intense and at the same time soils are predicted to be drier, leading to more flash flooding (Hopkins 2018). The projected warmer and periodically drier conditions during the 21st century may increase the risk for more severe drought (Hopkins 2018).

Long-term drought has caused die offs of perennial plants in desert tortoise habitat, likely driven by lack of winter rain (McAuliffe and Hamerlynck 2010). Die offs were extensive but not homogenous, and soil conditions likely played a role (McAuliffe and Hamerlynck 2010). Tortoises are selective herbivores that will feed from a wide variety of available plants if necessary but primarily focus their observed foraging effort on a small set of species, many of which are relatively uncommon (Jennings and Berry 2015). Given predictions that winters may become wetter but summers drier (Hopkins 2018), the impacts of future droughts on the vegetation that tortoises rely on is unclear. Some invasive species of *Bromus* grasses are successful in disturbed habitats, and their presence in desert habitat has helped alter the fire cycle (Brooks 1999, Bradley et al. 2016). However, germination, growth, and reproduction are limited by temperature and rainfall which makes it difficult to predict the relative success of invasive grasses vs. native forbs under predicted climate changes (Bradley et al. 2016). It is possible that tortoises will also face increased nutritional stress if preferred plants die off and more nutrient poor grasses like *Bromus* remain available.

Lovich et al. (2014) used intermittent surveys in Joshua Tree NP from 1979 to 2012 to estimate the impact of persistent and recurrent drought on tortoise survival. Estimated population size decreased dramatically from 1996 to 2012, with high survival in 1978–1996, and lower survival in 1997–2002. The lower survival rates were concurrent with persistent drought, and estimated survival rates were best explained by winter precipitation. Being in a national park, tortoises in Joshua Tree should be sheltered from many anthropogenic impacts including large scale habitat modification and degradation and direct killing by humans. In addition, in 2012, many of the dead tortoises showed signs consistent with death by dehydration and starvation. Therefore, the authors concluded the decline was likely the result of reduced survival rates due to drought (Lovich et al. 2014). Other populations of desert tortoises have also shown a negative impact of drought on survival and abundance. Populations in Arizona of *G. agassizii* and *G. morafkai* were surveyed multiple times between 1990 and 2017 and experienced very low survival (30% in the Black Mountains and 34% in the Hualapai Mountains) during a drought, which led to a drop in adult abundances of about 50% (USFWS 2022*a*).

There is some evidence that drought is affecting sex ratios of adult tortoises. Unequal sex ratios are thought to lower effective population size, which in small populations with limited connectivity could exacerbate inbreeding (Frankham 1995). In 2015–2016, Lovich et al. (2023) surveyed two sites in Shaver's Valley about 70 km southeast of Palm Springs along the boundary of the Joshua Tree and Chuckwalla TCAs. At both sites there was a male bias in live tortoises. At the cooler, wetter site there was an even sex ratio in tortoises found dead, but in the hotter and drier Chuckwalla site, more females were found dead. It is possible that the energetic requirements required for reproduction make females less likely to survive long-term drought conditions (Lovich et al. 2023). However, there is limited evidence that there is a widespread and long-term skew in sex ratios. In a 2.6 km^2 (1 mi^2) study plot in Joshua Tree NP, data from intermittent surveys from 1978–2012 showed that "sex ratios, defined as the number of live males divided by the number of females, ranged from unity, to male biased (5:1), to female biased (0.22:1) across years with no trend in any one direction" (Lovich et al. 2014). On a wind energy facility near Palm springs in 1997–2010, the "adult sex ratio was not significantly different from unity" (Lovich et al. 2011).

A major question is how much desert tortoise habitat will become unsuitable in the future due to heat and drought. Species have shifted altitude and/or latitude as climate has changed (VanDerWal et al. 2013, Wolf et al. 2016), but species that are not nimble dispersers may have trouble accessing new areas, and those areas may not contain the full suite of conditions necessary for survival. However, within current habitats, local refugia may persist in future climatic conditions and allow species to persist. Barrows et al. (2016) evaluated potential habitat refugia on MCAGCC and found that 33% of the study area (283,900 ha) supported desert tortoise habitat at the time. With a simulated 1°C (1.8°F) of warming, the amount of habitat shrunk by 25%, with remaining habitat occurring at higher elevation. Under a simulated

3°C warming, habitat area shrunk by 56% (to 127,650 ha). Of the remaining available habitat, 91% overlapped with current tortoise habitat, suggesting that climate refugia would be relatively easy for tortoises to access. However, it should be noted that while Barrows et al. (2016) considered 3°C (5.4°F) to be an end of century level of warming, California's 4th Climate Change Assessment from 2018 predicts that level of warming to occur in the inland deserts by 2039 (Bedsworth et al. 2018). In Joshua Tree National Park, desert tortoises are found in both the Mojave and Sonoran desert portions. Modelling by Barrows (2011) predicts that under 2°C (3.6°F) of warming with 50 mm decrease in precipitation, habitat area will decrease by about 88% in the Sonoran Desert portion and by about 66% in the Mojave Desert portion.

4.7 Fire

Desert tortoise habitat historically experienced few fires due to low plant productivity and sparse fuel loads, and those that did occur tended to burn in a patchy mosaic pattern (Esque et al. 2003). Consequently, desert tortoises are not well adapted to fire, although use of burrows can prevent mass casualties in fires (Esque et al. 2003). The expansion of invasive plants (primarily grasses like *Bromus*) has increased fuel loads in the Mojave Desert (Brooks 1999), and fire frequency in the California portion of the Mojave Desert increased between 1980 and 1995 (Brooks and Esque 2002). However, longer term studies looking at fires from 1980–2004 (Brooks and Matchett 2006) and 1992–2011 (Hegeman et al. 2014) in the Mojave Desert show no clear increase in numbers of fires or acres burned per year. However, 2005 stood out as the amount of area burned in the Mojave Desert was 385,357 ha (952,238 acres) (M. Brooks unpublished data), representing 132% of the total area that burned during the previous 25 years (Brooks and Matchett 2006). In recent years large fires have burned in Mojave National Preserve including the 2020 Dome Fire (43,273 acres /175 km^2) of higher elevation tortoise habitat) (USFWS 2022*a*), or the 2023 York Fire (93,078 acres/377 km^2). Fire-caused tortoise death is summarized in Berry and Murphy (2019):

> "Woodbury and Hardy (1948) reported deaths of about 14 tortoises from a fire covering ca. 5.2 km^2 on part of the Beaver Dam Slope south of Bunkerville in 1942. In a post-fire study, Lovich et al. (2011c) described a fire in the western Sonoran Desert that killed an adult female tortoise and injured five other adult tortoises. Nussear et al. (2012) reported that three of 30 tortoises died from fire during a comparative study of translocated and resident tortoises. In the Red Cliffs Desert Reserve and critical habitat in Utah, 687 tortoises died in 2005 in a fire that burned ca. 23% of the approximately 251 km^2 habitat (A. McLuckie, pers. comm.). Drake et al. (2012) described a tortoise recovering from burns three years post-fire."

The effects of wildfire on vegetation can impact tortoises in several ways. A study in low elevation Mojave Desert shrubland found that invasive *Bromus* cover increased after one fire but did not continue increasing after additional fires (Brooks 2012). However, native vegetation cover decreased with multiple fires, with percentage cover dropping from about 25% to about 1% when fire frequency increased from one every ten years to three every ten years. Given the poor nutritional content of *Bromus*, increasing fire frequency threatens tortoises' ability to find sufficient and adequate food. Tortoises tend to remain in same areas after fire (Lovich et al. 2018), and one study found that tortoises used burned and unburned areas nearly equally, starting the first year after the fire (Drake et al. 2015). Tortoises moved into the burned areas seasonally to forage for preferred annuals and herbaceous perennials (Drake et al. 2015). The use of burned habitats did not appear to affect their health or reproduction in the short term. However, the expansion of red brome grass in burned areas and the injuries that fire can cause tortoises remained concerns (Drake et al. 2015).

The effects of a changing climate on wildfire size and frequency in desert tortoise habitat are uncertain. Increased winter rain could promote biomass growth that dries out in the hotter summers and increases fuel load (Tagestad et al. 2016). Alternately, the predicted increase in drought like conditions may keep fuel loads low. Another variable is the cause of ignitions. In the past 40 years, human caused fires were more prevalent in areas with high visitation levels such as low to mid elevation and desert montane zones, while lightning caused fires were more common in the central and eastern areas that get summer monsoons (Brooks and Matchett 2006). There are widespread campaigns and regulations aimed at reducing the chances that visitors will cause fires in the desert, and the efficacy of these campaigns may influence fire frequency and spatial distribution in the future. Overall, Hopkins (2018) suggests that strong temporal and spatial variability in precipitation and fuel load across the desert makes long-term and widespread trends in fire regime hard to predict.

4.8 Disease and Parasites

Desert tortoises are susceptible to a variety of diseases, some of which are likely to have caused or contributed to population declines. Upper respiratory tract disease (URTD) has been cited as a cause of population declines in desert tortoise and was a reason for listing under the ESA in 1990 (USFWS 1990).

URTD can be caused by the bacteria *Mycoplasma agassizii* and *Mycoplasma testudineum*, while herpesviruses can cause similar symptoms (Johnson et al. 2005, Jacobson et al. 2014). The disease presents as lesions in the nasal cavity and inflammation of mucosa of the upper respiratory tract, muchoid discharge from the nares, damaged nasal scales due to chronic muchoid discharge, wheezing breath, swollen and watery eyes, and extreme lethargy (Jacobson et al. 1995, 2014, Johnson et al. 2005, Sandmeier et al. 2013). Tortoises that do not show clinical signs of infection can still serve as a reservoir for the disease and likely can transmit it to healthy tortoises (Jacobson et al. 1995). Transmission is most likely through direct contact that happens during courtship, mating, and fighting, and aerosol transmission is not likely (USFWS 1990, Jacobson et al. 2014). The disease both directly kills tortoises and can potentially interfere with their sense of smell and therefore their ability to forage for food and can potentially negatively affect their reproductive fitness (Germano et al. 2014, Jacobson et al. 2014). Sandmeier et al. (2013) found evidence that longer and colder winters correlated positively with the proportion of tortoises exhibiting URTD, possibly because time spent underground depresses the tortoise immune system or allows the bacteria to flourish.

A significant URTD outbreak occurred in the Desert Tortoise Natural Area in Kern County in 1989 when 627 dead tortoises were recovered during a survey, and 43% of 468 live tortoises had signs of the disease (Jacobson et al. 1991). The population declined by 90% between 1979 and 1992 (Berry and Medica 1995). In 1990–1995, Christopher et al. (2003) sampled tortoises at three sites in the Mojave Desert:

> "Of 108 tortoises, 68.5% had clinical signs of upper respiratory tract disease consistent with mycoplasmosis at least once during the study period. In addition, 48.1% developed moderate to severe shell lesions consistent with cutaneous dyskeratosis. Ulcerated or plaque-like oral lesions were noted on single occasions in 23% of tortoises at Goffs and 6% of tortoises at Ivanpah. Tortoises with oral lesions were significantly more likely than tortoises without lesions to have positive nasal cultures for *Mycoplasma agassizii* (P=0.001) and to be dehydrated (P=0.0007)".

More recent studies have found much lower prevalence of URTD. In the central Mojave Desert in 2005–2008, Berry et al. (2015) found only 1.49% of sampled tortoises were antibody positive. It is thought that the high prevalence of the disease in wild populations in the 1970s–1990s was due in part to infected captive tortoises being released into the wild. Several factors are correlated with outbreaks of the disease, mainly factors that increase physiological stress in tortoises such as drought, heavy metal pollution, and human disturbance (Jacobson et al. 2014). Berry et al. (2015) pointed out that many of the stressors that increase tortoise vulnerability to URTD, especially drought and proximity to human populations, are increasing in desert tortoise range. However, there have not been any large outbreaks documented in California recently, and in the Desert Tortoise Natural Area the disease has "evolved from an acute, epizootic disease with high mortality to a chronic endemic disease with variable morbidity, low mortality" (Jacobson et al. 2014). Reflecting the decreased level of threat currently posed by the disease, in their 2022 5-year review the USFWS stated that "direct disease management of wild tortoise populations is less important (other than in translocations of tortoises between populations) than managing factors that affect their habitat and its capacity to support healthy tortoises" (USFWS 2022*a*).

Official handling protocols include strict guidelines to minimize human mediated transfer of pathogens and stress (USFWS 2020*b*). In addition, translocating sick individuals runs the risk of spreading URTD, so translocation protocols include health assessments and quarantine to minimize disease transfer between populations (USFWS 2020*b*). However, disease can be transferred by tortoises naturally dispersing, and reservoirs of the disease in populations outside of California should be considered in discussions of connectivity (Burgess et al. 2021).

Shell diseases like cutaneous dyskeratosis also affect tortoises and present as "abnormal conformation and loss of normal integrity of the horny layer (scute) of the shell and cutaneous scales. Deep shell defects may expose dermal bone" (Homer et al. 2001). Shell lesions were correlated with high mortality rates of desert tortoises in Chuckwalla Bench in 1982–1988 (Figures 8 and 9, Jacobson et al. 1994) . In 1979, 56% of the tortoises surveyed had shell lesions.

The proportion of effected tortoises increased to 65% in 1982, to 90% in 1988, and remained high in 1990 at 87%. During those years the density of all tortoises (adults and juveniles) fell from 221/km^2 to 71/km^2, a 68% decline (Berry and Medica 1995). While the declines in population cannot be definitively tied to shell lesions, they could be a sign of a deficiency disease or toxicosis (Jacobson et al. 1994). There has been very little reported on shell disease in wild tortoises in California since the mid-1990s.

4.9 Overexploitation

Under the California Fish and Game Code, desert tortoises have had some legal protection from take or collection since 1961 (Fish & G. Code, § 5000: *It is unlawful to sell, purchase, harm, take, possess, transport, or shoot a projectile at, a tortoise* (Gopherus)). However, vandalism (gunshots) and collecting for pets were listed as reasons for population declines in the USFWS's 1990 decision to list the desert tortoise as threatened (USFWS 1990). Before tortoises were listed, Berry (1986*b*) found that percentage of tortoise deaths from gunshots in California deserts (1972–1982) ranged from a low of 1.8% at Chuckwalla Bench to a high of 28.9% in the Fremont Valley. Overall, 14.3% of carcasses found had evidence of gunshots, with the areas with the highest percentage in the Western Mojave. In a 2008–2009 study in the El Paso Mountains in Kern County, 6 of 67 carcasses had evidence of gunshots (Berry et al. 2020*c*). Berry and Murphy (2019) reported gunshot deaths in Fort Irwin National Training Center (1997–2003), Red Rock State Park (2002–2004), and the Desert Research Natural Area (2011).

While the actual number of California tortoises collected from the wild is unknown, Berry et al. (1996) (reported in Berry and Murphy (2019)) estimated that more than 2,000 tortoises were removed from four study areas over a 10-year period from the mid-1980s to the mid-1990s. It is likely some tortoises are still being taken from the wild, with those near roads most vulnerable. A study in the Sonoran Desert of Arizona in 2008–2009 placed decoy tortoises on roads and found 1.4% of drivers stopped and tried to collect the decoy by placing it in their vehicle. Drivers were more likely to notice the tortoises on maintained gravel roads compared to paved roads or unmaintained gravel roads. However, road type did not influence the probability a driver would try to collect the tortoise (Grandmaison and Frary 2012).

4.10 Other Human-related Activities

Mining and pollution

Although Spanish colonizers panned for gold in the Chocolate Mountains in the late 1700s, commercial mining in California deserts began in the 1800s. Prospectors and miners dug shafts to extract gold, tungsten, silver, copper, and other valuable materials (Shumway et al. 1980). Some of these shafts remain open and unfenced, and tortoises can fall in and become trapped (Berry and Murphy 2019). Mining also leaves behind pollutants of various types including mercury, arsenic, and lead that impact soil and plants (including those favored by tortoises) up to 15 km from mining sites (Chaffee and Berry 2006). These pollutants can enter tortoises via breathing, ingestion of impacted plants, or absorption through skin, and there is some concern that exposure to these toxins may make tortoises more susceptible to disease (Berry et al. 2015, Berry and Murphy 2019). Tortoises collected from the Kelly Rand Mining District northeast of California City and from Edwards Airforce Base had bioaccumulated arsenic in their shell plates compared to tortoises from areas with minimal land disturbance (Foster et al. 2009). However, Cohn et al. (2021) analyzed the blood of tortoises in the Ivanpah Valley and found that heavy metal levels in the blood were generally low (0%–7%), heavy metal levels in the soil did not exceed soil health guidelines, and there was no relationship between metal concentrations and body health or disease prevalence, suggesting that tortoises were not negatively impacted by mining pollution in that area.

Deliberate Releases

Based on public comments received by the Department, well-meaning individuals may release captive tortoises, believing it will help wild populations. People may also release animals they no longer wish to keep as pets. The deliberate release of captive tortoises presents several issues. Captive tortoises can have high prevalence of respiratory diseases which could be passed on to wild tortoises if they are released (Berry et al. 2015). Releasing animals of unknown genetic origin, or even different species like *G. morafkai* or the Texas tortoise (*G. berlandieri*), could result in hybridization with wild *G. agassizii* (USFWS 1994). The release of diseased captive tortoises was a large enough concern to be mentioned as reason for population declines in the 1994 Recovery Plan (USFWS 1994), but we lack robust recent data on the current prevalence of releases and their effects. A public education campaign highlighting the downsides to freeing captive tortoises may help address this threat. Translocations of captive tortoises into the wild are also discussed in section 5.2.

5. EXISTING MANAGEMENT

5.1 Regulatory Status and Legal Protections

Federal

Federal Endangered Species Act

In August 1989, the USFWS listed the Mojave population of desert tortoise as endangered on an interim basis. Eight months later in April 1990, it issued a final rule to list it as threatened (USFWS 1990). In July 2002, the USFWS received a petition to reclassify the species from threatened to endangered. In 2017, the USFWS announced a 90-day finding that the petition did not present substantial scientific or commercial information indicating that reclassifying the Mojave population of the desert tortoise may be warranted, and no status review was initiated in response to the petition. The USFWS has published status reviews in 2010 and 2022, both recommending that the threatened status be retained (USFWS 2010, 2022*a*). The 2022 status review uses much of the same data presented here and acknowledges that “the status of the Mojave Desert Tortoise had not improved by 2014 and most threats to the species persist at or above 2010–2011 levels. These conditions portend further status deterioration in the absence of concerted efforts by land managers to meaningfully reduce predator subsidies, vehicle-caused tortoise mortalities, and invasive annual plants in important tortoise habitats” (USFWS 2022*a*). The recommendation to retain the threatened status was based on finding about a dozen *G. agassizii* in Arizona, east of the Colorado River making the “range of the species slightly larger than the currently listed entity”, recognition that the range-wide population of tortoises is in the hundreds of thousands, and optimism that conservation actions will eventually result in population improvements (USFWS 2022*a*).

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to assess the environmental effects of their proposed actions prior to making certain decisions. Using the NEPA process, agencies evaluate the environmental and related social and economic effects of their proposed actions. Agencies also provide opportunities for public review and comment on those evaluations. Title I of NEPA contains a Declaration of National Environmental Policy. This policy requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 102 in Title I of the Act requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are to prepare detailed statements assessing the environmental impact of and alternatives to major federal actions significantly affecting the environment. These statements are commonly referred to as Environmental Impact Statements and Environmental Assessments.

State

California Law/Fish and Game Code

California law has long included protections for Mojave Desert Tortoise. In 1939, California state law prohibited purchase or sale of the species. In 1961, an additional law was passed to prohibit "*to sell, purchase, harm, take, possess, transport, or shoot a projectile at, a tortoise*" (Fish & G. Code, § 5000). In 1972, the Fish and Game Code was amended to allow possession of tortoises as long as the tortoise was legally acquired (Fish & G. Code, § 5001).

California Endangered Species Act

On August 3, 1989, the Commission listed the desert tortoise as a threatened species under CESA. CESA prohibits the import, export, take, possession, purchase, or sale of Mojave Desert Tortoise, or any part or product of Mojave Desert Tortoise, except as otherwise provided by the Fish and Game Code, such as through a permit or agreement issued by the Department (Fish & G. Code, § 2080 *et seq.*). For example, the Department may issue permits that authorize the incidental take of listed and candidate species if the take is incidental to an otherwise lawful activity, the impacts of the authorized take are minimized and fully mitigated, the activity will not jeopardize the continued existence of the species, and other conditions are met (Fish & G. Code, § 2081, subd. (b).). The Department may also authorize incidental take through voluntary local programs and safe harbor agreements (Fish & G. Code, §§ 2086 and 2089.2 et. *Seq.*) and for scientific, educational, or management purposes (Fish & G. Code, § 2081, subd. (a).). If the species is listed under both the federal ESA and CESA, a project that has received a federal incidental take statement or incidental take permit that is consistent with CESA can receive a consistency determination (CD) from the Department (Fish & G. Code, § 2080.1).

Given the predominance of federal land in desert tortoise range, it should be noted that federal agencies undertaking federal projects on federal land are usually not subject to CESA and instead must typically consult with the USFWS to "ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats" (USFWS 2022*d*). However, non-federal entities working on federal lands are subject to CESA. For example, timber companies with permission to harvest timber on U.S. Forest Service lands must comply with both federal and state wildlife laws.

In 2000 and 2005, the Department prepared summary reports pursuant to CESA describing the status of desert tortoise as declining (CDFW 2000, 2005). The 2005 report described the desert tortoise as severely threatened by population losses and further stated that tortoise populations were extremely low in some areas and may not have been viable (CDFW 2005).

<u>California Environmental Quality Act</u>
State and local agencies must conduct environmental review under the California Environmental Quality Act (CEQA) for discretionary projects proposed to be carried out or approved by the public agency unless the agency properly determines the project is exempt from CEQA (Pub. Resources Code, § 21080). If a project has the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species, the lead agency must make a finding that the project will have a significant effect on the environment and prepare an environmental impact report (EIR) or mitigated negative declaration as appropriate before proceeding with or approving the project (Cal. Code Regs., tit. 14, §§ 15065(a)(1), 15070, and 15380.). An agency cannot approve or carry out any project for which the EIR identifies one or more significant effects on the environment unless it makes one or more of the following findings: (1) changes have been required in or incorporated into the project that avoid the significant environmental effects or mitigate them to a less than significant level; (2) those changes are in the responsibility and jurisdiction of another agency and have been, or can and should be, adopted by that other agency; or (3) specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or alternatives identified in the EIR (Pub. Resources Code, § 21081; Cal. Code Regs., tit. 14, §§ 15091 and 15093.). For (3), the agency must adopt a statement of overriding considerations finding that the overriding benefits of the project outweigh the significant effects on the environment. CEQA establishes a duty for public agencies to avoid or minimize such significant negative effects where feasible (Cal. Code regs., tit. 14, § 15021.). Impacts to Mojave Desert Tortoise, as a CESA-threatened species, must be identified, evaluated, disclosed, and mitigated or justified under the Biological Resources section of an environmental document prepared pursuant to CEQA.

Nonregulatory Status

<u>Natural Heritage Program Ranking and IUCN Red List</u>
Natural heritage ranking does not provide any regulatory protections but is often considered during the CEQA process (Hammerson et al. 2008). All Natural Heritage Programs, such as the CNDDB, use the same ranking methodology originally developed by The Nature Conservancy and now maintained by NatureServe. This ranking methodology consists of a global rank describing the rank for a given taxon over its entire distribution, and a state rank describing the

rank for the taxon over its state distribution. Both global and state ranks reflect a combination of rarity, threat, and trend factors. The ranking methodology uses a standardized calculator that uses available information to assign a numeric score or range of scores to the taxon, with lower scores indicating that a taxon is more vulnerable to extinction, and higher scores indicating that a taxon is more stable (Faber-Langendoen et al. 2012). The rank calculation process begins with an initial rank score based on rarity and threats, with rarity (multiplied by 0.7) factored more heavily into the calculator than threats (multiplied by 0.3). The combined rarity and threat rank is then either raised or lowered based on trends. When there is a negative trend, the rank score is lowered, and when there is a positive trend the rank score is raised. Short-term trends are factored more heavily into the calculator than long-term trends. International Union for Conservation of Nature (IUCN) and NatureServe assess extinction risk for species using a time period of 10 years or 3 generations, whichever is longer, up to a maximum of 100 years (Faber-Langendoen et al. 2012).

The Mojave Desert Tortoise has been assigned a global rank of G3 indicating the species is "vulnerable and at moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors." This species has been assigned a state rank of S2 indicating the species is locally imperiled and "at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors." The factors cited for this rank include widespread habitat loss, degradation, and fragmentation, and human-associated factors that cause mortality (NatureServe 2022).

The IUCN Red List provided a global scope assessment of Mojave Desert Tortoise in October 2021 (Berry et al. 2021) resulting in a designation of critically endangered. This Red List category represents the highest risk of extinction and is assigned when a taxon has been evaluated against the ranking criteria and is not yet designated Extinct in the Wild, but qualifies above endangered, vulnerable, and near threatened. The species was originally assessed as vulnerable in 1996 and its designation has steadily increased in severity (Berry and Murphy 2019).

5.2 Management Efforts

Due to its large range and the decades since it was formally protected under the ESA and CESA, a diverse suite of government and other entities are involved in land ownership and management within the range of Mojave Desert Tortoise (Table 7). The majority of land is managed by federal agencies, but the range also includes a substantial portion of private land. The BLM is responsible for managing nearly 11,000 km^2 of Mojave Desert Tortoise critical habitat and is the largest landowner within the species range. The NPS is responsible for the next largest portion of the range, most of which is congressionally designated Wilderness where motorized vehicles are prohibited. Private lands and DoD lands comprise most of the remaining land ownership within the species range.

Table 6. Land ownership within the entire range of Mojave Desert Tortoise and within designated critical habitat.

Land Management Entity	Landownership in Species Range (Km^2)	Percent of Landownership in Species Range (%)	Landownership in Critical Habitat (Km^2)	Percent of Landownership in Critical Habitat (%)
United States Bureau of Land Management	37,960	42.5	10,917	56.6
United States National Park Service	18,418	20.6	3,702	19.2
Private Lands	15,147	17	1,730	9.0
United States Department of Defense	13,018	14.6	2,270	11.8
State of California	2,018	2.3	485	2.5
Cities, Counties, Non-Profits, Special Districts	995	1.1	114	0.6
Other Public or Private Lands	391	0.4	30	0.2
Other Federal	79	0.1	19	0.1
United States Bureau of Indian Affairs	689	0.8	NA	NA
United States Forest Service	242	0.3	NA	NA
United States Bureau of Reclamation	181	0.2	NA	NA
United States Fish and Wildlife Service	89	0.1	NA	NA

Partnerships and Working Groups

The Desert Tortoise Management Oversight Group (MOG), formed in 1994, is comprised of senior managers from USFWS, BLM, state transportation agencies, state wildlife agencies, county governments, and non-governmental organizations (NGOs) that work in the tortoise range in Arizona, Nevada, Utah, and California. This group identifies regional recovery priorities, addresses issues common to multiple agencies, and shares information and updates about tortoise status and their recovery activities.

The Recovery and Sustainment Partnership (RASP) is comprised of DoD and Department of Interior agencies and is intended to provide increased flexibility for the use of land for military operations (i.e., make it easier to conduct training in areas with tortoise populations) in return for developing recovery initiatives. Under this partnership, agencies fund recovery actions such as raven management in California. Pooled funding and the Memorandum of Understanding between RASP partners allows for increased flexibility and reduced regulatory hurdles for implementation of broad, regional scale recovery actions.

The California Desert Conservation Act (Fish & G. Code, § 1450 et seq.) became effective on January 1, 2022, and establishes a California Desert Conservation Program within the California Wildlife Conservation Board with the goals of protecting habitat in California's Mojave and Colorado deserts by planning and implementing land acquisition and restoration projects. The California Desert Conservation Program could result in increased conservation or restoration of Mojave Desert Tortoise habitat in California.

United States Fish and Wildlife Service

The USFWS has developed and revised range-wide Recovery Plans for Mojave Desert Tortoise that encourage collaboration, identify research priorities, and encourage management actions for the benefit of the species. In 1994, the USFWS published the first Recovery Plan and designated more than 25,000 km^2 of critical habitat, most of which is in California (USFWS 1994). The plan identified Desert Wildlife Management Areas and included management recommendations such as landscape-level management and monitoring, public education, and habitat protection (USFWS 1994). In 2011, the USFWS published revisions to the Revised Recovery Plan which identified research priorities and recovery actions, including facilitation of recovery partnerships, protection of existing populations and habitat, supplementing populations, and implementing adaptive management (USFWS 2011). In 2010, the USFWS published its first 5-year review for Mojave Desert Tortoise across its multi-state range, in which they assigned a recovery priority number indicating that the species faces a moderate degree of threat, has a low potential for recovery, and faces conflict with construction or other development projects or other forms of economic activity. The USFWS recommended no change in status from threatened to endangered, in part because implementation of the at-the-time draft Revised Recovery Plan was expected to resolve key uncertainties and improve recovery potential (USFWS 2010). In 2022, the USFWS published another 5-year review reporting the continuing declines in density in all the California Tortoise Conservation Areas (see Table 2), but also recommended no change in the listing status of the Mojave Desert Tortoise (USFWS 2022*a*). For more detail see section 5.1.

As part of the 2011 Revised Recovery Plan revision, Recovery Implementation Teams were developed, which are "composed of representatives from government agencies and non-profit organizations. Participants in these teams prepare proposals for recovery actions, seek funding to support the proposals, and assist with implementation when funding becomes available" (Berry and Murphy 2019). Recovery Implementation Teams have focused on restoration of habitat burned and/or denuded by livestock, trash management to mitigate predator subsidies, invasive plant control, roadway fencing, and other conservation and management actions (Berry and Murphy 2019).

Bureau of Land Management

The 2016 Desert Renewable Energy and Conservation Plan (DRECP) Land Use Plan Amendment (LUPA) to the California Desert Conservation Act Plan of 1980 guides management of 10.8 million acres (43,706 km^2) of BLM lands in California. The plan "identifies priority areas for renewable energy development while setting aside areas for conservation and recreation" (BLM 2022). Phase I of the DRECP focused on the BLM lands and was released as a LUPA. Phase II will focus on county-level planning designed to work in conjunction with the LUPA. Along with many other agencies and stakeholders, the Department provided input on the development of the DRECP.

Under the DRECP, 11,290 acres (~46 km^2) of modeled desert tortoise habitat would eventually be developed for renewable energy, with a streamlined permit review process (BLM 2016). The LUPA contains numerous conservation and management actions, including establishment of a cumulative limit (no more than 1%) on ground-disturbing activities within BLM-owned portions of TCAs and mapped linkages. The plan amendment further prohibits long-term habitat removal in high density tortoise areas (more than five tortoises at least 160 mm carapace length per square mile, or more than 35 individuals in total), but gives an exception for transmission projects. Although the LUPA allows some renewable energy project development in tortoise habitat, other lands will be managed "according to numerous conservation and management actions that are more protective of desert tortoises than direction contained in the previous land use plan "(USFWS 2022*a*).

National Park Service

Management of the Mojave Desert Tortoise on NPS lands is guided by the NPS Organic Act of 1916, the ESA, the Wilderness Act of 1964, the 2006 NPS Management Policies, each unit's General Management Plan (GMP) and Superintendent's Compendium, and Resource Stewardship Strategies.

The NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the NPS "shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations…to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

In desert tortoise range, the NPS administers Joshua Tree National Park, Death Valley National Park, and Mojave National Preserve. The majority of lands across these three units are congressionally designated Wilderness, including nearly 50% of lands in Mojave National Preserve, approximately 85% of lands in Joshua Tree National Park, and roughly 93% of lands in Death Valley National Park. The Wilderness Act is intended to preserve places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (Wilderness Act section 2, subd. I). Use of offroad vehicles and motorized equipment is prohibited in Wilderness areas.

The NPS Management Policies indicate that Parks will "meet its obligations under the National Park Service Organic Act and the Act to both pro-actively conserve listed species and prevent detrimental effects on these species." This includes working with other agencies and partners to implement management programs which inventory, monitor, restore, and maintain listed species habitats. The Mojave Desert Inventory & Monitoring Network of the NPS regularly implements monitoring programs at all three NPS units focused on desert spring riparian vegetation and water quality as well as upland vegetation and soil characteristics that might influence the survival of Mojave Desert Tortoise.

Broad conservation actions are outlined in GMPs and specific closures and updates to prohibited actions are contained in the Superintendent's Compendium. Examples include prohibitions on use of Unmanned Aircraft Systems (drones), limits on use of artificial lights to view wildlife, requirements for food storage and trash management, and commitments for restoration of disturbed areas and/or mitigation of direct vegetation impacts.

United States Department of Defense

The Sikes Act was established in 1960 to ensure conservation and protection of natural resources used by the DoD. The U.S. Congress amended the Sikes Act in 1997 requiring the DoD to develop and implement Integrated Natural Resources Management Plans (INRMPs). These plans outline how each military installation will manage its significant natural resources holistically while maintaining military readiness. Since these lands are often protected from access and use by the general public, they sometimes contain significant large tracts of plant and animal habitat and play important roles for species conservation and habitat connectivity.

Under the ESA, the DoD is responsible for managing and protecting the threatened and endangered species found on its installations. DoD is required to consult with the USFWS and National Oceanic and Atmospheric Association (NOAA) Fisheries to manage its threatened and endangered species efforts (Dalsimer 2016).

DoD facilities within the Mojave Desert Tortoise range include Naval Air Weapons Station China Lake, Edwards Air Force Base, Fort Irwin, Marine Air Ground Task Force Training Command and Marine Corps Air Ground Combat Center Twentynine Palms, Marine Corps Logistics Base Barstow, and the Chocolate Mountain Aerial Gunnery Range. DoD is an active collaborator in the MOG and RASP partnerships and contributes funding to many recovery actions. Unlike most other federal land, tortoise habitat under DoD jurisdiction is "subject to more dramatic changes in management or use than other federal lands depending on the changing national security situation" (USFWS 2011). This means that large tracts of desert tortoise habitat can relatively quickly be converted to uses that are incompatible with desert tortoise, requiring translocation of large number of tortoises (see section 4.1 for more details). To offset these losses of tortoise habitat, the DoD undertakes a variety of actions such as purchasing land in critical habitat units, increasing law enforcement, predator control and monitoring, rehabilitation of closed roads, and installation of fencing.

California Department of Fish and Wildlife

CESA prohibits the unauthorized take of desert tortoise, but the Department may permit take that is incidental to otherwise lawful activities if the impacts of the take are minimized and fully mitigated. These permits are commonly called incidental take permits.

The Department is required to determine what qualifies as "full mitigation" for each permit on a case-by-case basis. As a practical matter, full mitigation has frequently required the perpetual protection and management of habitat mitigation lands. In addition, projects may have to implement a variety of measures to minimize take of tortoises including but not limited to surveying and monitoring for their presence, fencing to keep tortoises out of the project site, relocating nests to safe offsite locations, translocating tortoises from the project site, and managing ravens on the site.

Since 1989, the Department has issued 192 ITPs and 49 CDs covering incidental take of Mojave Desert Tortoise; the most common project types include renewable energy, transportation, and utility infrastructure (for locations of permitted projects see Figure 11). The Department's records are not complete; however, at minimum these permits authorize 62,131 acres (~250

km^2) of permanent impacts and 14,672 acres (~59 km^2) of temporary impacts (based on data available on temporary acres from 36% of ITPs and on permanent impacts from 79% of ITPs). The ratio at which projects must protect and manage mitigation habitat varies on a project-by-project basis, however projects sited in federally designated critical habitat are generally mitigated at a 5:1 ratio and other habitats at around a 3:1 ratio, depending on quality. Permit holders have multiple options when choosing mitigation lands but must typically provide permanent protection and perpetual management of habitat for the listed species either on the project site or at another location approved by the Department. This requires transfer of fee-title and/or recordation of a conservation easement, to which the Department must be at least a third-party beneficiary, funding of short-term management practices and a long-term management endowment, and monitoring to ensure compliance with the conservation easement. Alternatively, permittees may purchase credits at conservation and mitigation banks.

The desert tortoise is addressed in several Natural Community Conservation Plans (NCCPs) and Habitat Conservation Plans (HCPs) in California, including the West Mojave Plan, the Coachella Valley Multi Species Habitat Conservation Plan (MSHCP), and the California Energy Commission's Habitat and Species Protection Research Project. The Coachella Valley MSHCP area supports a small but significant population of desert tortoises in Riverside County (CDFW 2005). This MSHCP includes all federally designated critical habitat within the plan area as part of the Desert Tortoise and Linkage Conservation Area.

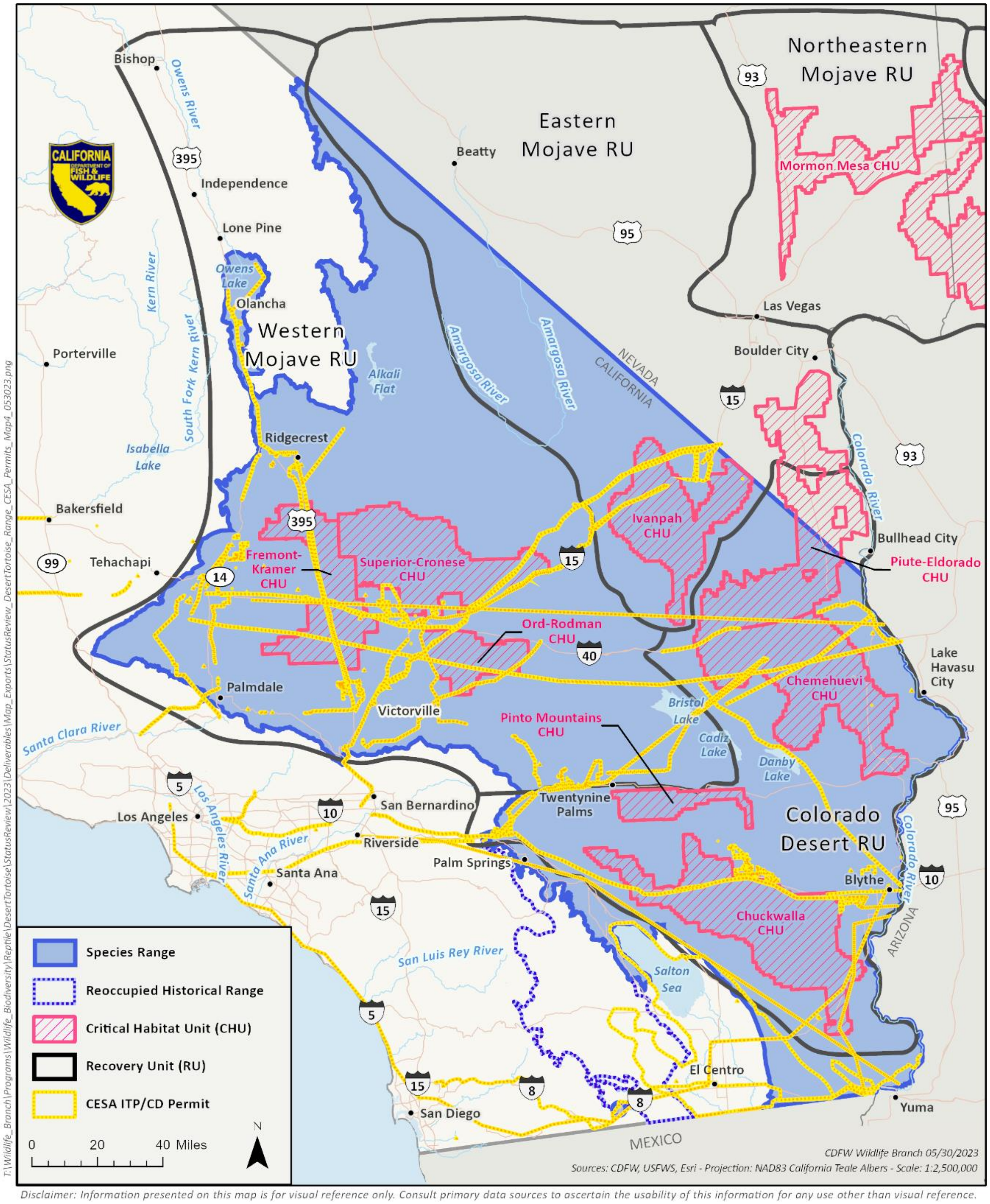


Figure 11. Map of Incidental Take Permits (ITPs) and Consistency Determinations (CD) in the general area of Mojave Desert Tortoise range in California. The linear permit areas are for energy transmission lines, pipelines, fiber optic lines, and other linear features. Other types of projects are represented as polygons.

Population Augmentation

Multiple agencies have coordinated on active management to augment and stabilize populations of desert tortoise. The two primary management strategies to increase the survival rates of individual tortoises are mitigation-driven translocation and release of head-started juveniles. Mitigation-driven translocation involves moving tortoises from a site where they would be harmed and into an appropriate recipient site. Head-starting is a strategy to reduce predation mortality on juvenile tortoises by hatching and rearing juveniles in captivity until they are large enough to avoid most predators.

Translocation

Mitigation driven translocation happens when a proposed project could result in incidental take of tortoises. As part of the minimization measures set forth in an ITP issued by the Department pursuant to CESA or an ITP or Incidental Take Statement issued by the USFWS pursuant to the ESA, tortoises in the project area can be translocated to preapproved recipient sites. The main purpose of translocations is to remove tortoises from project areas where they would otherwise not survive; however, bolstering the population at the recipient site is also a goal. There are several factors that need to be considered when tortoises are translocated, such as the habitat suitability of potential translocation sites and disease prevalence of both tortoises being moved and at the recipient site. The specific guidelines used by the USFWS are laid out in the USFWS Plan Development Guidelines (USFWS 2020*b*).

The Department requires that ITP holders monitor any tortoises translocated, and has teams carefully examine recipient sites for soil and vegetation communities that are suitable for all life stages of the tortoise, evaluate the presence and abundance of predators, and make sure there are sufficient burrows of appropriate size so that translocated tortoises can quickly find shelter. Most of the tortoises translocated under ITPs granted by the Department are placed within 4 miles of the donor site (although distance is only one of many considerations when choosing a recipient site) and the number of tortoises translocated for any project is usually less than 50. It should be noted that these common ITP requirements do not necessarily fully overlap with those of the USFWS. Due to the consistent efforts to find suitable recipient sites, deaths from translocation via dehydration or predation are rare (CDFW unpublished data, W. Campbell pers comm Jan 2023). However, the longer-term survival of translocated tortoises is not known.

Larger scale translocations face the challenge of finding recipient sites that are suitable for larger numbers of tortoises. If donor sites are chosen where resident populations are depleted or have low densities, they may not have the capacity to maintain higher densities of tortoises in general and might not be able to support large numbers of translocated animals (USFWS 2011). For example, sites with a depleted population due to habitat modification or degradation may currently be at a low carrying capacity and not be able to support many transplants because the site lacks sufficient food or shelter to support more individuals, thermal conditions are suboptimal, or predation pressure is high.

An additional consideration is how far to translocate individuals. When tortoises must be translocated from large tracts of land such as military bases, translocating individuals close to their home ranges may not always be feasible. Long distance translocation involves potential mixing of genetic subunits and possible maladaptation to the environment, and investigations into the genetic makeup of the source and recipient populations can help mangers make appropriate decisions (Weeks et al. 2011). Averill-Murray and Hagerty (2014) evaluated genetic variation of tortoises using microsatellite loci and concluded that "releasing tortoises at recipient sites within a straight-line distance of 200 km from the source population would most conservatively maintain historic genetic population structure." However, more recent work by Sánchez-Ramírez et al. (2018) using Single Nucleotide Polymorphisms (SNPs) suggests that there are three genetic subunits within the Western Mojave Recovery Unit and translocating them at distances of 200 km away could mix individuals from different genetic units.

In the spring of 2008, 570 tortoises (184 females, 293 males, 93 juveniles) were translocated from the southern edge of Fort Irwin National Training Center to neighboring public land in the Superior-Cronese Critical Habitat Unit. Esque et al. (2010) tracked the survival of translocated tortoises, resident tortoises (from areas near the release sites), and control tortoises (from areas more distant from release sites). In the first year, 19% of control tortoise, 21% of resident tortoises and 25% of translocated tortoises were found dead, with the majority of deaths attributed to predation. Esque et al. (2010) also reported higher mortality rates of tortoises in 2008 compared to the previous two years at sites across California and Nevada. Looking at the same translocation event, Mulder et al. (2017) found that four years later, the translocated males that survived were not fathering hatchlings. Even though translocated males made up 46% of the males in the population, all hatchlings that could be assigned fathers were sired by resident males.

Mack and Berry (2023) monitored 158 of the adult tortoises translocated from Fort Irwin in 2008 for ten years. Thirty-nine percent died in the first year, more than 50% were dead by the end of the third year, and after 10 years about 66% were confirmed dead and another 15% missing. Most of the deaths were attributed to coyote predation. However, they did not report survival rates of resident or control tortoises, so it is unclear the role translocation played in these death rates.

In the Ivanpah Valley near the Nevada border, the probability of mortality of translocated, resident, and control tortoises after translocation from a solar energy facility into nearby sites did not differ significantly either three (Brand et al. 2016) or five years (Dickson et al. 2019) after translocation.

Beyond the survival of tortoises involved in large scale translocations, there have been many studies looking at how body condition and temperature (Brand et al. 2016), environmental conditions (Nafus et al. 2017, Dickson et al. 2019), physiological stress (Drake et al. 2012), proximity of anthropogenic resources (Esque et al. 2010), movement and space use (Nussear et al. 2012, Farnsworth et al. 2015, Hinderle et al. 2015), and water availability (Field et al. 2007) affect the outcomes of translocations. These results are critical to improving and refining decision making around translocations.

Head starting

Head-starting is a strategy to try to circumvent the high mortality of juvenile tortoises in the wild (see sections 3.3 Mortality and Survival Rates and 4.5 Predation). Population modeling suggests that increased juvenile survival can improve population growth rates. Eggs are hatched in captivity and juveniles are reared until they reach a certain size and then released. There is some evidence that this strategy is effective at least in the short term (Nagy et al. 2015*a,b*, Tuberville et al. 2019), however, mortality is high for juveniles smaller than 100 mm in length. When Daly et al. (2019) monitored head started tortoises after release in the Mojave National preserve, annual survival was 44% and short-term survival was better if tortoises were more than 1.6 km from a raven's nest. Nagy et al. (2015) recommends not releasing head-started tortoises until they are over 100 mm, which requires keeping them in captivity for about 9 years and is a considerable investment of time and resources.

There is currently a head-starting program at the Ivanpah Desert Tortoise Head-starting Facility in Mojave National Preserve, a joint project between the University of Georgia and UC Davis. They have produced more than 675 hatchlings, released 324 which have been radio-tracked following release, with another approximately 275 for upcoming releases (Tuberville 2022). Another head-start program is on Edwards Air Force Base and involves San Diego Zoo, the U.S. Geological Survey, Cadiz Inc., and the BLM (SDZWA 2018).

6. SUMMARY OF KEY FINDINGS

CESA's implementing regulations identify key factors relevant to the Department's analyses and the Commission's decision on whether listing a species as threatened or endangered is warranted. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)).

The preceding sections of this status review describe the best scientific information available to the Department, with respect to the key factors identified in the regulations. This section considers the significance of any threat to the continued existence of Mojave Desert Tortoise for each of the factors.

Historical and current conservation efforts have not proven sufficient to halt the population declines of desert tortoises. The most robust tortoise density estimates come from annual systematic surveys begun in 2001 in the Tortoise Conservation Areas, which include the critical habitat units and contiguous areas with potential tortoise habitat and compatible management. Taken as a whole, these surveys provide strong evidence that most tortoise populations in California have declined rapidly over the past decades. Estimated rates of annual decline in density in the Recovery Units from 2001 to 2020 were about 4% in the Western Mojave (54%

decline over 19 years) and about 1% in the Eastern Mojave and Colorado Desert Recovery Units (17% decline over 19 years). In 2001, 80% of the TCAs had estimated densities below 3.9 adult tortoises/km^2, which is the density considered necessary for population viability. By 2020, all TCAs had estimated densities below that threshold. While we do not have estimates of density in all the TCAs prior to the desert tortoise being listed as threatened, densities in the early 1980s in select TCAs varied between 35 and 90 adults/km^2, and between 35 and 70 adults/km^2 when they were listed as threatened under CESA in 1989. Since the late 1970s, the number of juveniles detected on surveys has fallen to the point that in recent surveys in the Western Mojave almost no juveniles were found. Overall, population data indicate that the Mojave Desert Tortoise has experienced long-term, large population declines throughout its range in California. Data from the last 20 years show that this decline is ongoing. Populations in the TCAs, which represent much of the best habitat, are no longer considered viable.

Due to the slow components of tortoise life history, if past and current management is successful at mitigating threats and adverse impacts to tortoises, it will still take at least 25 years of positive population growth to reach the USFWS Recovery Criteria (USFWS 2022*a*). For example, the USFWS 1994 Recovery Plan estimates that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Annual survival rates for both adults and juveniles in many areas are much lower than 98%, making population stability, let alone growth, unlikely. Collectively, the available data show that despite 30 years of state and federal protection, in the critical habitat units (which were established to encompass the best tortoise habitat), most tortoise populations have continued to decline and do not show consistent signs of recovery. In regularly surveyed areas, tortoise densities are below the thresholds considered to represent population viability.

The dramatic declines in Mojave Desert Tortoise populations have likely resulted from the extensive number and interconnected nature of the threats facing tortoises in California. The important threats fall in two categories, those that directly kill adults and juveniles, and habitat modifications that make it less likely to support healthy populations.

Particularly in long-lived species that are slow to reproduce, decreased survival has long lasting impacts on the population and can alter demographic patterns for decades. Human created subsidies can increase predator densities, and predation pressure from ravens and coyotes reduce the survival of juvenile and adult tortoises, respectively. Increasing development removes or reduces habitat suitability and creates roads and increased traffic that can directly kill tortoises. Well-designed fences and culverts can help prevent tortoises and other wildlife being killed by vehicles along major roads, but many primary roads remain unfenced and little fencing has been built since 2011. Extensive networks of trails for off-highway vehicles on public lands add to the risk of tortoise roadkill. Development in the desert will likely continue and possibly speed up given California’s need for housing and renewable energy (Office of Governor Gavin Newsom 2021). Additional factors have direct and indirect impacts on tortoises and their habitat. Climate change is likely to make desert tortoise range hotter and drier and alter the vegetation communities. This will increase tortoise physiological stress, change activity patterns, and reduce and shift the locations of suitable tortoise habitat. Increased frequency or severity of drought can further degrade habitat and increase stress on tortoise populations. The nutritious native plants tortoises preferably feed on are being outcompeted by nutritionally poor invasive grasses, which can lower tortoise survival rates.

Some threats appear to be declining. Upper respiratory tract diseases were a major concern when tortoises were listed as threatened. Encouragingly, the prevalence of diseased tortoises is lower than in previous decades, and it does not currently appear to be an acute threat to wild populations. The prevalence of gunshot deaths also decreased in the past several decades, but it is unclear if this is due to change in human behavior or simply reflects a lower tortoise encounter rate due to declining tortoise density.

Given that there are multiple interacting threats that are reducing the amount and quality of viable habitat and declining survival rates of adults and juveniles, available information suggests that tortoise populations will continue to decline for the foreseeable future. However, several major threats like raven predation on juveniles and the lack of fencing on highways can be minimized with the appropriate resources and policy changes. Implementing these actions where appropriate to improve survival in the short term is critical to give desert tortoises the resilience to be able to weather longer term habitat and climactic effects.

7. PROTECTION AFFORDED BY LISTING

It is the policy of the state to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). If listed as an endangered rather than a threatened species pursuant to CESA, unauthorized "take" of Mojave Desert Tortoise will remain prohibited and its conservation, protection, and enhancement will remain a statewide priority. As the Mojave Desert Tortoise is already listed as threatened, public agency environmental review is required under the California Environmental Quality Act (CEQA) and its federal counterpart, the National Environmental Policy Act (NEPA). There are no changes in legal protections under CESA for species uplisted from threatened to endangered.

However, if the status of the Mojave Desert Tortoise is changed to endangered under CESA, it may increase the likelihood that state and federal land and resource management agencies will prioritize and allocate more funds towards protection and recovery actions. The federal and state listings of the desert tortoise as threatened stimulated a great deal of interest and funding in addressing basic questions about the species, with expanded research into status and distribution of populations, ecology, genetics, and diseases, as well as collaborations to minimize conflict among the many users of desert tortoise habitats. It also triggered the creation of a USFWS Recovery Plan and the numerous conservation and management measures outlined in section 5 (Existing Management). However, funding for species recovery and management is limited, and there is a growing list of threatened and endangered species. Therefore, while a status change pursuant to CESA will highlight the urgency of tortoise conservation needs, the management effects of such a change are uncertain.

8. RECOMMENDATION FOR THE COMMISSION

CESA requires the Department to prepare this status review regarding the status of Mojave Desert Tortoise in California based upon the best scientific information available to the Department (Fish & G. Code, § 2074.6). CESA also requires the Department to indicate in this status review whether the petitioned action is warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)). Based on the criteria described above, the best scientific information available to the Department indicates that Mojave Desert Tortoise is in serious danger of becoming extinct in California due to one or more causes including present or threatened degradation and loss of habitat, predation, and other natural occurrences and human-related activities.

The Department recommends that the Commission find the petitioned action to change the status of Mojave Desert Tortoise from threatened to endangered to be warranted.

9. MANAGEMENT RECOMMENDATIONS

CESA directs the Department to include in its status review recommended management activities and other recommendations for recovery of Mojave Desert Tortoise (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f).). The USFWS created a Recovery Plan for desert tortoise in 1994 which was revised in 2011. This is currently the most comprehensive framework of actions needed to recover the desert tortoise, and many of the recommendations are still very relevant. For our recommendations we borrow heavily from the framework in the 2011 revised Recovery Plan, include examples of recent progress, and point out specific areas where the Department could engage more.

9.1 Actions

This document is not a Recovery Plan; however, it is useful to identify the conservation goals that the management recommendations are meant to achieve.

In brief, the USFWS Recovery Plan includes the following objectives:

1. Maintain self-sustaining populations of desert tortoises within each recovery unit into the future.
    - Criteria: Rates of population change for desert tortoises are increasing over at least 25 years (a single tortoise generation)
2. Maintain well-distributed populations of desert tortoises throughout each recovery unit.
    - Criteria: Distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years
3. Ensure that habitat within each recovery unit is protected and managed to support long-term viability of desert tortoise populations.

The major elements of the USFWS Recovery Plan strategy to achieve these objectives are:

1. Develop, support, and build partnerships to facilitate recovery.
2. Protect existing populations and habitat, instituting habitat restoration where necessary.
3. Augment depleted populations in a strategic manner.
4. Monitor progress toward recovery.
5. Conduct applied research and modeling in support of recovery efforts within a strategic framework.
6. Implement a formal adaptive management program.

For each element in the Recovery Plan strategy, the USFWS includes specific measures to contribute to the strategy. We do not list all these specific measures here, but instead discuss the elements and measures that are most relevant and important to recovery in California and highlight those which the Department may have a role in implementing.

1. Develop, support, and build partnerships to facilitate recovery

There are multiple existing partnerships to facilitate recovery of desert tortoise (see section 5.2 Management Efforts). The Department could become more active in the MOG, participate in Recovery Implementation Teams, and strengthen relationships with state and federal agencies to collaboratively address priorities such as highway fencing and translocation.

2. Protect existing populations and habitat, instituting habitat restoration where necessary

a. Conserve intact desert tortoise habitat

The majority of land (63.1%) in the tortoise range is under stewardship of the BLM or the NPS and receives some level of protection (see Table 7). Future habitat conservation efforts should consider how habitat suitability will change in the coming decades under predicted climate change and ways in which habitat can be restored and made more resilient and/or habitat degradation can be ameliorated.

b. Secure lands/habitat for conservation

Projects that will potentially result in incidental take of tortoises may apply for an ITP from the Department. As a condition of the ITP, the Department must require any impacts to the desert tortoise to be fully mitigated. This requirement is most often met through the perpetual protection and management of off-site habitat. The Department should continue to focus on securing high quality habitats through the ITP process and through other means (e.g., facilitating recovery land acquisitions through grants, facilitating conservation easements). The USFWS also issues take authorizations that ask for mitigation in the form of land protection. For more detail see section 5.2 Management Efforts.

Other agencies are actively involved in securing habitat. As mentioned previously, “the Army acquired approximately 100,000 acres (~405 km^2) of nonfederal land within the Superior-Cronese Critical Habitat Unit for conservation management of desert tortoises. It also purchased the base property of three cattle allotments on which the Bureau subsequently re-allotted the forage to wildlife" (USFWS 2022*a*).

c. Connect functional habitat

Low genetic differentiation among desert tortoise populations in California (Hagerty and Tracy 2010) suggests that historically there were few barriers to movements and mixing, aside from large mountain ranges and other significant climatic or vegetative barriers. However, this is effectively no longer the case, and habitat patches are separated by roads, housing, agriculture, industry, energy projects, and military activities.

The strategy outlined in the 1994 Recovery Plan suggests that habitat patches of at least 2,590 km^2 (1,000 mi^2) are needed in each recovery unit to "contain a viable population of desert tortoises that is relatively resistant to extinction processes" (USFWS 1994). Multiple TCAs are smaller than 2,590 km^2, therefore protecting corridors between TCAs so that tortoises can disperse is important for conservation. Tortoises within isolated patches are at higher risk of extirpation due to the usual risks to small populations—stochastic catastrophes like drought and fire, reduction in genetic variation, and potential associated losses of fitness (Boarman et al. 1997, Berry and Murphy 2019, USFWS 2022*a*). While many of the patches share the same threats, given the differences in land use and management across the desert tortoise's range, individual patches should be managed to minimize the most severe threats for that patch. The USFWS (2019a) points out that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas) will make "recolonization of extirpated areas difficult, if not impossible."

Land is not equally protected across CHUs, creating potential barriers between areas of functional habitat. We recommend focusing compensatory habitat purchases and other types of land acquisitions on connecting functional habitat. The BLM is acquiring several thousand acres of checkerboard inholding in Chuckwalla Critical Habitat Unit which will improve connectivity to Joshua Tree National Park.

d. Fence, restrict, designate, close roads and routes

For functional habitat to be connected, tortoises need to be able to move and not be isolated in patches. A major action to achieve this is to establish safe tortoise road crossings and fence nearby areas along roads.

Erecting well designed tortoise exclusion fencing along major roadways and funneling them into appropriate crossings is a key recovery action. There are 500 km (~310 mi) of road identified as priority for fencing (USFWS 2022*a*). Currently, the regulations for highway fencing have made it extremely difficult and expensive to install tortoise fencing and are a major reason that there was very little tortoise exclusion fencing installed between 2011 and 2022. Under current practice, when an applicant applies for an ITP for a road project that includes tortoise exclusion fencing and culverts for crossing, the area of land inside the fence including the median between lanes of traffic is counted as impacted habitat that must be fully mitigated through land acquisition. The costs of procuring land adds substantial costs to fencing projects, to the point that much needed fencing is not being built. To speed up the building of fences, the

Department can work with Caltrans and other agencies to reduce cost and administrative burden of building tortoise exclusion fencing and can potentially broaden the measures considered to fully mitigate the impacts of road projects. In late 2023, there are some fencing projects in process, including the first phase of a BLM effort to build 3.5 miles of fencing along I-40 in the Rod-Ordman Critical Habitat Unit. In the Mojave National Preserve there is a road rebuilding project that includes 5 miles of tortoise fencing.

In addition to fencing paved roads, closing unauthorized OHV routes in CHUs is an important step to prevent further habitat degradation.

e. Minimize excessive predation on tortoises

Implementing multiple actions simultaneously is necessary to slow the expansion of predator populations. The DoD and the USFWS have active programs to reduce anthropogenic subsidies to ravens and coyotes by securing trash and water sources and reducing the number of raven nesting and roosting sites created by infrastructure. The USFWS has a program to reduce raven populations via egg oiling with a goal of no raven nests in priority areas for tortoise recruitment (K. Holcomb, USFWS Raven Management in CA. MOG April 16, 2022).

f. Restore desert tortoise habitat

Restore closed and unauthorized OHV trails and work to reduce non-native invasive grasses from desert tortoise habitat. Areas degraded by off road vehicles in Fremont Kramer Critical Habitat Unit are being restored by the BLM, and Marine Corps Air Ground Combat Center Twentynine Palms is restoring habitat as part of implementing the RASP.

g. Minimize factors contributing to disease (particularly upper respiratory tract disease)

Continue to discourage the release of pet tortoises into the wild. Monitor and quarantine translocated tortoises to make sure they are not diseased before relocation following recommendations in USFWS (2020).

h. Establish/continue environmental education programs

Environmental education is a preventative action that has been shown to effectively change learned behavior and can be used to reduce stakeholder conflict before it happens (Hungerford and Volk 1990). Educated citizens are more likely to be aware of the consequences they can have on desert tortoises and to be more willing to take responsibility for their actions than those with less knowledge (Vaske and Donnelly 2007). Widespread efforts in museums, hunting clubs, and in BLM and NPS visitor centers and interpretive sites are needed to inform the public about the status of the desert tortoise and its recovery needs (USFWS 2011).

Interpretive kiosks or visitor centers should be used to disseminate information about the desert tortoise and the need to minimize impacts on their habitat. Education programs should include such subjects as husbandry and adoption programs for captive tortoises, the importance of discouraging unauthorized breeding of captive tortoises, and state laws related to the release of captive tortoises. Education efforts should be focused on groups that use the desert on a regular basis, such as rock-hounds and off-highway vehicle enthusiasts. Additional educational tools include public service announcements, news releases, informational videos, brochures and newsletters, websites, and volunteer opportunities (USFWS 2011).

Mojave National Preserve has a "Drive Like a Tortoise" campaign to promote drivers to slow down both to decrease the number of vehicle collisions and road killed tortoises. Organizations like the Living Desert Zoo and Garden have billboards to promote the covering of trash to reduce subsidies to ravens.

i. Increase law enforcement
Increase efforts to enforce off-roading rules in Desert Wildlife Management Areas and CHUs.

3. Augment depleted populations through a strategic program

a. Translocation
The outcomes of translocation actions discussed in section 5.2 suggest that well designed translocation projects can result in short- and medium-term survival rates for translocated tortoises that are similar to resident tortoises. However, given the continuing decline of tortoise populations in general, translocations may often not be an effective conservation strategy without addressing the drivers of declines within the subject populations. At best, augmentation of populations through translocations can buy time and keep tortoises present on the landscape while the threats causing declines are addressed. In addition, given the long-term decline of tortoise populations, understanding the population impacts of translocation is critical so that they can be effectively incorporated into larger scale long-term strategic conservation goals (Germano et al. 2015). Projects that hold ITPs from the Department monitor translocated tortoises for 5 years and submit reports to the Department. These data should be organized and analyzed in order to understand medium-term survival rates of translocated individuals, and the impacts of potential population fragmentation (see section 9.3). Increased collaboration should occur between agencies that perform translocations to understand the landscape and population impacts of short- and long-range translocations and coordinate research on disease dynamics, recruitment rates, and gene flow (USFWS 2020*b*).

b. Head-starting
Head-starting is a strategy to try to circumvent the high mortality of juvenile tortoises in the wild. Population modeling suggests that increased juvenile survival can improve population growth rates. There is some evidence that this strategy is effective at least in the short term, however, mortality is high for juveniles smaller than 100 mm in length. Daly et al. (2019) points out that by itself, head-starting is unlikely to lead to population recovery if larger issues that depress survival such as raven density and habitat degradation are not addressed. Another consideration is that unless factors that depress adult survival are also addressed, focusing on putting more juveniles in a "degraded environment in which their parents have already demonstrated that they cannot flourish" is not an effective long-term solution (Frazer 1992).

Head-starting programs should continue to monitor the survival of juveniles and the effectiveness of the programs as a population augmentation measure.

4. Monitor progress toward recovery

The USFWS conducts surveys of the Tortoise Conservation Areas to generate estimates of density, abundance, and annual rates of change (see section 3.2 Trends in Density and Abundance). The USFWS (2011) also has detailed recommendations regarding population monitoring at the Recovery Unit scale.

The Department collects a variety of data on tortoises from holders of ITPs and Scientific Collecting Permits. Improving the capacity of the Department to summarize and analyze these data to identify the cumulative impacts of permitted projects on tortoise populations will help expand the geographic scope of monitoring and is key to developing criteria for decisions on potential limits to take for desert tortoise. Sharing this information with other state and federal agencies through the MOG will help bring a broader and more comprehensive understanding of the state of tortoise populations in California. In addition, the Department should continue to engage with the USFWS and other partners to address high priority monitoring needs through the Cooperative Endangered Species Conservation Fund (Traditional Section 6) Grant Program See sections 9.2 and 9.3 for more detail.

5. Conduct applied research and modeling in support of recovery efforts within a strategic framework

The 2011 USFWS Revised Recovery Plan includes many specific research and modeling actions needed to address desert tortoise recovery. Funding for continued long-term monitoring at sites outside of TCAs such as the Desert Tortoise Natural Area would expand our understanding of long-term trends in areas with different types of management. The Department should continue to engage with the USFWS and other partners to address high priority research needs through the Cooperative Endangered Species Conservation Fund (Traditional Section 6) Grant Program and other funding opportunities.

6. Implement a formal Recovery Plan

The Department has authority to develop and implement non-regulatory Recovery Plans and recovery criteria for CESA-listed species with the goal of improving the status of species and managing threats to the point where CESA listing may no longer be appropriate or necessary. The Department should consider whether adoption of the USFWS Recovery Plan, potentially with amendments, is warranted.

9.2 Regulations and Policy

Due to the number of interacting threats facing the desert tortoise, mitigation measures developed to mitigate impacts in ITPs could address a broader suite of conservation activities. Acquiring mitigation land is an important measure, but it only addresses a few of the recovery actions for the desert tortoise. The Department should consider all available actions that meet the “fully mitigated” standard for offsetting project impacts. All measures that support and improve populations should be considered as mitigation, including installing tortoise fencing along highways, habitat enhancement, management and control of raven populations, and measures that improve connectivity. Focusing on land acquisition at the expense of other measures could result in the protection of high-quality habitat but limited reductions in broader factors causing direct mortality or restricting movement between protected areas.

Another useful step would be to review the implementation and effectiveness of all ITPs issued since CESA listing. The Department may not issue an ITP if “issuance would jeopardize the continued existence of the species” (Fish & G. Code, § 2081, subd. (c).). Given the long-term decline of desert tortoise populations, a Department evaluation of prior mitigation measures would help it assess the impacts, both direct and cumulative, of subsequent projects proposing to incidentally take desert tortoises.

9.3 Capacity Building within CDFW

Personnel

For these Management Recommendations to be most consistently implemented and successful, staffing and/or funding capacity that can be devoted to developing, supporting, and building partnerships to facilitate recovery of the Mojave Desert Tortoise is needed. Adequate staffing facilitates internal coordination and knowledge-building, as well as regular coordination and collaboration with other agencies and organizations. Dedicated Department tortoise recovery staff could serve as a primary point of contact for desert tortoise permitting and facilitate better coordination internally and externally with those working on tortoise conservation and management.

Upgrading Systems

Currently, much of the Department review and issuance of ITPs for Mojave Desert Tortoise is done on a project-by-project basis, with some take permitted through Natural Community Conservation Plans and Habitat Conservation Plans like the Coachella Valley Multi Species Habitat Conservation Plan. Projects that apply for ITPs are required to collect data and submit compliance reports to the Department. Likewise, translocation projects are required to monitor results for five years and submit reports to the Department. There is currently no central location in the Department for those types of data and reports. Much of the old data, reports, and information is in paper form and is stored in various Department offices and is functionally inaccessible. Data on project locations, recipient sites, release points, disease testing locations with test results, and mitigation lands need to be stored digitally and made available in compliance with relevant Department scientific data policies. Without a central repository for data and platforms where it can be accessed and used by staff it is difficult to understand the scope and extent of impacts of development on tortoises. Consequently, the Department does not have a complete view of how many acres have been impacted, or the amount and location of habitat that has been conserved as mitigation and the success of that mitigation. However, a permitting system is currently in development that is intended to centralize and streamline the issuing of ITPs and other permits that will make it easier for the Department to make informed decisions on future incidental take permits and jeopardy determinations.

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APPENDIX A. TABLE OF ESTIMATED DENSITIES 2004–2021

Table A1. Estimated densities (adults/km^2) of tortoises (≥ 180 mm carapace length) in Tortoise Conservation Areas in California. Estimates for 2004–2014 have standard errors (SE); estimates for 2015–2021 have coefficients of variation expressed as percentages. Data from (USFWS 2006, 2015, 2016, 2018, 2019b 2022*a,b,* Allison and McLuckie 2018).

Recovery Unit	TCA	2004	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Western Mojave	Fremont-Kramer	8.4 (2.31)	5.3 (1.28)	3.0 (1.46)	0.5 (0.51)	3.3 (1.13)	2.4 (0.60)	3.5 (1.11)	2.2 (1.07)	NA	4.7 (1.05)	4.5 (28.0)	NA	4.1 (22.01)	NA	2.7 (24.0)	1.7 (27.6)	NA
Western Mojave	Ord-Rodman	7.3 (2.25)	7.7 (1.80)	7.1 (3.26)	5.0 (5.34)	7.2 (2.65)	7.5 (1.85)	3.2 (1.18)	4.6 (2.14)	NA	3.5 (0.88)	NA	NA	3.9* (19.84)	3.4* (30.79)	2.5* (20.33)	NA	2.5* (24.3)
Western Mojave	Superior-Cronese	6.3 (1.84)	6.3 (1.32)	5.9 (2.28)	1.9 (1.19)	4.6 (1.12)	2.6 (0.49)	3.4 (0.79)	4.3 (1.41)	NA	2.5 (0.60)	2.6 (26.7)	3.6 (26.3)	1.7 (23.76)	NA	1.9 (23.7)	NA	NA
Eastern Mojave	Ivanpah	4.4 (1.19)	4.4 (2.46)	5.6 (1.95)	5.1 (2.92)	4.1 (1.86)	1.0 (0.48)	4.5 (1.72)	2.8 (1.79)	NA	2.3^{α}	1.9 (24.3)	NA	NA	3.7 (23.62)	2.6 (24.9)	NA	3.0 (24.5)
Colorado Desert	Chocolate Mountain	11.4 (3.55)	13.4 (4.31)	6.5 (1.50)	4.5 (2.56)	7.5 (2.74)	13.8 (3.52)		6.0 (1.84)	7.3 (1.96)	8.4 (2.09)	10.3 (21.1)	8.5 (20.7)	9.4 (14.8)	7.6 (32.46)	7.0 (29.51	7.1 (22.1)	3.9 (31.8)
Colorado Desert	Chuckwalla	4.9 (1.49)	6.0 (1.77)	4.3 (1.19)	4.2 (2.84)	NA	3.7 (1.14)	3.9 (1.37)	3.9 (1.62)	NA	3.3^{α}	NA	NA	4.3 (15.7)	NA	1.8 (28.8)	4.6 (19.4)	2.6 (24.0)
Colorado Desert	Chemehuevi	6.7 (1.27)	10.3 (3.10)	3.9 (1.71)	4.8 (3.07)	9.4 (5.98)	4.2 (1.40)	4.0 (1.51)	0.8 (0.90)	NA	2.8^{α}	NA	1.7 (30.6)	NA	2.9 (24.21)	NA	4.0 (15.2)	NA
Colorado Desert	Fenner	8.2 (1.94)	13.5 (2.80)	6.2 (2.37)	6.6 (3.05)	8.3 (4.01)	6.9 (2.49)	6.8 (2.78)	0.9 (0.95)	NA	4.8^{α}	NA	5.5 (30.0)	NA	6.0 (26.25)	2.8 (29.8)	NA	5.3 (19.8)
Colorado Desert	Pinto Mountains	2.2 (2.12)	9.9 (3.58)	1.9 (0.98)	3.3 (3.53)	4.3 (2.38)	3.4 (1.85)	3.3 (1.39)	3.7 (1.57)	NA	2.4^{α}	NA	2.1 (31.6)	2.3 (32.7)	NA	1.7 (31.8)	2.9 (20.6)	NA
Colorado Desert	Joshua Tree	1.9 (0.53)	2.7 (0.79)	3.0 (1.94)	2.3 (1.75)	2.3 (1.56)	2.8 (1.56)	3.5 (1.33)	3.4 (1.63)	NA	3.7^{α}	NA	2.6 (34.7)	3.6 (22.5)	NA	3.1 (20.2)	3.9 (23.3)	NA

*724 adults were translocated into the Ord-Rodman TCA in 2017–2019 due to expansion at Twentynine Palms Marine Corps Air Gunnery Command Center. These are included in these density estimates. In 2014, the density estimates for the Western Mojave TCAs and Chocolate Mountain are estimated from line distance sampling (Allison and McLuckie 2018).

α= Estimates from Ivanpah and the Colorado Desert TCAs (excluding Chocolate Mountain) in 2014 are not based on line distance sampling in that year; they are mean densities based on trend data from previous years (USFWS 2022*a*)

APPENDIX B. PUBLIC NOTIFICATIONS

Pursuant to Fish and Game Code 2074.4, the California Department of Fish and Wildlife (Department) and the California Fish and Game Commission (Commission) notified affected and interested parties and solicited data and comments on the petitioned action to list Mojave Desert Tortoise as endangered under the California Endangered Species Act (CESA). Requests for information were distributed by several methods:

- On October 19, 2020, the Commission published a Notice of Findings regarding the candidacy and status review of the Mojave Desert Tortoise in the California Regulatory Notice Register (Cal. Reg. Notice Register 2020, No. 44-Z, p. 1445).
- On May 27, 2022, the Department distributed by email and mail the attached public notice to approximately 130 people and offices of state and federal agencies, industry, and non-governmental organizations, notifying them of the Mojave Desert Tortoise's candidacy and to request information and comments on the petitioned action.
- On May 10, 2022, the Department distributed the attached press release to an email listserv maintained by the Department's Office of Communication, Education and Outreach, and posted the press release to the Department's News Room website, notifying the public of the Mojave Desert Tortoise's candidacy and to request information and comments on the petitioned action.

Public Notice

May 27, 2022

SUBJECT: NOTIFICATION OF STATUS REVIEW FOR MOJAVE DESERT TORTOISE UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

To Whom It May Concern:

The California Department of Fish and Wildlife (Department) has initiated a status review for the Mojave desert tortoise (*Gopherus agassizii*), pursuant to Fish and Game Code section 2074.6, and is providing this notice pursuant to Fish and Game Code section 2074.4 to solicit data and comments on the petitioned action from interested and affected parties.

The Department has initiated this status review following the Fish and Game Commission's (Commission) decision at its October 14, 2020 meeting to accept for consideration the petition to up-list the species from threatened to endangered under the California Endangered Species Act (CESA). Having provided public notice (Cal. Reg. Notice Reg. 2020, No. 44-Z, p. 1445; Fish & G. Code, § 2074.2), the Mojave desert tortoise is a candidate species under CESA, and as such, retains the same legal protection afforded to an endangered or threatened species (Fish & G. Code, §§ 2074.2 & 2085). The listing petition and the Department's petition evaluation report are available at: https://fgc.ca.gov/CESA#adt

Take (hunt, pursue, catch, capture, or kill, or attempt to do so) of the Mojave desert tortoise remains prohibited (Fish & Game Code § 86). However, Incidental Take may be authorized with appropriate permits (Fish & G. Code §§ 2081(b), 2080.1, 2089.2 et. seq., 2086). Activities conducted for scientific, educational, or management purposes including research and restoration, which may result in take of this species, can be authorized through permits or memorandums of understanding (Fish & G. Code § 2081(a)). For more information on take authorizations, visit https://wildlife.ca.gov/Conservation/CESA/Permitting or contact your regional Department office.

The Department requests any data or comments on the species' ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, and recommendations for management of the species. Please provide such data or comments to the Department contact via email: Anne.Hilborn@wildlife.ca.gov, and include "Mojave desert tortoise" in the subject line. Comments may also be submitted by mail addressed to "Attn: Anne Hilborn" at the address in the letterhead.

The Department has 12 months to review the petition, evaluate the available information, and report back to the Commission whether the petitioned action is warranted (Fish & G. Code, § 2074.6). The written report will indicate, based on the best scientific information available, whether the Department concludes the petitioned action is warranted or not warranted. The Commission will place receipt of the report on the agenda for the next available Commission meeting after delivery. The report will be made available to the public at that meeting. Following receipt of the Department's report, the Commission will allow a 30-day public comment period prior to taking any action on the Department's recommendation.

The Department respectfully requests your responses and information before **June 25th, 2022,** to allow sufficient time to evaluate the information for possible incorporation in the Department's final status review report to the Commission.

If you have any questions regarding this notice, please contact the Department via email at: Anne.Hilborn@wildlife.ca.gov.

California Department of Fish and Wildlife News Release

May 10, 2022

Media Contacts:
Anne Hilborn, CDFW Wildlife Branch
Kirsten Macintyre, Office of Communications, Education and Outreach

CDFW Seeks Public Comment Related to Mojave Desert Tortoise

The California Department of Fish and Wildlife (CDFW) is seeking public comment on a proposal to uplist the Mojave Desert Tortoise from threatened to endangered under the California Endangered Species Act (CESA).

The Mojave Desert Tortoise (*Gopherus agassizii*) is found in the Mojave Desert, the western Sonoran Desert and the southern Great Basin Desert. They spend much of the year underground in burrows to shelter from extreme temperatures. When they do emerge, they feed on native grasses. Their densities have declined drastically in many places in California in the past 20 years. Threats include habitat fragmentation, development in the desert including sustainable energy projects, increasing drought due to climate change, invasive grasses out-competing food items preferred by tortoise, disease, predation by coyotes and ravens, and human-caused mortality.

In March 2020, Defenders of Wildlife submitted a petition to the California Fish and Game Commission to formally uplist the Mojave Desert Tortoise as an endangered species under CESA. The Commission published findings of its decision to advance the species to candidacy on Oct. 14, 2020, triggering a period during which CDFW will conduct a status review to inform the Commission's decision on whether to uplist the species.

As part of the status review process, CDFW is soliciting public comment regarding the species' ecology, biology, life history, distribution, abundance, threats, and habitat that may be essential for the species, and any recommendations for management. Comments, data, and other information can be submitted by email to: wildlifemgt@wildlife.ca.gov. If submitting comments by email, please include "Mojave Desert Tortoise" in the subject heading.

Comments may also be submitted by surface mail to:

California Department of Fish and Wildlife
Wildlife Diversity Program
Attn: Anne Hilborn
P.O. Box 944209
Sacramento, CA 94244-2090

All comments received by June 10, 2022 will be evaluated prior to submission of the CDFW report to the Commission. Receipt of the report will be placed on the agenda for the next available meeting of the Commission after delivery and the report will be made available to the public at that time. Following the receipt of the CDFW report, the Commission will allow a 30-day public comment period prior to taking any action on the petition.

CDFW's Mohave Desert Tortoise petition evaluation report can be found on the CDFW website.

Public Response

The Department received 54 letters or emails from the public and 3 from NGOs/government agencies. Fifty four letters expressed or implied support for the listing of the Mojave Desert Tortoise under CESA. Three letters had no obvious stated stance.

The Department received 2 substantive comments. Information in the comments included previously published data on threats and population trends which has been addressed in the status review. One of the comments included unpublished location data that was not of a quality that could be included in the status review.

All communications are on file with the Department and can be provided on request by emailing wildlifemgt@wildlife.ca.gov.

APPENDIX C. TRIBAL NOTIFICATION

In June of 2022 the Department mailed and emailed the following notifications (see below) to 85 members of Tribal governments whose ancestral lands overlap with the historic range of the Mojave Desert Tortoise.

The Xolon Salinan Tribe and the Yuhaaviatam of San Manuel Nation asked some clarifying questions which staff were able to answer.

The Fernandeño Tataviam Band of Mission Indians reviewed the project and did not wish to engage in consultation.

The Rincon Band of Luiseño Indians acknowledged the receipt of the notification and asked to be kept informed of findings and determinations following the review.

Notification for Federally Listed Tribes

June 1, 2022

NOTIFICATION OF STATUS REVIEW FOR MOJAVE DESERT TORTOISE UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Dear Honorable Member:

NOTICE IS HEREBY GIVEN that the California Department of Fish and Wildlife (Department) has initiated a status review for Mojave desert tortoise (Gopherus agassizii) pursuant to Fish and Game Code section 2074.6. The Department is providing this notice pursuant to Fish and Game Code section 2074.4, and the Department's Tribal Communication and Consultation Policy, to solicit data and comments on the petitioned action from interested and affected parties and to notify California Tribes of this process and to offer government-to-government consultation if desired by a Tribe.

The Department has initiated this status review following related action by the Fish and Game Commission. Having provided public notice (Cal. Reg. Notice Reg. 2020, No. 44-Z, p. 1445; Fish & Game Code, § 2074.2), the Mojave desert tortoise is a candidate species under the California Endangered Species Act (CESA) and as such, retains the same legal protection afforded to an endangered or threatened species (Fish & Game Code §§ 2074.2 and 2085). The listing petition and the Department's petition evaluation report are available at: https://fgc.ca.gov/CESA#adt

The Department welcomes direct communication and consultation to discuss the status review for Mojave desert tortoise and to identify any impacts to Tribal interests or cultural resources. The Department is committed to open communication with your Tribe under its Tribal Communication and Consultation Policy, which is available through the Department's Tribal Affairs webpage at: https://www.wildlife.ca.gov/General-Counsel/Tribal-Affairs.

To request formal government-to-government consultation pursuant to the Department's Tribal Communication and Consultation Policy, please contact the Department's Tribal Liaison by email at tribal.liaison@wildlife.ca.gov. Please designate and provide contact information for the appropriate Tribal lead person.

In addition to notifying the Department of any impacts to tribal interests or cultural resources, the Department welcomes any data or comments on the species' ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, and recommendations for management of the species. Please provide such data or comments to the Department contact via email wildlifemgt@wildlife.ca.gov and include "Desert Tortoise" in the subject line. Comments may also be submitted by mail addressed to "Attn: Anne Hilborn at the address in the letterhead.

The Department has 12 months to review the petition, evaluate the available information, and report back to the Commission whether the petitioned action is warranted (Fish & Game Code, § 2074.6). The written report will indicate, based on the best scientific information available, whether the Department concludes the petitioned action is warranted or not warranted. The Commission will place receipt of the report on the agenda for the next available Commission meeting after delivery. The report will be made available to the public at that meeting. Following receipt of the Department's report, the Commission will allow a 30-day public comment period prior to taking any action on the Department's recommendation.

The Department respectfully requests your responses and information before June 30th, 2022, to allow sufficient time to evaluate the information for possible incorporation in the Department's final status review report to the Commission. If you would like more information on the status review, please contact Anne Hilborn, Senior Environmental Scientist (Specialist) at anne.hilborn@wildlife.ca.gov or at the address in the letterhead.

We look forward to your response and input on this status review.

Sincerely,

Scott Gardner, Wildlife Branch Chief

ec: California Department of Fish and Wildlife

Chad Dibble, Deputy Director, Wildlife and Fisheries Division,

Tribal Liaison

Christine Found-Jackson, Acting Environmental Program Manager, Wildlife Diversity Program

Anne Hilborn, Senior Environmental Scientist (Specialist), Wildlife Diversity Program

Notification for Non-Federally Listed Tribes

June 1, 2022

NOTIFICATION OF STATUS REVIEW FOR MOJAVE DESERT TORTOISE UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Dear Honorable Member:

NOTICE IS HEREBY GIVEN that the California Department of Fish and Wildlife (Department) has initiated a status review for Mojave desert tortoise (Gopherus agassizii) pursuant to Fish and Game Code section 2074.6. The Department is providing this notice pursuant to Fish and Game Code section 2074.4, and the Department's Tribal Communication and Consultation Policy, to solicit data and comments on the petitioned action from interested and affected parties and to notify California Tribes of this process and to offer consultation if desired by a Tribe.

The Department has initiated this status review following related action by the Fish and Game Commission. Having provided public notice (Cal. Reg. Notice Reg. 2020, No. 44-Z, p. 1445; Fish & Game Code, § 2074.2), the Mojave desert tortoise is a candidate species under the California Endangered Species Act (CESA) and as such, retains the same legal protection afforded to an endangered or threatened species (Fish & Game Code §§ 2074.2 and 2085). The listing petition and the Department's petition evaluation report are available at: https://fgc.ca.gov/CESA#adt

The Department welcomes direct communication and consultation to discuss the status review for Mojave desert tortoise and to identify any impacts to Tribal interests or cultural resources. The Department is committed to open communication with your Tribe under its Tribal Communication and Consultation Policy, which is available through the Department's Tribal Affairs webpage at: https://www.wildlife.ca.gov/General-Counsel/Tribal-Affairs.

To request formal consultation pursuant to the Department's Tribal Communication and Consultation Policy, please contact the Department's Tribal Liaison by email at tribal.liaison@wildlife.ca.gov. Please designate and provide contact information for the appropriate Tribal lead person.

In addition to notifying the Department of any impacts to tribal interests or cultural resources, the Department welcomes any data or comments on the species' ecology, genetics, life history, distribution, abundance, habitat, the degree and immediacy of threats to its reproduction or survival, the adequacy of existing management, and recommendations for management of the species. Please provide such data or comments to the Department contact via email wildlifemgt@wildlife.ca.gov and include "Desert Tortoise" in the subject line. Comments may also be submitted by mail addressed to "Attn: Anne Hilborn at the address in the letterhead.

The Department has 12 months to review the petition, evaluate the available information, and report back to the Commission whether the petitioned action is warranted (Fish & Game Code,

§ 2074.6). The written report will indicate, based on the best scientific information available, whether the Department concludes the petitioned action is warranted or not warranted. The Commission will place receipt of the report on the agenda for the next available Commission meeting after delivery. The report will be made available to the public at that meeting. Following receipt of the Department's report, the Commission will allow a 30-day public comment period prior to taking any action on the Department's recommendation.

The Department respectfully requests your responses and information before June 30th, 2022, to allow sufficient time to evaluate the information for possible incorporation in the Department's final status review report to the Commission. If you would like more information on the status review, please contact Anne Hilborn, Senior Environmental Scientist (Specialist) at anne.hilborn@wildlife.ca.gov or at the address in the letterhead.

We look forward to your response and input on this status review.

Sincerely,

Scott Gardner, Wildlife Branch Chief

ec: California Department of Fish and Wildlife

Chad Dibble, Deputy Director, Wildlife and Fisheries Division

Tribal Liaison

Christine Found-Jackson, Acting Environmental Program Manager, Wildlife Diversity Program

Anne Hilborn, Senior Environmental Scientist (Specialist), Wildlife Diversity Program

APPENDIX D. COMMENTS FROM PEER REVIEWERS ON THE MOJAVE DESERT TORTOISE STATUS REVIEW

Pursuant to Fish and Game Code section 2074.6, the review process included independent and competent peer review of the draft status review by persons in the scientific/academic community acknowledged to be experts on Mojave Desert Tortoise and related topics, and possessing the knowledge and expertise to critique the scientific validity of the status review contents. Appendix D contains the specific comments provided to the Department by the individual peer reviewers, the Department's written response to the comments, and any amendments made to the status review (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Independent experts that reviewed the status review are listed in Table D1, below.

Table D1. Status Review Peer Reviewers

Name	Affiliation
Jeffery Lovich	USGS
Kristina Drake, Kerry Holcomb, Corey Mitchell	USFWS Desert Tortoise Recovery Office
Kenneth Nussear	University of Nevada, Reno

Comments by external reviewers and response from the Department. Line numbers refer to lines in the version of the status review sent to external reviewers (available at end of this appendix)

GENERAL COMMENT (Lovich): This is a very thorough and well-written review but there is a lot more literature available and I will point some out. The desert tortoise is one of the most-studied turtle in the United States (Lovich, J.E., and J.R. Ennen. 2013. A quantitative analysis of the state of knowledge of turtles of the United States and Canada. Amphibia-Reptilia 34:11-23.). Particularly surprising was finding no citation for Ernst and Lovich. 2009. Turtles of the United States and Canada. Johns Hopkins University Press. 827 pp. That book summarizes more data and publications on desert tortoises that are not included in this report. Based on the available scientific information presented, the CDFW makes a compelling case for listing the tortoise as endangered in California. The weight of scientific evidence presented supports the contention that populations continue to decline since their listing as threatened decades ago. However, extinction would probably take a long time to occur given the number of tortoises that still exist, their longevity, and the availability of topographic refugia to respond to global warming as pointed out by Cam Barrows' publications.
RESPONSE: Have added citations for Ernst and Lovich 1994 version of the book, especially in section 2 on Biology. Note: As stated in section 1.2, the status review "is not intended to be an

exhaustive review of all published scientific literature on Mojave Desert Tortoise; rather it is intended to summarize key points relevant to the status of the species and address regulatory report requirements. "

GENERAL COMMENT (DTRT): Throughout the report, the referenced findings related to translocation/augmentation outcomes and associated literature for *G. agassizii* do not reflect the full body of available literature. Please review the document and include appropriate references and findings translocation outcomes. For example, publications such as Brand et al. 2016, Dickson et al. 2019, Drake et al. 2012, Esque et al. 2010, Farnsworth et al. 2015, Field et al. 2007, Harju et al. 2019, Hinderle et al. 2015, Nafus et al. 2017, Nussear et al. 2012, Mack and Berry 2023 should all be considered cumulatively. Additionally, all most no information is available on the long-term effects of translocation. Only one published paper reports outcomes for translocated tortoises for 10 years (Mack and Berry 2023), and this study did not include resident and control tortoise comparisons, excluding the ability to evaluate the efficiacy of translocation. We need long-term studies (i.e., 15-25 yrs) with balanced designs (translocated, resident, and control tortoises) to evaluate translocation outcomes and its effectiveness as a conservation tool.
RESPONSE: Due to this and other feedback, the section on translocation was extensively altered. References were added (Brand et al. 2016, Dickson et al. 2019, Drake et al. 2012, Esque et al. 2010, Farnsworth et al. 2015, Field et al. 2007, Harju et al. 2019, Hinderle et al. 2015, Nafus et al. 2017, Nussear et al. 2012, Mack and Berry 2023), and specific statements about the efficacy of translocation were reworked.

GENERAL COMMENT (Nussear): Overall I agree with the assessment. Given that after more than 30 years of protection under both state and federal ESAs. While recovery planning efforts have been found to provide sound recommendations, difficulties in implementation and enforcement of implementations (e.g. maintaining closed roads and routes) have contributed toward continued habitat loss and degradation. With continued growth of urban areas and infrastructure, expansion of military training areas, expansive recreation, challenges of invasive species with respect to wildfire and nutrition, subsidization of key predators, and a changing climate the tortoise faces a challenging road to recovery, and indeed continues to decline in much of its range.
While the right decision for the species, this decision will no doubt draw scrutiny and contestation. Toward improving the factual evidence brought to bear, there are several areas were the literature cited could be improved as the attribution is either incorrect, or incomplete.

LINE 140 (DTRT)

Suggested edit: "his Status Review of the Mojave desert tortoise (*Gopherus agassizii*, tortoise; also known as Agassiz's desert tortoise)." Edit throughout document.
RESPONSE: The USFWS doesn't capitalize the full name, however the Department made the decision to fully capitalize Mojave Desert Tortoise.

LINE 144-158 (DTRT)

Suggested edit: The tortoise was designated a threatened species under CESA in 1989. On March 23, 2020, the Commission received a petition from Defenders of Wildlife, Desert Tortoise Council, and Desert Tortoise Preserve Committee to change the status of the tortoise

from threatened to endangered. On April 13, 2020, the Commission referred the Petition to the Department for evaluation pursuant to Fish and Game Code section 2073 and published a formal notice of receipt of the petition (Cal. Reg. Notice Register 2020, No. 18-Z, p. 693). At its meeting on August 20, 2020, the Commission received the Department's petition evaluation report. which was based on available information and recommended to the Commission that the petition be accepted. At its October 14, 2020, meeting, the Commission accepted the petition to change the status of the tortoise from threatened to endangered (Cal. Reg. Notice Register 2020, No. 44-Z, p. 1445). As a result, the Department was directed to complete this Status Review, which is a detailed evaluation of the current status of the tortoise and includes its recommendation regarding whether the tortoise's status should be changed from threatened to endangered.
RESPONSE: This section has been extensively reworked to get closer to statutory requirements

LINE 169-177 (DTRT)

Suggested edit: In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the species complex formerly known as the "desert tortoise" in fact consists of two separate species—Mojave desert tortoise ~~,~~and Sonoran desert tortoise (*G. morafkai*), (Murphy et al. 2011). Five years later, in 2016, the Sonoran desert tortoise was further split into two species – Sonoran desert tortoise and thornscrub tortoise (*G. evgoodei*) (Edwards et al. 2016). The Mojave Desert Tortoise~~,~~ retains the binomial *G. agassizii*, and ranges contemporarily across the Mojave and Sonoran deserts of southeastern California, southern Nevada, and small areas of Arizona north of the Colorado River as well as southwestern Utah.

LINE 172 (DTRT)

Citation for recommendation above: Murphy, R.W., Berry, K.H., Edwards, T., Leviton, A.E., Lathrop, A. and Riedle, J.D., 2011. The dazed and confused identity of Agassiz's land tortoise, Gopherus agassizii (Testudines, Testudinidae) with the description of a new species, and its consequences for conservation. *ZooKeys*, (113), p.39.
RESPONSE: The executive summary acts as an abstract without references. The Murphy et al. 2011 reference is cited in section 2.1 on Taxonomy

LINE 172 (DTRT)

Citation for recommendation above: Edwards, T., Karl, A.E., Vaughn, M., Rosen, P.C., Torres, C.M. and Murphy, R.W., 2016. The desert tortoise trichotomy: Mexico hosts a third, new sister-species of tortoise in the Gopherus morafkai–G. agassizii group. *ZooKeys*, (562), p.131.
RESPONSE: The executive summary acts as an abstract without references. The Edwards et al. 2016 reference is cited in section 2.1 on Taxonomy.
RESPONSE: This paragraph has been deleted but in the taxonomy section (2.1) the text now reads "In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the species complex formerly known as "Desert Tortoise" in fact consists of two separate species—Mojave Desert Tortoise and Sonoran Desert Tortoise (G. morafkai). The Mojave Desert Tortoise, also known as Agassiz's Desert Tortoise, retains the binomial G. agassizii, and ranges currently across the Mojave and Sonoran deserts of southeastern California, southern Nevada, and small areas of Arizona and Utah north of the Colorado River as well as southwestern Utah....... More recent work by Edwards et al. (2016) separates Desert tortoises living in the thorn scrub and tropical deciduous forests of southern Mexico into another species Gopherus evgoodei."

LINE 180 (Lovich)

I was surprised that no papers by David Germano were cited. This line should cite GERMANO, D. J. 1994. Growth and age at maturity of North American tortoises in relation to regional climates. Can. J. Zool. 72:918-931. AND GERMANO, D. J. 1994. Comparative life histories of North American tortoises. National Biological Survey, Fish and Wildlife Research 13.
RESPONSE: The executive summary acts as an abstract without references.

LINE 180 (DTRT)

Recommended citation for line 180: Peterson, C.C., 1996. Anhomeostasis: seasonal water and solute relations in two populations of the desert tortoise (Gopherus agassizii) during chronic drought. Physiological Zoology, 69(6), pp.1324-1358.
RESPONSE: The executive summary acts as an abstract without references. Pederson et al. 1996 is cited in section 2.2 on Life History

LINE 180 (DTRT)

Recommended citation for line 180: Medica, P.A., Nussear, K.E., Esque, T.C. and Saethre, M.B., 2012. Long-term growth of desert tortoises (Gopherus agassizii) in a southern Nevada population. *Journal of Herpetology*, pp.213-220.
RESPONSE: The executive summary acts as an abstract without references. Medica et al. 2012 has been added to the relevant text in section 2.2 on Life History

LINE 180 (Lovich)

30 eggs per year is impossible. This claim is later associated with a citation by Berry and Murphy but they say that nowhere in the publication. Instead, someone assumed that if tortoises can have up to 10 eggs in a clutch and up to three clutches/year they can produce 30. The literature says annual egg production can be 16-18 eggs, about half the number given.
RESPONSE: Altered text to read "typically lay one or two clutches of eggs (about 6 eggs per clutch)"

LINE 181 (DTRT)

Recommended citation for line 181: Mitchell, C.I., Friend, D.A., Phillips, L.T., Hunter, E.A., Lovich, J.E., Agha, M., Puffer, S.R., Cummings, K.L., Medica, P.A., Esque, T.C. and Nussear, K.E., 2021. 'Unscrambling' the drivers of egg production in Agassiz's desert tortoise: climate and individual attributes predict reproductive output. Endangered Species Research, 44, pp.217-230.
RESPONSE: The executive summary acts as an abstract without references. Mitchell et al. 2021 is cited IN relevant text in section 2.2 on Life History.

LINE 182 (DTRT)

Recommended citation for line 182: Spotila, J.R., Zimmerman, L.C., Binckley, C.A., Grumbles, J.S., Rostal, D.C., List Jr, A., Beyer, E.C., Phillips, K.M. and Kemp, S.J., 1994. Effects of incubation conditions on sex determination, hatching success, and growth of hatchling desert tortoises, Gopherus agassizii. *Herpetological Monographs*, pp.103-116.
RESPONSE: The executive summary acts as an abstract without references. Rostal et al. 2002 is a reference for incubation temperatures in section 2.2

LINE 182 (DTRT)

Recommended citation for line 182: Bjurlin, C.D. and Bissonette, J.A., 2004. Survival during early life stages of the desert tortoise (Gopherus agassizii) in the south-central Mojave Desert. Journal of Herpetology, pp.527-535.

RESPONSE: The executive summary acts as an abstract without references. Bjurlin and Bissonette 2004 is cited on relevant text in section 2.2 on Life History

LINE 175 - 179 (DTRT)

Suggested edit: The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile. Consequently, tortoises must use behavioral and physiological adaptations to avoid extreme body temperatures <15 to >35°C (<59 to >95°F Zimmermann et al. 1994) and dehydration (Peterson 1996), as well as budget stored energy (Henen 1997, Peterson 1996) They primarily regulate their temperature by using underground burrows where the air is cooler and higher in humidity than ~~the~~ outside air in summer and warmer in winter, which results in tortoises spending more than 90% of their lives underground (Zimmermann et al. 1994).

RESPONSE: Text has been altered to "The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile that uses behavioral and physiological adaptations to avoid extreme temperatures and dehydration, and to budget stored energy. Mojave Desert Tortoises primarily regulate their temperature by using underground burrows where the air is cooler and higher in humidity in summer, and warmer in winter. They can spend more than 90% of their lives underground." The executive summary does not contain references.

LINE 180-184 (DTRT)

Suggested edit: Females become sexually mature at 12–20 (mean 18.8, Medica et al. 2012) years old and typically lay one or two clutches of eggs (~ 6 eggs per clutch) per year; however, some females have been document to oviposit more than two clutches (Mitchell et al. 2021). Tortoise nests are typically placed near the mouth or entrance to the burrow or within suitable soil (Ennen et al 2012). Nest predation is common, with 12-26% of nests generally destroyed by predators (Ennen et al. 2012, Bjurlin & Bissonette 2004). Reported incubation time in the wild varies from 67–104 days (Berry and Murphy 2019) and incubation temperatures determine the sex of the hatchlings, with hotter temperatures (>32.8°C) producing female-skewed clutches (Spotila et al. 1994).

RESPONSE: The executive summary acts as an abstract without references. Text has been altered to read "Females become sexually mature at 12–20 years old, typically lay one or two clutches of eggs (about 6 eggs per clutch) per year. Nest predation is common, with 12–47% of nests lost to predators annually. Reported incubation time in the wild varies from 67–104 days and incubation temperatures determine the sex of the hatchlings, with hotter temperatures producing female-skewed clutches." 47% is the depredation rate on nests in 1998 in Bjurlin & Bissonette 2004. Suggested references (Medica et al 2012, Mitchell et al. 2021, Ennen et al. 2012, Bjurlin & Bissonette 2004) have been added to the relevant text in section 2.2 on life history.

Line 185-190 (Nussear)

Your summation of dietary preferences given in lines 185 to 190 is inaccurate - we have published information indicating that they neither avoid plants with high potassium, nor exotics - although these can be detrimental to health. With respect to annual forage they are really more of a generalist"

RESPONSE: The information referred to has been deleted.

LINE 185-186 (DTRT)

Suggested edit: Tortoises selectively feed on annual forbs, annual and perennial grasses, and herbaceous perennial plants and will consume some cacti.

RESPONSE: Done

LINE 191-198 (DTRT)

Suggested edit: Tortoise habitat typically occurs on alluvial fans and plains and colluvial/bedrock slopes that facilitate the digging of burrows. Tortoises need sufficient forage as well as large shrubs and bushes for shade and protection of burrows. They are associated with saltbush, creosote bush, white bur-sage, and cheesebush. At higher elevations, tortoises are more likely to be found near Joshua tree, Mojave yucca, and blackbrush. Tortoises occur in very low densities or are absent where shrub cover is sparse, and annual food plants are available only intermittently (e.g., the lower elevations in Death Valley). They also occur at low densities in moderately to severely disturbed areas, regardless of desert or region.
RESPONSE: The executive summary has been shortened and much of this paragraph has been cut.

LINE 191 (Lovich)

G. agassizii can also occupy boulder piles as they often do in Joshua Tree National Park. See Cummings, K.C., J.E. Lovich, S.R. Puffer, T.R. Arundel, and K.D. Brundige. 2020. Micro-geographic variation in burrow use of Agassiz's desert tortoises in the Sonoran Desert of California. Herpetological Journal 30:177-188.
RESPONSE: The executive summary is not that detailed but have added "by using underground burrows or rock shelters (Cummings et al., 2020)" in the relevant place in section 2.2.

LINE 197-198 (DTRT)

A terrestrial development index of approximately 7 (or 7% developed) resulted in mean maximum encounter rates of live tortoise that approached zero -- see Carter et al. 2020. Recommended citation - Carter, S.K., Nussear, K.E., Esque, T.C., Leinwand, I.I., Masters, E., Inman, R.D., Carr, N.B. and Allison, L.J., 2020. Quantifying development to inform management of Mojave and Sonoran desert tortoise habitat in the American southwest. Endangered Species Research, 42, pp.167-184.
RESPONSE: The results from Carter et al 2020 are discussed in section 4.1 on habitat modification and destruction.

LINE 199-201 (DTRT)

Suggested edit: Ravens are a major predator of juvenile tortoises while coyotes target both juvenile and adult tortoises. Raven populations have expanded dramatically in the desert due to resource subsidies from humans (Holcomb et al. 2021).
RESPONSE: The executive summary acts as an abstract without references. Holcomb et al. 2021 is cited in section 4.4 on Predation.

LINE 201 (DTRT)

Recommended citation for Line 201: Holcomb, K.L., Coates, P.S., Prochazka, B.G., Shields, T. and Boarman, W.I., 2021. A desert tortoise–common raven viable conflict threshold. *Human–Wildlife Interactions*, *15*(3), p.14.
RESPONSE: The executive summary acts as an abstract without references. Holcomb et al. 2021 is cited in section 4.4 on Predation.

LINE 203-207 (DTRT)

Suggested edit: In California, the range of the tortoise includes the Mojave Desert and Colorado Subunit of the Sonoran Desert and even a sliver of the Great Basin desert~~s~~, from the southern end of the Owens Valley south of the town of Lone Pine in Inyo County to the Mexican border

near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Peninsular , Sierra Nevada, and Transverse mountains in the west.
RESPONSE: The executive summary has been shortened and much of this text has been cut. Text now reads "In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Sonoran and Great Basin deserts. "

LINE 208 (DTRT)

Surveys began in 2001. Edit accordingly.
RESPONSE: Done

LINE 210-221 (DTRT)

Suggest updating tortoise trends based on Zylstra et al. 2023:
Zylstra, E.R., Allison, L.J., Averill-Murray, R.C., Landau, V., Pope, N.S. and Steidl, R.J., 2023. A spatially explicit model for density that accounts for availability: a case study with Mojave desert tortoises. Ecosphere, 14(3), p.e4448.
RESPONSE: Have updated this using the results from Zylstra et al. 2023.

LINE 233 (DTRT)

Comment to line 233 "critical habitat units" - Critical habitat was designated based on the best available data available prior to 1994. The Service considers Critical habitat to be areas considered essential for the conservation of a listed species.
RESPONSE: The relevant sentence has been removed in the editing of the executive summary

LINE 255 (DTRT)

This statement is incorrect. "large scale translocations do not tend to have high survival rates". Most unpublished and published data related to small scale and large scale translocations indicate that survival is similar between resident, control, and translocated tortoises. Mortality rates do vary by rate based on climate (drought), habitat condition, and predator-prey dynamics in the area.
RESPONSE: Have deleted this sentence following a re write of the translocation section.

LINE 255 (Nussear)

Your statement on translocations on line 255 is potentially misleading: *"Large scale tortoise translocations do not tend to have high survival rates."* What have you defined as a high survival rate? Is this relative to 100%? Relative to resident and control populations inhabiting the same areas and conditions? The potential losses if tortoises are otherwise removed, or worse yet left in place where development or increased military training will occur? Without explicit decisions about what your criteria are this sounds arbitrary
RESPONSE: Have deleted this sentence following a rewrite of the translocation section.

LINE 223-225 (DTRT)

Suggested edit: The population data available indicate that there were sharp drops in density before listing as threatened, and those losses have continued to the point where most tortoise habitats no longer supports viable tortoise densities and adult densities are rapidly declining.
This sentence has been deleted following a rewrite of the population status due to using Zylstra et al. 2023.

LINE 226-236 (DTRT)

Suggested edit: The slow maturation and low reproductive rates of tortoises mean~~s~~ that if past and current management is successful at addressing threats and stemming the decline of tortoise populations, it would still take at more than 25 years of positive population growth to

reach the USFWS Recovery Criteria (U.S. Fish and Wildlife Service 2022*a*). For example, the USFWS 1994 Recovery Plan estimates that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Contemporary annual survival rates for both adults and juveniles are much lower than 98% in all areas, making population stability, let alone growth, unlikely. Collectively, the available data show that in the critical habitat units, tortoise densities are low to very low, and despite 30 years of state and federal protection as a threatened species, tortoise populations continue to decline and do not show consistent signs of recovery.
RESPONSE: This paragraph has been reworked to shorten the executive summary. It now reads in part "For example, the USFWS 1994 Recovery Plan estimates that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Annual survival rates for both adults and juveniles are much lower than 98% in most areas, and since the late 1970s, the number of juveniles detected on surveys has also fallen sharply, to the point that in some recent surveys in the western Mojave Desert almost no juveniles were found. "

LINE 238-241 (DTRT)

Suggested edit: The dramatic declines of tortoise populations are likely due to the extensive number and interconnected nature of the threats they face. The important threats fall into two categories, those that directly kill adults and juveniles, and those that cause longer-term changes to habitat availability and quality.
RESPONSE: Done

LINE 242-249. (DTRT)

Suggested edit: In long-lived species that are slow to reproduce, decreased survival has long lasting impacts on the population viability and can alter demographic rates for decades. Increased numbers of predators including ravens and coyotes reduce the survival of juvenile and adult tortoises, respectively. Development within the tortoise range often creates roads that can lead to road-killed tortoises, and extensive networks of trails for off highway vehicles on public land increase the chance that tortoises will be run over in areas without paved roads. Moreover, road infrastructure provides subsidies in the form of roadkill and garbage to ravens and coyotes. Well-designed fences and culverts can help prevent tortoises and other wildlife from being killed by vehicles along major roads, but little fencing has been built since 2011.
RESPONSE: Done

LINE 250-255 (DTRT)

Suggested edit: Habitat modification, fragmentation, and destruction reduces the amount of habitat that can support tortoises in the long-term and reduce the size of remaining habitat patches. Although a large proportion of the tortoise’s range is under federal control, renewable energy, housing, illegal cannabis, and other types of development reduce the amount of habitat available. Most concerningly, subsidized predators like the raven and coyote leverage habitat fragmentation and disturbances to expand their densities throughout “undisturbed” habitats. The Department of Defense is a large landowner in the tortoise’s range and frequently expands the areas that it uses for training, requiring the translocation of hundreds of tortoises. Large scale tortoise translocations do not tend to have high survival rates.
RESPONSE: Done

LINE 256 (Nussear)

Line 256: the effects of climate change are likely under stated you state "Additional factors have direct and indirect impacts on tortoises and their habitat. Climate change, which is likely to cause hotter and periodically drier conditions in the desert tortoise range, will increase their physiological stress and change activity patterns." it will likely make areas of habitat unsuitable, potentially alter reproduction, hibernation, and many other facets of tortoise ecology. I think this is well beyond the changing of activity patterns and increased physiological stress. I think that Barrows did a paper on this with tortoises in Joshua tree, and there is certainly more that could be referenced here.
RESPONSE: Have added "In combination, the impacts of climate change will likely result in less available suitable habitat." But this is a brief summary, and section 4.6 on Climate change and drought goes into more detail.

LINE 259 (DTRT)

Suggested edit: The nutritious native vegetation tortoises feed on is being outcompeted
RESPONSE: Done

LINE 270-274 (DTRT)

Consider updating with Zylstra et al. 2023 density information. "However, there is still a large amount of available habitat and even at low densities, in 2014 there were estimated to be more than 61,000 adult tortoises within the TCAs. This is a decrease from an estimated 310,000 adults in 2004, and as densities have continued to fall since 2014, current abundance is likely lower than 60,000 adult tortoises".
RESPONSE: Have updated with information from Zylstra et al. 2023

LINE 356 (Lovich)

What about G. evgoodi? See EDWARDS, T., A. KARL, M. VAUGHN, P. ROSEN, C. MELÉNDEZ TORRES, AND R. W. MURPHY. 2016. The desert tortoise trichotomy: Mexico hosts a third, new sister-species of tortoise in the Gopherus morafkai–G. agassizii group. ZooKeys. 562:131-158.
RESPONSE: Have added "More recent work by Edwards et al. (2016) separates Desert tortoises living in the thorn scrub and tropical deciduous forests of southern Mexico into another species Gopherus evgoodei. "

LINE 366 (Lovich)

There are G. agassizii and hybrids "east of the Colorado River in the Kingman area of AZ. See EDWARDS, T., K. H. BERRY, R. D. INMAN, T. C. ESQUE, K. E. NUSSEAR, C. A. JONES, AND M. CULVER. 2015. Testing taxon tenacity of tortoises: evidence for a geographical selection gradient at a secondary contact zone. Ecology and Evolution. 5:2095-2114.
RESPONSE: Have added "However, there is “anomalous" population of G. agassizii east of the Colorado River in the Black Mountains of Arizona (Edwards et al. 2015)."

LINE 357-362 (DTRT)

Suggested edit: Desert tortoises are members of the order Testudines, family Testudinidae, genus *Gopherus*. When the Commission listed Desert Tortoise as threatened in 1989, *Gopherus agassizii* was understood to range from southeastern California, across southern Nevada, through western Arizona, and south into Sonora and Sinaloa, Mexico. In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the complex formerly known as “desert tortoise” in fact consists of two separate species, Mojave desert tortoise and Sonoran desert tortoise (Murphy et al. 2011, Iverson et al. 2017). Five years later,

in 2016, the Sonoran desert tortoise was further split into two species – Sonoran desert tortoise and thornscrub tortoise (G. evgoodei) (Edwards et al. 2016).
RESPONSE: Text now reads "More recent work by Edwards et al. (2016) separates Desert tortoises living in the thorn scrub and tropical deciduous forests of southern Mexico into another species Gopherus evgoodei."

LINE 363-365 (DTRT)

Suggested edit: "Desert tortoises east of the Colorado River in Arizona and northern Mexico are now classified as Sonoran desert tortoise, also known as Morafka's desert tortoise (*Gopherus morafkai*)." See the 2022 USFWS 5-year review for more details regarding tortoise populations found east of the Colorado River that are genetically G. agassizii.
RESPONSE: See above comments for additions to text regarding this population of tortoises. This document is California specific and doesn't focus on this population.

LINE 379 (Lovich)

what about the largest female they reported? It was bigger
RESPONSE: Have amended sentence to "Generally males are larger than females (Ernst and Lovich 1994) but the largest measured wild individual was a female in 1986 whose carapace length was 374 mm (Berry and Murphy 2019)"

LINE 396 (Lovich)

See comment in line 4 of the spreadsheet
RESPONSE: This references the comment about line 191 and the text in section 2.2 now reads "by using underground burrows or rock shelters (Cummings et al., 2020)"

LINE 397 (DTRT)

Medica et al. 2012 reported a mean of 18.8, please include.
RESPONSE: Done

LINE 402 (DTRT)

Citation referenced above. Include in literature. Mitchell, C.I., Friend, D.A., Phillips, L.T., Hunter, E.A., Lovich, J.E., Agha, M., Puffer, S.R., Cummings, K.L., Medica, P.A., Esque, T.C. and Nussear, K.E., 2021. 'Unscrambling' the drivers of egg production in Agassiz's desert tortoise: climate and individual attributes predict reproductive output. *Endangered Species Research*, *44*, pp.217-230.
RESPONSE: Done

LINE 403 (Nussear)

Line 403: "There are anecdotal reports of females nest guarding against humans and Gila Monsters, but there is no parental care once eggs have hatched (Berry and Murphy 2019)"
This is the wrong reference to cite here - you should probably cite Gienger and Tracy 2008
In general throughout this assessment it appears that you put entirely too much emphasis on Berry and Murphy 2019 - rather than more direct references.
RESPONSE: Changed to "Tortoise nests are typically placed near the mouth or entrance to the burrow or within suitable soil (Ennen et al. 2012), and there is no parental care once eggs have hatched (Berry and Murphy 2019)." Made the changes since Gila Monsters not being widespread in California and human attacks on nests not necessarily being a major issue.

LINE 404 (DTRT)

"Gila Monsters": Gila monsters occur at low densities in only a few locations in California and likely do not pose a threat to tortoise nest success for this reason.

RESPONSE: Changed to "Tortoise nests are typically placed near the mouth or entrance to the burrow or within suitable soil (Ennen et al. 2012), and there is no parental care once eggs have hatched (Berry and Murphy 2019). "due to Gila Monsters not being widespread in California and human attacks on nests not necessarily being a major issue

LINE 392-394 (DTRT)

Suggested edit: They also found that the overlap in the area in an individual's home range from one year to the next was ~35% and did not vary significantly by sex. Individuals tend to have fidelity to home ranges and activity centers, even after a fire (Drake et al. 2015, Lovich et al. 2018).

RESPONSE: Done

LINE 401-402 (DTRT)

Suggested edit: Females lay 0–3 clutches in the spring and the number of eggs laid per clutch ranges from 1–10. Females typically lay one or two clutches of eggs (~ 6 eggs per clutch) per year; however, some females have been document to oviposit more than two clutches (Mitchell et al. 2021). Tortoise nests are typically placed near the mouth or entrance to the burrow or within suitable soil (Ennen et al 2012).

RESPONSE: Done

LINE 403-404 (Lovich)

Not true. See Agha, M., J.E. Lovich, J.R. Ennen, and E. Wilcox. 2013. Nest-guarding by female Agassiz's desert tortoise (Gopherus agassizii) at a wind-energy facility near Palm Springs, California. The Southwestern Naturalist 58:254-257.

RESPONSE: Changed to "Tortoise nests are typically placed near the mouth or entrance to the burrow or within suitable soil (Ennen et al. 2012), and there is no parental care once eggs have hatched (Berry and Murphy 2019). " due to Gila Monsters not being widespread in California and human attacks on nests not necessarily being a major issue

LINE 409 (DTRT)

Replace 52% with 26%. Nest predation is common, with 12–26% . Comment - I cant seem to find 55% nest predation stat in Berry and Murry 2019. Please revise accordingly.

RESPONSE: Percentages changed to 26-47% based on yearly numbers in Bjurlin and Bissonette 2004

LINE 410 (Nussear)

Line 410: "When nests are not predated, hatchling success is about 80% " - The verb here should be depredated, predated is to come before something - e.g. [pree-deyt] verb (used with object), pre·dat·ed, pre·dat·ing. to date before the actual time; antedate: He predated the check by three days. to precede in date: a house that predates the Civil War.

RESPONSE: Done

LINE 412 (DTRT)

Delete "At that age they become less vulnerable to predators.

RESPONSE: Done

LINE 418 (DTRT)

Add scientific names to "red brome, cheat grass, red stem filaree, and African mustard".

RESPONSE: Done

LINE 419 (Nussear)

Line 419–420: "but tortoises avoid eating exotic grasses when possible as they are low in nitrogen and require relatively large amounts of water to process."
no, they don't. See Esque 1984, and Tracy et al. 2006
RESPONSE: Deleted. Text now reads "Much of the range of the desert tortoise is highly invaded by nonnative plants including grasses like red brome (Bromus rubens) and cheatgrass (Bromus tectorum). Experimental studies found that grass diets that included no forbs were detrimental to tortoises, leading to weight loss, poor body condition, or even death (Hazard et al. 2009, Drake et al. 2016). This was the case even when the diet included native grasses (Drake et al. 2016). "

LINE 433 (Nussear)

Line 433: Berry and Murphy (2019) report that desert tortoises spend >90% of their lives underground. - this has been reported by numerous other studies, and entirely too much accredited to this reference - see also lines 438 - 441. kines 444 - 445, and I can't even list how many places. Repeatedly gives the appearance of a really shallow review of the primary literature.
RESPONSE: Noted, and the thoroughness of the citations provide throughout is appreciated. However, as stated in section 1.2, the status review " is not intended to be an exhaustive review of all published scientific literature on Mojave Desert Tortoise; rather it is intended to summarize key points relevant to the status of the species and address regulatory report requirements."

LINE 435 (Lovich)

You may want to cite HUTCHISON, V. H., A. VINEGAR, AND R. J. KOSH. 1966. Critical thermal maxima in turtles. Herpetologica. 22:32-41. and ZIMMERMAN, L. C., M. P. O'CONNOR, S. J. BULOVA, J. R. SPOTILA, S. J. KEMP, AND C. J. SALICE. 1994. Thermal ecology of desert tortoises in the eastern Mojave Desert: seasonal patterns of operative and body temperatures, and microhabitat selection. Herpetological Monographs. 8:45-59.
RESPONSE: Have expanded the range of temperatures when tortoises go to shade based on info in Zimmerman et al 1994

LINE 447 (Lovich)

See Ennen, J.R., K.P. Meyer, and J.E. Lovich. 2012. Female Agassiz's desert tortoise activity at a wind energy facility in southern California: the influence of an El Niño event. Natural Science 4:30-37. doi:10.4236/ns.2012.41006.
RESPONSE: Changed/ added so text now reads "Tortoises moved less, used fewer burrows, and had smaller home ranges during drought years as compared to wet years in the mid-1990s (Duda et al. 1999). However, at a different site in the late 1990s, the relationships between precipitation and activity area, rate of movement, and burrows used were less clear (Ennen et al. 2012), suggesting that there are many interacting forces that determine tortoise activity and movement levels**."**

LINE 409-412 (DTRT)

Suggested edit: Nest predation is common, with 12–26% of nests generally destroyed by predators (Berry and Murphy 2019, Ennen et al. 2012, Bjurlin & Bissonette 2004). When nests are not predated, hatchling success is about 80% (Bjurlin and Bissonette 2004). Newly hatched tortoises are about 4–5 cm in length (Bjurlin and Bissonette 2004) and their shells do not fully ossify until they are 5–7 years old. For more information about predation, see section 4.4.

RESPONSE: Percentages changed to 26-47% based on yearly numbers in Bjurlin and Bissonette 2004

LINE 434-436 (DTRT)

"Tortoises are active when their body temperatures are between 19.0°C and 37.8°C (66.2–100°F), they retreat to shade when body temperatures are 37–38°C (98.6–100.4°F), and body temperatures of 43°C (109.4°F) are deadly (Brattstrom 1965)". Review and add Zimmerman, L.C., O'Connor, M.P., Bulova, S.J., Spotila, J.R., Kemp, S.J. and Salice, C.J., 1994. Thermal ecology of desert tortoises in the eastern Mojave Desert: seasonal patterns of operative and body temperatures, and microhabitat utilization. Herpetological Monographs, pp.45-59.
RESPONSE: Have expanded the range of temperatures when tortoises go to shade based on info in Zimmerman et al 1994

LINE 460-461 (Nussear)

Lines 460–461: "Therefore, desert tortoise habitat typically consists of alluvial fans and plains and colluvial/bedrock slopes (Nussear et al.
2012)". This isn't the best reference for this, how about Germano 1994, or Nussear and Tuberville 2014? See also 465 and 466
RESPONSE: Have changed citation to Germano et al. 1994

LINE 515-417 (DTRT)

Delete these sentences "Tortoises favor native plants and plant parts that are high in water and low in potassium (Oftedal et al. 2002). Potassium is potentially toxic and requires a large amount of water and nitrogen to excrete.".
RESPONSE: Deleted

LINE 451 (Lovich)

Citation?
RESPONSE: Have added Ernst and Lovich 1994 as a reference to this cluster of sentences

LINE 461 (Lovich)

How about burrows under caliche layers?
RESPONSE: Although not mentioned specifically, this sentence is sufficiently broad enough to cover caliche layers. “Due to their dependence on burrows, they require soils, topography, geological features, and vegetation that facilitate the creation of burrows or dens (Andersen et al. 2000).”

LINE 482 (Lovich)

Berry 1984 not in lit cit
RESPONSE: Citations within a quote are not included in the bibliography

LINE 485 (Lovich)

Lower elevation areas free of tortoises include the Salton Trough. See Lovich, J.E., T. Edwards, K.H. Berry, S. Puffer, K. Cummings, J. Ennen, M. Agha, R. Woodard, K. Brundige, and R.W. Murphy. 2020. Refining genetic boundaries in the western Sonoran Desert for Agassiz’s desert tortoise (Gopherus agassizii): the influence of the Coachella Valley on gene flow among populations in southern California. Frontiers of Biogeography 12:1-14. https://escholarship.org/uc/item/54r0m1cq.
RESPONSE: Have added some text to the section on range and distribution "While caution should be used in using these types of data, there appear to be fewer occurrences in the

northern part of the range and in the Death Valley/Mojave Central Trough (see grey area on Figure 3), and few occur in low areas near the Salton Sea (Lovich et al. 2020)**."**

LINE 494 (DTRT)

Suggested edit: In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Colorado subunit of the Sonoran and Great Basin Deserts
RESPONSE: Done

LINE 507 (DTRT)

Suggested edit: In 2016, park staff began surveying for tortoises and formally collecting incidental observation data, and subsequent genetic analysis of tortoise blood and scat suggested “evidence of a naturally reproducing Mojave desert tortoise population in Anza Borrego Desert State Park” (Manning 2018).
RESPONSE: Done

LINE 516-520 (DTRT)

Suggested edit: The distribution of desert tortoises within California is uneven, and portions of the range no longer provide suitable tortoise habitat due to agriculture, development, and military activity. Data on tortoise occurrences from the California Natural Diversity Database (CNDDB) and the Global Biodiversity Information Facility (GBIF) were used to plot the distribution
RESPONSE: Done

LINE 548 (DTRT)

"Outbreeding depression has not been studied in G. agassizii." Also see Averill-Murray and Hagerty 2014 for discussion/calculations related to outbreeding depression. Translocation Relative to Spatial Genetic Structure of the Mojave Desert Tortoise,
Gopherus agassizii. Chelonian Conservation and Biology 13:35-41.
RESPONSE: Altered text to read "Outbreeding depression has not been well studied in G. agassizii; however, the potential negative impacts of outbreeding are expected to occur at long time scales (~600 years; Averill-Murray and Hagerty 2014). This suggests that habitat quality and predator numbers are more important than outbreeding depression when evaluating suitable recipient sites for translocation. Despite this, Sánchez-Ramírez et al. (2018) advise caution when moving tortoises long distances for translocation or population augmentation. For more details about translocations see section 5.2"

LINE 538-551 (DTRT)

Please also consider Scott, P.A., Allison, L.J., Field, K.J., Averill-Murray, R.C. and Shaffer, H.B., 2020. Individual heterozygosity predicts translocation success in threatened desert tortoises. Science, 370(6520), pp.1086-1089. and the Translocation of Mojave Desert Tortoises from Project Sites: Plan Development Guidance:
https://www.fws.gov/sites/default/files/documents/Revised%20USFWS%20DT%20Translocation%20Guidance.20200603final.pdf
RESPONSE: This paper is focused on tortoises from captive origins, and is not a great fit for this section of the status review.

LINE 638 (DTRT)

The use of square transects with 3 km sides was initiated in 2004, prior to this different transect lengths/shapes were used for line distance surveys

RESPONSE: Added text "In 2001–2003, two person teams surveyed TCAs using line transect surveys. Transects were searched out to 8–10 m from the centerline. The shape and length of the transect changed year to year (USFWS 2006). Starting in 2004, square transects with 3 km sides were set up to provide good coverage of each TCA, and a random selection of these transects are surveyed each year."

LINE 649 (DTRT)

As currently presented, the estimates in Table 2 for 2014 do not represent a survey in IV, CK, CM, FE, PT, or JT, but rather an extrapolated estimate based on trends outlined in USFWS 2022a. Recommend updating the table to reflect either only years surveyed or adding notation to differentiate.

RESPONSE: Following the inclusion of Zylstra et al. 2023, this table has been moved to the Appendix. Have listed the density estimates from line sampling from Allison and McLuckie, and bolded the densities estimated from trends as presented in USFWS 2022a. Added following text to legend "In 2014, the density estimates for the Western Mojave TCAs and Chocolate Mountain are estimated from line distance sampling and are found in Allison and Mcluckie (2018). The bolded estimates from Ivanpah and the Colorado Desert TCAs (excluding Chocolate Mountain) come not from that years' line distance sampling but are mean densities calculated from trends using data from previous years (USFWS 2022a)"

LINE 639-640 (DTRT)

Suggested edit: Two surveyors walk line transects along the boundary of the square or as close to it as is feasible, where the lead surveyor walks in a straight line on a specified compass bearing, trailing 25m of cord, and the second crew member follows at the end of the line.

RESPONSE: Done

LINE 640-642 (DTRT)

Suggested edit: They record the distance and bearing from the survey line to all tortoises seen and live tortoises are measured and sexed. In addition, data from tortoises carrying radio transmitters are used to estimate what portion of tortoises are above ground. These data are then used to calculate the proportion of tortoises that are detectable during the entire period transects are walked in an area.

RESPONSE: Text modified to "In addition, data from tortoises carrying radio transmitters are used to estimate what portion of tortoises are above ground and detectable during the transects."

LINE 684 (DTRT)

Spatially explicit estimates based on line distance data presented in Zylstra et al. 2023 demonstrate that in 2020 all TCA's are below the 3.9 threshold.

Have updated this section to use results from Zylstra et al 2023

LINE 682-685 (DTRT)

"The most recent surveys (2019–2021) show that in the Eastern and Western Mojave Recovery Units, all of the TCAs surveyed were below the 3.9 adult tortoises/km2 threshold. In the Colorado Desert Recovery Unit, two were at the threshold, two were below it, and only one TCA (Fenner) was above (U.S. Fish and Wildlife Service 2022a)". Comment - Spatially explicit estimates based on line distance data presented in Zylstra et al. 2023 demonstrate that in 2020 all TCA's are below the 3.9 threshold.

RESPONSE: Have updated this section to use results from Zylstra et al 2023

LINE 688 (DTRT)

Recommend updating figures 8 and 9 based on updated values in Table 2

RESPONSE: Done

LINE 698 (DTRT)

Table 2. 2014, density estimate values listed for this year come from two different sources, estimates calculated from annual line distance sampling in TCAs (Chocolate Mtn and SC; Allison and McLuckie 2018) and extrapolated estimates based on trends (all other TCAs) from USFWS 2022a. However, FK and OR were also surveyed in 2014. Recommend consistency in citing estimates, either 1) list density estimates for all areas surveyed in 2014 (AG, SC, FK, OR) from Allison and McLuckie 2018, include extrapolated estimates for other TCAs not surveyed and **add notation to differentiate** OR 2) list extrapolated estimates for all **including notation to differentiate extrapolated estimates** from actual years surveyed.

RESPONSE: Following the inclusion of Zylstra et al. 2023, this table has been moved to the Appendix. Have listed the density estimates from line sampling from Allison and McLuckie, and bolded the densities estimated from trends as presented in USFWS 2022a. Added following text to legend "In 2014, the density estimates for the Western Mojave TCAs and Chocolate Mountain are estimated from line distance sampling and are found in Allison and McLuckie (2018). The bolded estimates from Ivanpah and the Colorado Desert TCAs (excluding Chocolate Mountain) come not from that years' line distance sampling but are mean densities calculated from trends using data from previous years (USFWS 2022a)"

LINE 698 (DTRT)

Table 2. 2015, missing values for Ivanpah and Chocolate Mountain (USFWS 2016)

RESPONSE: Done

LINE 698 (DTRT)

Table 2. 2016, missing values for Chocolate Mountain, please update to include (USFWS 2016)

RESPONSE: Done

LINE 698 (DTRT)

Table 2, 2017, no value should be listed for Ivanpah, this TCA was not surveyed in 2017, please delete (USFWS 2018)

RESPONSE: Done

LINE 698 (DTRT)

Table 2, 2018, please correct the coefficient of variation for the Ord-Rodman estimate from 20.79 to 30.79 (USFWS 2019b)

RESPONSE: Done

LINE 698 (DTRT)

Table 2, 2019, missing values for Chocolate Mountain, please update (USFWS 2020a)

RESPONSE: Done

LINE 700 (DTRT)

Table 2, need to add USFWS 2022a citation

RESPONSE: Done

LINE 718 (Lovich)

Estimating live tortoises from sign is not a reliable method.

RESPONSE: Added text "These early monitoring programs sometimes relied on tortoise sign (tracks, scats, burrows, or carcasses) as well as observations of live tortoises, or employed mark-recapture methods to obtain estimates of abundance or density. It should be noted that survey methods that rely on sign to estimate numbers of live tortoises are not reliable. In addition, mark recapture methods contain several assumptions that are violated in surveys of tortoises (Corn 1994), and the lack of spatial information in conventional mark recapture analysis leads to inflated estimates of density (Mitchell et al. 2021b). Therefore, estimates of density before 2001 must be approached with caution and direct comparisons between density estimates from mark recapture and line transect density methods are not advised. However, we can use these studies to give a rough picture of the state of tortoise populations in the late 20th century." Deleted "From 1979–1980 to 2020–2021, densities of adults in the corresponding TCAs fell 93% in Fenner, 96% in Chuckwalla, 89% in Chemehuevi, and 93% in Ivanpah" as this is a flawed direct comparison.

LINE 738 (DTRT)

"In addition, the BLM density estimates are only for the single plot per TCA". Comment - In addition, these results are likely biased high due to violations of statistical assumptions (Mitchell et al. 2021). Mitchell, C. I., K. T. Shoemaker, T. C. Esque, A. G. Vandergast, S. J. Hromada, K. E. Dutcher, J. S. Heaton, and K. E. Nussear. 2021. “Integrating Telemetry Data at Several Scales with Spatial Capture-Recapture to Improve Density Estimates.” Ecosphere 12: e03689.

RESPONSE: Added text "In addition, mark recapture methods contain several assumptions that are violated in surveys of tortoises (Corn 1994), and the lack of spatial information in conventional mark recapture analysis leads to inflated estimates of density (Mitchell et al. 2021b)." Added text "Comparing the density estimates in Berry and Medica (1995) to the USFWS estimates in 2001–2021 is not appropriate due to the differences in methodology described above. However, comparing the mark recapture density estimates between 1979 and 1992 can give us a sense of the general scale of decline even if the estimates themselves are biased high (Berry and Medica 1995, Mitchell et al. 2021b). "

LINE 711 and forward (Lovich)

These plot-based surveys cannot reliably be compared to data from line distance sampling data as that is like comparing apples to oranges. In the omitted Ernst and Lovich 2009 citation (page 564) mentioned above we compared and contrasted the techniques, their strengths and weaknesses. Plot-based surveys cannot be reliably extrapolated to surrounding areas and have been heavily criticized in the literature for their limitations. See CORN, P. S. 1994. Recent trends of desert tortoise populations in the Mojave Desert, p. 85-93. In: Biology of North American Tortoises. R. B. Bury and D. J. Germano (eds.). United States Department of the Interior, National Biological Survey. Fish and Wildlife Research 13. AND BURY, R. B., AND P. S. CORN. 1995. Have desert tortoises undergone a long-term decline in abundance? Wildlife Society Bulletin. 23:41-47. While I believe the plot-based data are valuable when those limitations are considered, you need to clarify that they are very different techniques and may not be useful for integration of data on declines.

RESPONSE: Bury and Corn 1995 question the assertions in Berry 1984 that there has been large scale declines in the desert tortoise densities up until that point and to claims of a 60-90% decline from 1900-1970s. The status review does not touch on population status or density prior to Berry 1984's strip transects which have rough density classes. Corn 1994 has a similar data set to Berry and Medina 1995, however because the violations of assumption in mark recapture in 60 days surveys, they present the data as relative abundance. The overall trends are similar over 1979-1990 as reported in Berry and Medina. Have reworded the section on Berry and Medica 1995's results to make it more clear about their limitations. See above

LINE 768 (Lovich)

Freilich worked on a one square mile plot (the Barrow Plot) in JTREE. That's "well-defined"
RESPONSE: Removed "and since they did not have a well-defined effective trapping area, their density estimates are rough. "

LINE 816 (Lovich)

Desert tortoises have the following life history traits: long-lived, late maturing, variable nest success due to predation, high adult survival, bet-hedging reproductive strategy (see ENNEN, J. R., J. E. LOVICH, R. C. AVERILL-MURRAY, C. B. YACKULIC, M. AGHA, C. LOUGHRAN, L. TENNANT, AND B. SINERVO. 2017. The evolution of different maternal investment strategies in two closely related desert vertebrates. Ecology and Evolution:1-13.), and relatively high juvenile survival to compensate for variable nest success. Classic studies of turtles with similar traits are: CONGDON, J. D., A. E. DUNHAM, AND R. C. LOBEN SELS. 1993. Delayed sexual maturity and demographics of Blanding's turtles (Emydoidea blandingii): Implications for conservation management of long-lived organisms. Conserv Biol. 7. AND CONGDON, J. D., A. E. DUNHAM, AND R. C. VAN LOBEN SELS. 1994. Demographics of common snapping turtles (Chelydra serpentina): implications for conservation and management of long-lived organisms. Amer. Zool. 34:397-408. You even show fairly high rates of juvenile survivorship on page 37. Without compensation for high nest mortality if hatchlings (you say this is high on page 37 line 903 and with the Daly et al. citation on page 37) populations could not survive.
RESPONSE: Have added text "In long-lived species like the tortoise, if adult survivorship drops, reproductive rates or juvenile survival would have to increase dramatically to keep populations stable. Analysis by the USFWS (1994) estimated that “a 10% increase in adult mortality can require a 300% increase in juvenile survivorship” to maintain a stable population. Many of the threats to adult survival also affect juveniles, making it unlikely that juvenile survivorship can naturally increase to the levels needed to compensate for the decreasing adult survival documented above"

Page 34 Figure (Lovich)

All of the presumed confidence intervals overlap each other so they aren't really different
RESPONSE: Assume this refers to figure 12. Have added/altered relevant text to read "In the yearly transect surveys done in the TCAs, the median midline carapace length did not change significantly between 2001 and 2015 (Figure 10). However, fewer juveniles small enough to be classified as outliers (the small circles below the lower ‘whisker’ in the box and whisker plot of Figure 10) were found in 2007–2015 compared to 2001–2005. In 2011, only one juvenile (midline carapace length <180 mm) was found, and in 2012 none were found. In some areas, the youngest tortoises found in recent years were at least 30 years old (Holcomb 2022a). Despite a steady median carapace length across 2001–2015, the range of carapace lengths decreased, with most of that change due to fewer smaller individuals found. Even with thousands of adults in a population, if sufficient juvenile tortoises are not surviving to breeding age, the population will decline without interventions like head-starting, although that decline may take decades to manifest (Lovich et al. 2018)."

LINE 856-857 (Lovich)

Prey switching was the mechanism proposed

RESPONSE: Text amended to read "It should be noted that other factors that impact survival, such as predation, roadkill, and disease were not tested independently" prey switching is discussed more in section 4.5 on predation.

LINE 870-881 (DTRT)

Comment - Esque et al. 2010 highlighted that we have too many subsidized predators (e.g., coyotes) throughout the Mojave Desert and that prolonged drought conditions likely created a shift in predator-prey dynamics. Increased mortality for G. agassizii was observed range-wide in 2008-2009. Please rephrase to include the importance of this finding.

RESPONSE: Prey switching and Esque et al 2010 is talked about at the end of the section 4.4 on predation. The addition of Cypher et al. 2018 adds some counterpoints to the discussion. Text read "During periods of suppressed rodent and prey populations following dry years, it has been suggested that coyotes will switch to preying on tortoises (Esque et al. 2010). This may help explain the widespread high mortality rates due to predation in 2008 (Esque et al. 2010). However, work by Cypher et al. (2018) did not necessarily support that hypothesis. In a study following the 2008 translocation of tortoises to an area south of Fort Irwin, they collected data on the relative abundance of rodents and rabbits, as well as the contents of coyote scats in 2009–2014. The years 2011–2014 were very dry compared to the wetter years of 2009–2010. While the frequency of occurrence of rodents in scat was lower in dry years (24.3%–46.3%) than in the wet years (53%–65%), the frequency of tortoises in scat was also lower in dry years (2.4%–2.6%) compared to wet years (5.6%–5.8%). These results suggest that it is unlikely coyotes switched to tortoise prey because of lack of rodents. Instead, as coyotes ate fewer rodents in the dry years, their amount of anthropogenic food sources increased (Cypher et al. 2018). While 2008 may have been an anomalous widespread pulse in predation pressure (Esque et al. 2010), there is a lack of rigorous evidence that coyotes regularly prey switch to tortoises when rodent or lagomorph populations are low because of drought. "

LINE 897 (Lovich)

is 300% the right number?

RESPONSE: Full quote is "Indeed, somewhere in the order of only 1% of all eggs need survive to reproductive age. On the other hand, a 10% increase in adult mortality can require a 300% increase in juvenile survivorship. Furthermore, any reduction in the fecundity of adults exacerbates this further."

LINE 901 (DTRT)

"Several factors limit the number of hatchlings that are produced in the wild each year." Comment See Mitchell et al. 2021 for more information related to the drivers of egg production. The authors modeled reproductive output as a factor of climate and individual attributes and detected a declining trend in egg production across all recovery units over time.

RESPONSE: Citation was previously added. Altered text to read "Several factors limit the number of hatchlings that are produced in the wild each year. Temperature, precipitation and body size influence the number eggs females lay (Mitchell et al. 2021a), with the maximum being 12-18 eggs a year (J. Lovich Pers comm 2023). "

LINE 902 (Lovich)

See earlier comment about 30 eggs/year being wrong

RESPONSE: Altered text to read "Several factors limit the number of hatchlings that are produced in the wild each year. Temperature, precipitation and body size influence the number eggs females lay (Mitchell et al. 2021a), with the maximum being 12-18 eggs a year (J. Lovich Pers comm 2023). "

LINE 918 (Lovich)

This addresses a proximate (not enough turtles) not an ultimate (impacts continue to kill turtles in the wild) cause. See FRAZER, N. B. 1992. Sea turtle conservation and halfway technology. Conservation Biology. 6:179-184. for a critique of headstarting.

RESPONSE: True, but this distinction may not be necessary here.

LINE 901-917 (Lovich)

juvenile survival rates aren't that low. See comments line 23 of spreadsheet

RESPONSE: Have deleted that sentence.

LINE 953 (DTRT)

Again, you say survival rates of juveniles are low but you say 100% on page 37 line 928

RESPONSE: That is a modelled survival rate that hasn't been ground truthed and focused mostly on predation risk from ravens. Other factors make it unlikely annual survival would be 100%

LINE 986-987 (Lovich)

The west Mojave is highly built up and growing. See HUNTER, L. M., M. D. J. GONZALEZ G, M. STEVENSON, K. S. KARISH, R. TOTH, T. C. EDWARDS, R. J. LILIEHOLM, AND M. CABLK. 2003. Population and land use change in the California Mojave: Natural habitat implications of alternative futures. Population Research and Policy Review. 22:373-397.

RESPONSE: Added some text at the end of the paragraph to add context about how the results of the Carter et al. 2020 paper may not hold into the future "However, these categories of development used above do not take into account unpaved roads and tracks for off-highway vehicles (OHVs) which are allowed on BLM land (see section 4.2), and given the pace of a variety of development in the desert, the conclusions may be less applicable in the future."

LINE 997 (Lovich)

Cite Hunter et al. above?

RESPONSE: This paper is interesting, but it is from 2003 and offers 2 potential development possibilities by 2020 with amounts of DT tortoise habitat in conflict with development. With the information easily available it would be hard to judge which scenario most closely matches reality and it is unclear it would add much to what information is already presented.

LINE 1034 (Lovich)

Cite Lovich and Bainbridge for recovery

RESPONSE: Done "Recovery from disturbance can take a long time in desert ecosystems (Lovich and Bainbridge 1999). "

LINE 1043 (Lovich)

How about fire as an impact esp. on bases like China Lake where lots of ordinance is fired

RESPONSE: Unable to find specific information about fires on DoD land.

LINE 1055 (Lovich)

Citation is Lovich and Ennen, not et al.

RESPONSE: Changed. "

LINE 1057 (Lovich)

after "infrastructure" add "for wind"

RESPONSE: The relevant sentence has been removed due to further editing

LINE 1112 (Nussear)

line 1112 Cannabis operations - this seems like a trivial inclusion. 12 km^2? This seems to be about the equivalent of party balloon effects, surprised to see this here.

RESPONSE: As noted, the visited acres of illegal cannabis grows are likely an underestimate of the true number of acres and it is probable that active and abandoned acres will continue to grow. The Department felt it is worthy to mention as something to keep an eye on in the future.

LINE 1117 (Lovich)

Guard dogs or any dogs?

RESPONSE: In the context of cannabis operations the dogs are mostly guard dogs. Pet/ feral dogs can be an issue generally near homes.

LINE 1208 (Lovich)

West where? Mojave?

RESPONSE: Have modified to clarify "According to the BLM, in 2008 there were four times the number of off-highway vehicles in western states than in 1998 (Bisson 2008)."

LINE 1258 (DTRT)

Suggested edit: Grasses are high in fiber, contain less digestible energy, and little protein (Hazard et al. 2009; Drake et al. 2016),

RESPONSE: That text is within a quote, alterations would not be appropriate

LINE 1242-1243 (DTRT)

"Fueled in part by nitrogen pollution carried by wind from the Los Angeles Basin which enriches desert soils (Fenn et al. 2010), invasive Mediterranean grasses have spread through much of the Mojave Desert." Comment- nitrogen pollution is not a significant contributor to the spread and establishment of invasive Mediterranean grasses. Habitat disturbance, recreation activities, and loss of native plants plays the biggest roles.

RESPONSE: Have deleted the relevant part of the sentence.

LINE 1297 (DTRT)

Suggested edit: The best studied predators of tortoises are ravens , coyotes, and badgers. " Include scientific name the first time predators are referenced in document.

RESPONSE: Have added scientific names to the document.

LINE 1341-1343 (DTRT)

Suggested edit: Ten years later, 104 were dead, an estimated 60% of which were killed by coyotes (Esque et al. 2010; Mack and Berry 2023). Increased tortoise mortality due to coyote depredation was observed throughout the tortoise’s range (Esque et al. 2010).

RESPONSE: Sentence has been altered to read "Coyotes are thought to be a major predator of adult tortoises. In a study of translocated tortoises in the Superior-Cronese CHU, between 2008 and 2018 an estimated 60% were killed by predators, likely coyotes based on nearby tracks and scat (Esque et al. 2010, Mack and Berry 2023). " Esque et al. 2010 range wide results are discussed in the paragraph that follows this text.

LINE 1357 (DTRT)

Add Emblidge et al. 2014 citation after badger. Suggest adding this citation from Endangered Species Research 28:109-116 and maybe a statement that evidence is mounting that badgers may play an important role in heavy localized mortality event.

RESPONSE: Have added the text "Badgers are thought to be partially responsible for high levels of mortality of tortoises in 2012-2013 on and near Ft. Irwin and may be important predators in certain locales (Emblidge et al. 2015). "

LINE 1360 (Lovich)

The following two citations also discuss prey switching: Lovich, J.E., S.R. Puffer, K. Cummings, T.R. Arundel, M.S. Vamstad, and K.D. Brundige. 2023. High female desert tortoise mortality in the western Sonoran Desert during California's epic 2012–2016 drought. Endangered Species Research 50:1-16. https://doi.org/10.3354/esr01215 and Lovich et al. 2014 already in lit cit.
RESPONSE: The coyote predation/scavenging discussion in Lovich et al. 2014 is included the section on predation. The 2023 reference was useful for the section on impacts of drought.

LINE 1505 (Nussear)

line 1505 - 1506 " foraging for annuals in the burned areas, while using the cover of perennial shrubs only found in unburned areas (Drake et al. 2015). "
This really isn't true, and not what Drake et al says if you read beyond just the abstract. Tortoises also used cover in burned areas, and that consisted of both burned and unburned perennials in the scar of the burn. - see also Snyder et al. 2019
RESPONSE: Altered text to "Tortoises tend to remain in same areas after fire (Lovich et al. 2018), and one study found that tortoises used burned and unburned areas nearly equally, starting the first year after the fire (Drake et al. 2015). Tortoises moved into the burned areas seasonally to forage for preferred annuals and herbaceous perennials (Drake et al. 2015). The use of burned habitats did not appear to affect their health or reproduction in the short term. However, the expansion of red brome grass in burned areas and the injuries that fire can cause tortoises remained concerns (Drake et al. 2015)."

LINE 1531 (Lovich)

You might cite SCHUMACHER, I. M., D. C. ROSTAL, R. A. YATES, D. R. BROWN, E. R. JACOBSON, AND P. KLEIN, A. 1999. Persistence of maternal antibodies against Mycoplasma agassizii in desert tortoise hatchlings. American Journal of Veterinary Research. 60:826-831. as there is no evidence of transmission of URTD from females to their embryos
RESPONSE: Was unable get a copy of this paper and mother to offspring transmission is not mentioned in the document.

LINE 1534 (Lovich)

add "potentially" I'm not aware of evidence that tortoises have to smell to find food
RESPONSE: Have added the word potentially "The disease both directly kills tortoises and can potentially interfere with their sense of smell and therefore their ability to forage for food and can potentially negatively affect their reproductive fitness (Germano et al. 2014, Jacobson et al. 2014)"

LINE 1527-1528 (DTRT)

Suggested edit: The disease presents as lesions in the nasal cavity and inflammation of mucosa of the upper respiratory tract, muchoid discharge from the nares, damaged nasal scales due to chronic muchoid discharge
RESPONSE: Done

LINE 1569 (DTRT)

Delete this sentence. There is no evidence of this. Being captured by humans for research and/or translocation can stress tortoises and make them more susceptible to URTD.

RESPONSE: Unclear what this comment refers to as the original sentence says "Being captured by humans for research and/or translocation can stress tortoises and make them more susceptible to URTD. " However, that sentence has been deleted in the general editing process.

LINE 1580 (Lovich)

Change associated to correlated
RESPONSE: Done. "Shell lesions were correlated with high mortality rates of desert tortoises in Chuckwalla Bench in 1982–1988 "

LINE 1569-1570 (DTRT)

Edit this sentence to the following: Official handling protocols have strict guidelines in place to minimize human-mediated transfer of pathogens stress as much as possible (U.S. Fish and Wildlife Service 2020b, a).
RESPONSE: text altered to "Official handling protocols include strict guidelines to minimize human mediated transfer of pathogens and stress (USFWS 2020b). "

LINE 1636 (Lovich)

morafkai misspelled
RESPONSE: Fixed

LINE 1643 (Lovich)

15.4 tortoises/km squared at my Palm Springs tortoise site as cited in Lovich et al. 2011 already in lit cit
RESPONSE: This whole section has been deleted.

LINE 1647 (DTRT)

"the most recent estimates of abundance…" Predicted abundances at the recovery unit level are available for 2020 from Zylstra et al 2023
RESPONSE: Have deleted this section and deleted the table with abundances from 2014

LINE 1648 (DTRT)

Predicted abundances at the recovery unit level are available for 2020 from Zylstra et al 2023
RESPONSE: Have deleted this section and deleted the table with abundances from 2014

1658 (DTRT)

Recommend incorporating trends and predicted densities from Zylstra et al. 2023 into this section
RESPONSE: Have deleted this section

LINE 1678 (Lovich)

While adult sex ratios in desert tortoises tend to be equal the issue is much more complicated. See these citations: LOVICH, J. E., AND J. W. GIBBONS. 1990. Age at maturity influences adult sex ratio in the turtle Malaclemys terrapin. Oikos. 59:126-134. AND Lovich, J. E. 1996. Possible demographic and ecologic consequences of sex ratio manipulation in turtles. Chelonian Conservation and Biology 2:114-117. AND Lovich, J.E., J.W. Gibbons, and M. Agha. 2014. Does the timing of attainment of maturity influence sexual size dimorphism and adult sex ratio in turtles? Biological Journal of the Linnean Society 112:142-149. AND Lovich, J.E., S.R. Puffer, K. Cummings, T.R. Arundel, M.S. Vamstad, and K.D. Brundige. 2023. High female desert tortoise mortality in the western Sonoran Desert during California's epic 2012–2016 drought. Endangered Species Research 50:1-16. https://doi.org/10.3354/esr01215
RESPONSE: Have added Lovich 2023 as a citation, see below.

LINE 1680 (Lovich)

Not true. See Lovich, J.E., S.R. Puffer, K. Cummings, T.R. Arundel, M.S. Vamstad, and K.D. Brundige. 2023. High female desert tortoise mortality in the western Sonoran Desert during California's epic 2012–2016 drought. Endangered Species Research 50:1-16. https://doi.org/10.3354/esr01215

RESPONSE: This comment refers to sex ratios. The sex ratio text has been moved to section 4.6 Climate Change and Drought and now reads "There is some evidence that drought is affecting sex ratios of adult tortoises. Unequal sex ratios are thought to lower effective population size, which in small populations with limited connectivity could exacerbate inbreeding (Frankham 1995). In 2015–2016, Lovich et al. (2023) surveyed two sites in Shaver's Valley about 70 km southeast of Palm Springs along the boundary of the Joshua Tree and Chuckwalla TCAs. At both sites there was a male bias in live tortoises. At the cooler, wetter site there was an even sex ratio in tortoises found dead, but in the hotter and drier Chuckwalla site, more females were found dead. It is possible that the energetic requirements required for reproduction make females less likely to survive long-term drought conditions (Lovich et al. 2023)."

LINE 1680 (Nussear)

Line 1680 you state "Unfortunately, there are no published data on sex ratios in the 17 TCAs (Berry and Murphy 2019)," - this isn't really the case, Allison and Mcluckie, Esque et al, and many other studies and datasets exist.

RESPONSE: Deleted

LINE 1658-1659 (Lovich)

Are these "small populations"?

RESPONSE: Have deleted section on small populations.

LINE 1671-1676 (Lovich)

This is discussed in more detail in Lovich, J.E., J.R. Ennen, M. Agha, and J.W. Gibbons. 2018. Where have all the turtles gone, and why does it matter? BioScience 68:771–781. The long lives of tortoises can give the perception of population persistence even with no juvenile recruitment.

RESPONSE: Moved text to section 3.2 Trends in Density and Abundance has been added "Even with thousands of adults in a population, if sufficient juvenile tortoises are not surviving to breeding age, the population will decline without interventions like head-starting, although that decline may take decades to manifest (Lovich et al. 2018)."

LINE 1694 (Lovich)

cite Lovich, J.E., S.R. Puffer, K. Cummings, T.R. Arundel, M.S. Vamstad, and K.D. Brundige. 2023. High female desert tortoise mortality in the western Sonoran Desert during California's epic 2012–2016 drought. Endangered Species Research 50:1-16. https://doi.org/10.3354/esr01215

RESPONSE: Resolved, see above

LINE 1815 (Lovich)

"The" Mojave Desert Tortoise

RESPONSE: Fixed

LINE 1847 (Lovich)

How about Utah?

RESPONSE: Added Utah. "The Desert Tortoise Management Oversight Group (MOG), formed in 1994, is comprised of senior managers from USFWS, BLM, state transportation agencies, state wildlife agencies, county governments, and non-governmental organizations (NGOs) that work in the tortoise range in Arizona, Nevada, Utah, and California. "

LINE 1871 (DTRT)

"In 2008 and 2011….". 2008 was a draft for review. Please only use 2011.
RESPONSE: Deleted 2008

LINE 1871 (DTRT)

Suggested edit: "the USFWS published revisions to the a Revised Recovery Plan…"
RESPONSE: Done

LINE 1880 (DTRT)

delete 2008
RESPONSE: Done

LINE 1886 (DTRT)

Edit to "As part of the revised 2011 Revised Recovery Plan".
RESPONSE: Done

LINE 1957 (Lovich)

You included the Yermo logistics base earlier but not here (and they have tortoises)
RESPONSE: Amended "DoD facilities within the Mojave Desert Tortoise range include Naval Air Weapons Station China Lake, Edwards Air Force Base, Fort Irwin, Marine Air Ground Task Force Training Command and Marine Corps Air Ground Combat Center Twenty-Nine Palms, Marine Corps Logistics Base Barstow, and the Chocolate Mountain Aerial Gunnery Range. "

LINE 2079 (Nussear)

Line 2079 - competition, you should probably address that there is active grazing of sheep and cattle in California, and whether that overlaps with desert tortoises (it does), and where and to what extent that occurs.
RESPONSE: This section has been reworked and a new section 4.4 Competition has been added to better align the document with statutory requirements. The text now reads "Grazing by livestock is a major part of the recent history of the desert. While grazing on BLM lands was historically permitted in tortoise range (Berry et al. 2014) after federal listing in 1990 it was halted in the CHUs. However, grazing is allowed on private inholdings within the CHUs, which are often unfenced. The documented impacts of livestock on tortoises include competition for food, trampling to death, and causing the collapse of burrows (see Berry and Murphy (2019)). Livestock also degrade habitat by creating or expanding trails which reduces annual plant cover and can (but does not always) promote wind erosion and compaction (Webb and Stielstra 1979, Lovich and Bainbridge 1999). "

LINE 2097 (Nussear)

Line 2097: Climate change - there are local and regional modeling efforts that demonstrate a predicted loss of habitat. The potential for this to impact tortoise populations lies far beyond the potential for the military to train more.
RESPONSE: True, have added this sentence "Modelling by Barrows (2011) predicts that under 2°C (3.6°F) of warming with 50 mm decrease in precipitation, habitat area will decrease by about 88% in the Sonoran Desert portion and by about 66% in the Mojave Desert portion."

LINE 2172 (Lovich)

You should cite Lovich, J.E., J.R. Ennen, S.V. Madrak, and B. Grover. 2011. Turtles, culverts and alternative energy development: an unreported but potentially significant mortality threat to

the desert tortoise (Gopherus agassizii). Chelonian Conservation and Biology 10:124-129. Culverts can be death traps for tortoises.
RESPONSE: This section has been deleted, but have added this sentence section 4.2 on road fencing "However, proper design is key, culverts can become death traps for tortoises if not properly designed and implemented (Lovich et al. 2011)."

LINE 2176 (Lovich)

Cite Hunter et al. above?
RESPONSE: This section has been deleted to bring the document in line with regulatory requirements

LINE 2230-2237 (DTRT)

General Comment. Given the declining status Mojave desert tortoises in California and continued habitat loss and degradation due to increased human activity and infrastructure, we agree that the Department's recommendation to change the status of Mojave desert tortoises from threatened to endangered is warranted in California.

LINE 2330 (Lovich)

There is no discussion of the negative effects of fencing on tortoises and other wildlife and there is a huge literature on that needs to be mentioned
RESPONSE: Have emphasized that the fencing has to be well designed "Erecting well designed tortoise exclusion fencing along major roadways and funneling them into appropriate crossings is a key recovery action. "

LINE 2374 (Lovich)

Has anyone ever quantified the effectiveness of these efforts? It may use funds that could be more meaningful in other recovery efforts
RESPONSE: There may not be specific quantification of the impact of outreach in this particular case, but there is a large body of research about effective ways to communicate with the public and how it can impact behavior change.

LINE 2397-2401 (DTRT)

Suggested edit: Population augmentation is currently accomplished through two types of projects, mitigation-driven translocation and release of head-started juveniles. Mitigation-driven translocation involves moving tortoises from a site where they would be harmed and into an appropriate recipient site. Head-starting is a strategy to reduce predation mortality on juvenile tortoises by hatching and rearing juveniles in captivity until they are large enough to avoid most predators. In the future, conservation-based translocations of adults may also be possible.
RESPONSE: Much of this section has been moved to section 5.2 Management Efforts. The first suggested text changes were made but the Department will leave any discussion of conservation-based translocation to a future Recovery Plan

LINE 2406-2411 (DTRT)

Suggested edit. There are a number of considerations that need to be taken into account when tortoises are translocated as laid out in the USFWS’s guidance on translocating tortoises from project sites Plan Development Guidelines (U.S. Fish and Wildlife Service 2020b).
Considerations Major concerns include the habitat suitability of potential translocation sites

and the disease prevalence of both tortoises being moved and at the recipient site possibility of disease transfer from transplants to resident tortoises.
RESPONSE: Much of this section has been moved to section 5.2 Management Efforts, but the suggested text edits were made.

LINE 2408 (DTRT)

Suggested edit: Considerations recipient site of potential translocation sites and the disease prevalence of both tortoises being moved into and at the recipient site.
RESPONSE: The section on translocation was heavily modified and moved. This sentence has been deleted.

LINE 2409 (DTRT)

In reference to resident tortoises - This is only part of it. The residents can also transfer pathogens to the translocated and increased contacts rates could change the background disease dynamics at the site.
RESPONSE: Have clarified with the suggested edits above.

LINE 2410 (DTRT)

In reference to "ITP holders monitor" - Please consider the monitoring guidance in USFWS 2020b vs requiring the monitoring of small numbers of translocated tortoises.
RESPONSE: Have re arranged the paragraphs and add the text "The Department" to clarify that these are monitoring actions via CDFW ITPs and not guidance issued by USFWS

LINE 2412 (DTRT)

In reference to "sufficient burrows of appropriate size...": Existing burrows should not be a requirement. The focus should be on shelter sites in general. They must be able to seek shade and protection immediately, but that doesn't need to be within a burrow. The abundance of other types of shelter is likely more important, as tortoises released into a new environment would need to find the existing burrow vs taking immediate shelter under shrubs, boulders, etc.
RESPONSE: This paragraph discusses actions related to ITPs issued by CDFW which can differ from the USFWS guidance on burrows vs shelter sites. Have rearranged the paragraphs and added some text to make that more clear "The Department requires that ITP holders monitor any tortoises translocated, and has teams carefully examine recipient sites for soil and vegetation communities that are suitable for all life stages of the tortoise, evaluate the presence and abundance of predators, and make sure there are sufficient burrows of appropriate size so that translocated tortoises can quickly find shelter"

LINE 2419 (DTRT)

Start this paragraph as... "There is evidence from more than a dozen sites that translocation, including large-scale translocation, can be an important conservation tool (Brand et al. 2016, Dickson et al. 2019, Drake et al. 2012, Esque et al. 2010, Farnsworth et al. 2015, Field et al. 2007, Harju et al. 2019, Hinderle et al. 2015, Nafus et al. 2017, Nussear et al. 2012). Finding recipient sites for for large numbers of tortoises is challenging. If donor sites are chosen because resident populations are depleted ..."
RESPONSE: Have included these references in this paragraph "Beyond the survival of tortoises involved in large scale translocations, there have been many studies looking at how body conditions and temperature (Brand et al. 2016), environmental feature and conditions (Nafus et al. 2017, Dickson et al. 2019), physiological stress (Drake et al. 2012), proximity of anthropogenic resources (Esque et al. 2010), movement and space use (Nussear et al. 2012,

Farnsworth et al. 2015, Hinderle et al. 2015), and water availability (Field et al. 2007) affect the outcomes of translocations. These results should be used to keep improving and refining decision making around translocations." This text is now in section 5.2 Management Efforts

LINE 2429 (Nussear)

you misrepresent the findings in Esque 2010 - animals that were in control groups also suffered similar mortality rates, as did animals throughout the range of the tortoise. Another oversight is that you don't factor in the number of animals lost from habitat if they are removed and not translocated. This is an important consideration - The better option is to find alternative siting for things like solar facilities etc that result in the loss and degradation of tortoise habitat, but the continued lack of the ability to say no to these large scale disturbances leaves you with little choice.

RESPONSE: The translocation section was extensively rewritten to incorporate this and other feedback

LINE 2402 onward (Lovich)

This section doesn't do much to change my perception of the lack of effectiveness of translocation based on the literature. You should cite: SULLIVAN, B. K., E. M. NOWAK, AND M. A. KWIATKOWSKI. 2015. Problems with mitigation translocation of herpetofauna. Conservation Biology. 29:12-18. AND GERMANO, J. M., K. J. FIELD, R. A. GRIFFITHS, S. CLULOW, J. FOSTER, G. HARDING, AND R. R. SWAISGOOD. 2015. Mitigation-driven translocations: are we moving wildlife in the right direction? Frontiers in Ecology and the Environment. 13:100-105. AND GERMANO, J. M., AND P. J. BISHOP. 2008. Suitability of amphibians and reptiles for translocation. Conservation Biology. 23:7-15.

RESPONSE: The translocation section was extensively rewritten to incorporate this and other feedback

LINE 2413-2414 (DTRT)

In reference to "most of the tortoises translocated under IPTs…." - Does the Department try to keep them within 4 miles or is this a result of moving from harm's way into adjacent habitat? Putting such restraints on the distance tortoises can be moved will limit the ability to get tortoises into good quality, high priority augmentation sites that are consistent with greater conservation objectives.

RESPONSE: Have added the text "(although distance is only one of many considerations when choosing a recipient site)" This sentence is now in section 5.2 Management Efforts

LINE 2456- (DTRT)

Edit translation to translocation

RESPONSE: Done

LINE 2489 (DTRT)

In reference to "high death rates". Unlikely. Studies showed former captives did very well when in good health upon release. More likely factors were the lack of stringent translocation suitability evaluations and rigorous health assessments as are now requirements.

RESPONSE: The translocation section was extensively rewritten to incorporate this and other feedback

LINE 2486-2499 (DTRT)

Suggest editing this paragraph to the following. "The failure of these large and long-term translocations to either keep translocated tortoises alive or the resident population stable

suggests translocation may often not be an effective management strategy without figuring out and addressing the drivers of declines within the subject populations. Augmentation of populations through translocations may buy time and keep tortoises present on the landscape while the threats causing declines are addressed. The majority of the tortoises translocated into LSTS came from captivity and were likely not well adapted to surviving in the wild, which is likely a factor in their high death rates. Most official translocations in California involve moving wild tortoises from a project site to a nearby area, and so may not face the same difficulties in survival that releasing captive tortoises appear to create. However, the evidence from Ord-Rodman suggests that even an addition of large numbers of new adults to a nearby area can slow but does not prevent population declines. The low survival rates of translocated adults and the lack of genetic integration of males suggest that large scale translocation may not provide much recorded benefit to recipient populations and does not necessarily remove the translocated tortoises from harm's way. Thus, identification of the reasons for the depleted population in the recipient site is important to ensure translocation is conducted in a manner appropriate to facilitate survival, and to prevent its failure as a minimization measure."
RESPONSE: The translocation section has been modified extensively, but this particular text is now "However, given the continuing decline of tortoise populations in general, translocations may often not be an effective conservation strategy without addressing the drivers of declines within the subject populations. At best, augmentation of populations through translocations can buy time and keep tortoises present on the landscape while the threats causing declines are addressed. "

LINE 2487-2488 (Lovich)

If it isn't an effective strategy, why pursue it?
RESPONSE: The translocation section was extensively rewritten to incorporate this and other feedback

LINE 2520 (Lovich)

The Frazer citation above should be incorporated in this section
RESPONSE: Have added text " Daly et al. (2019) points out that by itself, head-starting is unlikely to lead to population recovery if larger issues that depress survival such as raven density and habitat degradation are not addressed. Another consideration is that unless factors that depress adult survival are also reduced, focusing on putting more juveniles in a "degraded environment in which their parents have already demonstrated that they cannot flourish" is not an effective long-term solution (Frazer 1992). "

LINE 2541 (DTRT)

Delete "yearly"
RESPONSE: Done

LINE 2545 (Lovich)

How would making sex ratio data public help stakeholders given the complexities of interpreting sex ratios listed above in this spreadsheet?
RESPONSE: Have deleted this paragraph

LINE 2545 (Nussear)

Line 2545 - Regarding sex ratio data - these are easily obtained. Just ask the FWS for it, I have done so repeatedly and they have always been happy to provide it. This seems like a straw man argument that is a result of poor communication.

RESPONSE: Have deleted this paragraph

LINE 2568 (Lovich)

Adaptive management is thrown around by people that don't fully understand what it means. In its simplest form it is using policy as a testable hypothesis, monitoring its effectiveness, adjusting the policy to increase effectiveness and repeating the cycle. Is that what you mean? It requires a substantial investment of time and people as shown in the Glen Canyon Dam Adaptive Management Program https://www.usbr.gov/uc/progact/amp/index.html.

RESPONSE: Have altered to "Implement a formal Recovery Plan"

LINE 2615 (Lovich)

Why only 5 years for a species with a cohort generation time of about 25 years that lives to be 50 or so? Isn't recruitment an important component of success?

RESPONSE: Ideally the monitoring period would be longer for such a long lived animal, but until the Department effectively organizes and analyzes the data they have, asking permit holders to do more monitoring seems like an unnecessary burden.

LINE See section 2.2. (DTRT)

Comment. Too much of 2.2 Species Description and Life History is extrapolated from Berry and Murphy 2019. Please review broader literature for appropriate citations and information.

RESPONSE: Some primary references have been added to this section thanks to the suggestions of multiple reviewers, but as stated in section 1.2, the status review is not intended to be an exhaustive review of all published scientific literature on Mojave Desert Tortoise; rather it is intended to summarize key points relevant to the status of the species and address regulatory report requirements.

State of California

Natural Resources Agency

Department of Fish and Wildlife

DRAFT REPORT TO THE FISH AND GAME COMMISSION

STATUS REVIEW OF MOJAVE DESERT TORTOISE

(*Gopherus agassizii*)

[DATE]

Mojave Desert Tortoise, BLM photo by Dana Wilson

Charlton H. Bonham, Director

Department of Fish and Wildlife

Suggested citation:

California Department of Fish and Wildlife (CDFW). [DATE]. Status Review of Mojave Desert Tortoise (*Gopherus agassizii*). Report to the California Fish and Game Commission. California Department of Fish and Wildlife, 715 P Street, Sacramento, CA 95814. 188 pp., with appendices.

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LIST OF ABBREVIATIONS, ACRONYMS, AND TERMS

CEQA – California Environmental Quality Act
NEPA – National Environmental Policy Act
CESA – California Endangered Species Act
CNDDB – California Natural Diversity Database
Commission – California Fish and Game Commission
Department – California Department of Fish and Wildlife
CHU – Critical Habitat Unit
RU – Recovery Unit
TCA –Tortoise Conservation Area

DoD – Department of Defense
ESA – Endangered Species Act
NPS – National Park Service
USFWS – United States Fish and Wildlife Service
BLM – Bureau of Land Management
ITP – Incidental Take Permit
NEPA – The National Environmental Policy Act
et al. – “and others”

EXECUTIVE SUMMARY

This Status Review of Mojave Desert Tortoise (*Gopherus agassizii*; also known as Agassiz's Desert Tortoise) has been prepared by the California Department of Fish and Wildlife (Department) for the California Fish and Game Commission (Commission) pursuant to the requirements of the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.).

The Mojave Desert Tortoise was designated a threatened species under CESA in 1989. On March 23, 2020, the Commission received a petition from the Defenders of Wildlife, the Desert Tortoise Council, and the Desert Tortoise Preserve Committee to change the status of the Mojave Desert Tortoise from threatened to endangered. On April 13, 2020, the Commission referred the Petition to the Department for evaluation pursuant to Fish and Game Code section 2073 and published a formal notice of receipt of the petition (Cal. Reg. Notice Register 2020, No. 18-Z, p. 693). At its meeting on August 20, 2020, the Commission received the Department's petition evaluation report. The Department based its evaluation on available information and recommended to the Commission that the petition be accepted. At its October 14, 2020 meeting, the Commission accepted the petition to change the status of the Mojave Desert Tortoise from threatened to endangered (Cal. Reg. Notice Register 2020, No. 44-Z, p. 1445). As a result, the Department was directed to complete this Status Review, which is a detailed evaluation of the current status of the tortoise and includes its recommendation regarding whether the tortoise's status should be changed from threatened to endangered.

This Status Review is based on the best scientific information currently available to the Department regarding each of the components listed under section 2072.3 of the Fish and Game Code, and section 670.1 of Title 14 of the California Code of Regulations. In addition, this Status Review includes a preliminary identification of habitat that may be essential to the continued existence of the species, and the Department's recommendations for management activities and other recommendations for recovery of the species. (Fish & G. Code, § 2074.6.). This Status Review has been independently reviewed by scientific peers pursuant to Fish and Game Code section 2074.6.

Species Description, Biology, and Ecology

In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the complex formerly known as "Desert Tortoise" in fact consists of two separate species—Mojave Desert Tortoise and Sonoran Desert Tortoise. Mojave Desert Tortoise, also known as Agassiz's Desert Tortoise, retains the binomial *G. agassizii*, and ranges across the deserts of southeastern California, southern Nevada, and small areas of Arizona and Utah north of the Colorado River.

The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile. Tortoise body temperature is closely linked to the temperature in the environment, and Mojave Desert Tortoises live in places that can fluctuate up to 40°C (104°F) seasonally. They primarily regulate their temperature by using underground burrows where the air is cooler and moister than the outside air in summer and warmer in winter and can spend more than 90% of their lives underground.

Females become sexually mature at 12–20 years old and lay a maximum of 30 eggs per year and nest in a den or burrow or under trees. Nest predation is common, with 12–55% of nests generally destroyed by predators. Reported incubation time in the wild varies from 67–104 days and incubation temperatures determine the sex of the hatchlings, with hotter temperatures producing female-skewed clutches.

Tortoises selectively feed on forbs, grasses, and herbaceous perennial plants and will consume cacti during droughts. They favor native plants and plant parts that are high in water and low in potassium. Much of the range of the desert tortoise is highly invaded by nonnative plants like red brome, cheat grass, red stem filaree, and African mustard, but tortoises avoid eating exotic grasses when possible as they are low in nitrogen and require relatively large amounts of water to process.

Desert tortoise habitat typically consists of alluvial fans and plains and colluvial/bedrock slopes that facilitate the digging of burrows. Tortoises need sufficient food plants as well as larger shrubs and bushes for shade and protection of burrows. They are associated with saltbush, creosote bush, white bur-sage, and cheesebush. At higher elevations, tortoises are more likely to be found near Joshua tree, Mojave yucca, and blackbrush. Tortoises occur in very low densities or are absent where shrub cover is sparse, precipitation is low, and annual food plants are available only intermittently (e.g., the lower elevations in Death Valley). They also occur at low densities in moderately to severely disturbed areas, regardless of desert or region.

Ravens are a major predator of juvenile tortoises while coyotes target both juvenile and adult tortoises. Raven populations have expanded dramatically in the desert due to resource subsidies from humans.

Status and Trends

In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Sonoran and Great Basin deserts from the southern end of the Owens Valley south of the town of Lone Pine in Inyo County to the Mexican border near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Sierra Nevada, Transverse, and Peninsular mountains in the west.

The most robust estimates of densities come from annual systematic surveys done in the Tortoise Conservation Areas (TCAs). These surveys began in 2004 and cover large areas of the best habitat for tortoises, including federally designated critical habitat. Most of the surveys provide consistent evidence that populations are declining at rapid rates. In 2004–2014, densities in the TCAs declined between 3.3% and 10.8% per year. These rates are unsustainable for most species, but especially for a long-lived and slow-reproducing species such as the desert tortoise. Sixty percent of the TCAs currently have densities below that which is necessary for population viability (3.9 adult tortoises/km^2), while another 30% are at the threshold. Only one

TCA currently has a tortoise density above what is needed for population viability. While we do not have estimates of density in all the TCAs prior to the desert tortoise being listed as threatened in 1989, densities in select TCAs varied between 35 and 90 adults/km^2 in the early 1980s, and between 35 and 70 adults/km^2 when they were listed. It is estimated that densities of adults in certain TCAs fell between 89% and 97% from the early 1980s to 2020–2021. Since the late 1970s, the number of juveniles detected on surveys has also fallen sharply, to the point that in recent surveys in the western Mojave Desert almost no juveniles were found. The population data available indicate that there were sharp drops in density before listing as threatened, and those losses have continued to the point where much of the best tortoise habitat no longer supports viable tortoise densities.

The slow maturation and low reproductive rates of tortoises means that if past and current management is successful at addressing threats and stemming the decline of tortoise populations, it would still take at least 25 years of positive population growth to reach the USFWS Recovery Criteria (U.S. Fish and Wildlife Service 2022*a*). For example, the USFWS 1994 Recovery Plan estimates that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Annual survival rates for both adults and juveniles are much lower than 98% in most areas, making population stability, let alone growth, unlikely. Collectively, the available data show that in the critical habitat units (which are assumed to be the best tortoise habitat), tortoise densities are low to very low, and despite 30 years of state and federal protection, tortoise populations continue to decline and do not show consistent signs of recovery.

Threats

The dramatic declines in Mojave Desert Tortoise populations are likely due to the extensive number and interconnected nature of the threats they face. The important threats fall in two categories, those that directly kill adults and juveniles, and those that cause longer-term changes to habitat availability and quality.

In long-lived species that are slow to reproduce, decreased survival has long lasting impacts on the population and can alter demographic patterns for decades. Increased numbers of predators including ravens and coyotes reduce the survival of juvenile and adult tortoises, respectively. Development within the tortoise range often creates roads that can lead to road-killed tortoises, and extensive networks of trails for off highway vehicles on public land increase the chance that tortoises will be run over in areas without paved roads. Well-designed fences and culverts can help prevent tortoises and other wildlife being killed by vehicles along major roads, but little fencing has been built since 2011.

Habitat modification and destruction reduces the amount of habitat that can support tortoises in the long-term. Although a large proportion of desert tortoise range is under federal control, renewable energy, housing, illegal cannabis, and other types of development reduce the amount of habitat available. The Department of Defense is a large landowner in desert tortoise range and frequently expands the areas that it uses for training, requiring translocation of hundreds of tortoises. Large scale tortoise translocations do not tend to have high survival rates.

Additional factors have direct and indirect impacts on tortoises and their habitat. Climate change, which is likely to cause hotter and periodically drier conditions in the desert tortoise range, will increase their physiological stress and change activity patterns. The nutritious native vegetation tortoises feed on are being outcompeted by nutritionally poor invasive grasses, which can lower tortoise survival rates. Fires fueled by invasive grasses decrease the amount of native vegetation available for tortoises to feed on and remove other important vegetation components of tortoise habitat.

Some threats appear to be declining since the species was listed. Upper respiratory tract diseases were a major concern when tortoises were listed as threatened. Encouragingly, the prevalence of diseased tortoises is lower than in previous decades, and it does not appear to be an acute threat to wild populations. The prevalence of gunshot deaths has also decreased in the past several decades, but it is unclear if this is due to change in human behavior or simply reflects a lower tortoise encounter rate due to declining tortoise density.

Historical and current conservation efforts have not proven sufficient to halt the population declines of desert tortoise. However, there is still a large amount of available habitat and even at low densities, in 2014 there were estimated to be more than 61,000 adult tortoises within the TCAs. This is a decrease from an estimated 310,000 adults in 2004, and as densities have continued to fall since 2014, current abundance is likely lower than 60,000 adult tortoises. Given that there are multiple interacting threats that are reducing the amount and quality of viable habitat and lowering survival rates of adults and juveniles, the available information suggests that tortoises populations will continue to decline for the foreseeable future. However, several of the major threats like raven predation on juveniles and the lack of tortoise exclusion fencing on highways are issues that can be addressed with the appropriate resources and policy changes. Implementing these actions where appropriate to improve survival in the short term is critical to give desert tortoises populations the resilience to weather longer term habitat and climactic effects.

Several recommended management actions are described in this report. Improved coordination and communication between the Department and other state and federal agencies would help the implementation of these actions. We also point to several needs for increasing capacity at the Department to better track the impact of threats and conservation actions on tortoise populations.

Recommendation—The Department provides this status review report, including its recommendation, to the Commission in an advisory capacity based on the best scientific information available. In consideration of the scientific information contained herein, the Department has determined that listing the Mojave Desert Tortoise as endangered under CESA is warranted at this time.

1. REGULATORY SETTING

1.1 Petition Evaluation Process

On March 23, 2020, the Commission received a Petition from Defenders of Wildlife, The Desert Tortoise Council, and The Desert Tortoise Preserve Committee to change the status of Mojave Desert Tortoise from threatened to endangered. On April 13, 2020, the Commission referred the Petition to the Department for evaluation pursuant to Fish and Game Code section 2073 and published a formal notice of receipt of the petition (Cal. Reg. Notice Register 2020, No. 18-Z, p. 693). At its meeting on April 16, 2020, the Commission officially received the Petition.

A petition to list, delist, or change the status of a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant" (Fish & G. Code, § 2072.3).

The Department's charge and focus in its advisory capacity to the Commission is scientific, and it evaluates petitions based on the best scientific information available regarding potential listing factors including those listed above. At its meeting on August 20, 2020, the Commission received the Department's petition evaluation report, which is intended to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information (Fish & G. Code, §§ 2073.5 & 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d) & I). Focusing on the information available to the Department relating to each of the required information categories listed above, the Department recommended to the Commission that the petition be accepted.

At its public meeting on October 14, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. Upon publication of the Commission's notice of its findings, the Mojave Desert Tortoise was designated a candidate species on October 19, 2020 (Cal. Reg. Notice Register 2020, No. 44-Z, p. 1445).

1.2 Status Review Overview

The Commission's decision to designate the Mojave Desert Tortoise as a candidate species triggered the Department's process for conducting a 12-month status review to inform the Commission's decision on whether the change in status is warranted (Fish & G. Code, § 2074.6 and Cal. Code of Regs., title 14, § 670.1). At its meeting on October 14, 2021, the Commission granted the Department a six-month extension to complete the status review and facilitate external peer review.

This status review report is not intended to be an exhaustive review of all published scientific literature relevant to the Mojave Desert Tortoise. Rather, it is intended to summarize the best scientific information available relevant to the status of the species, provide that information to the Commission, and to serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted. This final report is informed by independent peer review of an earlier draft by scientists with expertise relevant to the Mojave Desert Tortoise. Specifically, this status review represents the Department's evaluation of whether the status of the tortoise should be changed from threatened to endangered. Species that are "threatened" are not presently threatened with extinction but are likely to become endangered in the foreseeable future without special protection and management. An "endangered" species is one that is in serious danger of becoming extinct throughout all or a significant portion of its range due to one or more of the following factors: present or threatened modification or destruction of its habitat; overexploitation; predation; competition; disease; or other natural occurrences or human-related activities. (Fish & G. Code, § 2062; § 2067; Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A).)). The status review report also identifies habitat that may be essential to the continued existence of the species and provides management recommendations for recovery of the species (Fish & G. Code, § 2074.6).

Receipt of this report is to be placed on the agenda for the next available meeting of the Commission after delivery. At that time, the report will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition.

2. BIOLOGY

2.1 Taxonomy

Desert tortoises are members of the order Testudines, family Testudinidae, genus *Gopherus*. When the Commission listed Desert Tortoise as threatened in 1989, *Gopherus agassizii* was understood to range from southeastern California, across southern Nevada, through western Arizona, and south into Sonora and Sinaloa, Mexico. In 2011, studies of tortoise genetics, morphometrics, and ecology led experts to conclude that the complex formerly known as "Desert Tortoise" in fact consists of two separate species, Mojave Desert Tortoise and Sonoran Desert Tortoise (Murphy et al. 2011, Iverson et al. 2017). Mojave Desert Tortoise, also known as Agassiz's Desert Tortoise or Mohave Desert Tortoise, retains the binomial *G. agassizii*, and ranges across the deserts of southeastern California, southern Nevada, and small areas of Arizona and Utah north of the Colorado River. Desert tortoises east of the Colorado River in Arizona and northern Mexico are now classified as Sonoran Desert Tortoise, also known as Morafka's Desert Tortoise (*Gopherus morafkai*). Only the Mojave Desert Tortoise occurs in California. This status review uses the common name Mojave Desert Tortoise when referring to *G. agassizii* as the species is currently understood. Any reference to Agassiz's or Mohave Desert Tortoise in this document should be considered synonymous with Mojave Desert Tortoise.

2.2 Species Description and Life History

Much of the information in this section is summarized from a Berry and Murphy (2019) monograph on *Gopherus agassizii*. The Mojave Desert Tortoise is a long-lived, desert-dwelling reptile. The upper shell or carapace of adults ranges in size from 178mm to over 370mm in length. Shell color varies from light yellow to dark charcoal in hatchling tortoises and from light to dark brown in adults (Berry and Murphy 2019). The largest measured wild individual was a female in 1986 whose carapace length was 374 mm. The largest male measured in the wild was 330 mm carapace length (Berry and Murphy 2019).

Figure 1. Mojave Desert Tortoise. Pictures by Dana Wilson BLM (left) and Roy Averill-Murray USFWS (right).

Desert tortoises make extensive use of underground burrows to regulate body temperature and as protection from predators. Temperatures in burrows can be up to 20°C (36°F) cooler than summer air temperatures, especially very deep in the burrows (Berry and Murphy 2019). Home range size depends on sex, age, and environmental conditions. Over a 2-year study in the western Mojave Desert, male home range size was 39–47 ha and female home range size was 14–17 ha (Harless et al. 2009). Home ranges of juveniles tend to be smaller, and home ranges are larger during wet years than in dry years. Home ranges of individuals can overlap (O'Connor et al. 1994) and in the western Mojave Desert Harless et al. (2009) found that males overlap more with other tortoises than do females. They also found that the overlap in area in an individual's home range from one year to the next was ~35% and did not vary significantly by sex. Individuals tend to have fidelity to home ranges and activity centers, even after fire (Drake et al. 2015, Lovich et al. 2018).

Tortoises are long-lived and females are thought to become sexually mature at 12–20 years old, depending on locality (Woodbury and Hardy 1948, Turner et al. 1986, Curtin et al. 2009). Generation time is estimated to be around 25 years (U.S. Fish and Wildlife Service 1994). Mating occurs in late summer and fall, and females can mate with multiple males (Davy et al. 2011). Female tortoises can store sperm/delay implantation so that nesting and egg laying occurs in April–July depending on the region (Berry and Murphy 2019). Females lay 0–3 clutches in the spring and the number of eggs laid per clutch ranges from 1–10. Females nest in a den or burrow under large shrubs. There are anecdotal reports of females nest guarding against humans and Gila Monsters, but there is no parental care once eggs have hatched (Berry and Murphy 2019). Reported incubation time in the wild varies from 67–104 days (McLuckie and Fridell 2002) and incubation temperatures determine the sex of the hatchlings. Sex ratios were 1:1 at an incubation temperature of 31.3°C (88.3°F), while eggs incubated at under 30°C (86°F) produced only male hatchlings and only females hatched from eggs incubated over 32.5° (90.5°F) (Rostal et al. 2002). Nest predation is common, with 12–55% of nests generally destroyed by predators (Berry and Murphy 2019). When nests are not predated, hatchling success is about 80% (Bjurlin and Bissonette 2004). Newly hatched tortoises are about 4–5 cm in length (Bjurlin and Bissonette 2004) and their shells do not fully ossify until they are 5–7 years old. At that age they become less vulnerable to predators. For more information about predation, see section 4.4.

Tortoises selectively feed on annual and perennial forbs, grasses, and will consume cacti during droughts (Berry and Murphy 2019). Tortoises favor native plants and plant parts that are high in water and low in potassium (Oftedal et al. 2002). Potassium is potentially toxic and requires a large amount of water and nitrogen to excrete. Much of the range of the desert tortoise is highly invaded by nonnative plants like red brome, cheat grass, red stem filaree, and African mustard, but tortoises avoid eating exotic grasses when possible as they are low in nitrogen and require relatively large amounts of water to process. Experimental studies found that grass diets that included no forbs were detrimental to tortoises, leading to weight loss, poor body condition, or even death (Hazard et al. 2009, Drake et al. 2016). This was the case even when the diet included native grasses (Drake et al. 2016). According to Berry & Murphy (2019), tortoises "favored species of forbs or herbaceous perennials from several plant families: Asteraceae, Boraginaceae, Cactaceae, Fabaceae, Malvaceae, Nyctaginaceae, Onagraceae, and Plantaginaceae (Burge and Bradley 1976; Avery and Neibergs 1997; Jennings and Berry 2015)."

Tortoises are ectotherms whose body temperature is closely linked to the temperature in the environment around them. Mojave Desert Tortoises live in places that can fluctuate up to 40°C (104°F) seasonally and they primarily regulate their temperature by using underground burrows where the air is cooler and moister than the outside air in summer and warmer in winter. Depending on the type, length, and depth of burrow, average temperatures inside vary from 33.7–36.6°C (92.6–97.8°F) in the summer and 8.9–13.5°C (48–56.3°F) in the winter (Mack et al. 2015). Berry and Murphy (2019) report that desert tortoises spend >90% of their lives underground. Tortoises are active when their body temperatures are between 19.0°C and 37.8°C (66.2–100°F), they retreat to shade when body temperatures are 37–38°C (98.6–100.4°F), and body temperatures of 43°C (109.4°F) are deadly (Brattstrom 1965). However, tortoises can be active above ground at any time of year, especially if it has rained and they can drink, or if they need to move between shelters. They generally are underground or in rock shelters in late fall and winter, and in late spring through the hot summer. In early spring and fall they are more active above ground, feeding, travelling, and interacting with other tortoises (Berry and Murphy 2019). On a given day, air temperature determines when the tortoises are active above ground. In the cooler late winter and spring, they are active late morning to mid-afternoon. In the hotter summer and fall, if activity occurs, it tends to be in the cool of the morning and late evening. Smaller juvenile tortoises can be active at cooler temperatures than larger tortoises so tend to be active more days per year (Berry and Murphy 2019). Available water and forage have a strong impact on activity and movement. Tortoises had lower metabolic rates, moved less, used fewer burrows, and had smaller home ranges during drought years.

Tortoises also have additional behavioral and physiological strategies to deal with extremes of temperature and resource availability. During droughts, tortoises can lose up to 40% of their body mass. They can resorb water from their bladders and store sodium, chloride, and urea in their blood and in the bladder. When it rains, they drink, void their bladders, and rapidly increase their body weight (Peterson 1996, Berry and Murphy 2019).

2.3 Habitat Associations

Figure 2. Mojave Desert Tortoise in the Mojave Desert. Photo by Rachel London via USFWS

Mojave Desert Tortoises in California can be found in part of the southern Great Basin, Mojave, and western Sonoran deserts in southeastern California (Berry and Murphy 2019). Due to their dependence on burrows, they require soils, topography, geological features, and vegetation that facilitate the creation of burrows or dens (Andersen et al. 2000). Therefore, desert tortoise habitat typically consists of alluvial fans and plains and colluvial/bedrock slopes (Nussear et al. 2012). Tortoises also need appropriate vegetation communities for forage and shelter. Most burrows are found beneath shrubs, though they can also be dug into the sides of ephemeral streams.

The vegetation types that tortoises use varies across their range and by altitude. As Berry and Murphy (2019) put it:

> “Within the Mojave Desert ecosystem, tortoises occur in several vegetation associations. At lower elevations or adjacent to dry lake beds, saltbush associations (*Atriplex* spp.) and other members of the Chenopodiaceae provide habitat. The most common associations contain creosote bush (*Larrea tridentata*), usually with white bur-sage (*Ambrosia dumosa*) or cheesebush (*A. salsola*) and several other species of shrubs, cacti, and perennial grasses. With increasing elevation, multiple species of woody shrubs and tree yuccas (Joshua tree, *Yucca brevifolia,* and Mojave yucca, *Y. schidigera*) become more common, with blackbrush (*Coleogyne ramosissima*) associations present in higher elevations.
>
> The western Sonoran Desert is a warmer, hotter desert with a higher proportion of precipitation occurring in summer. This desert is also characterized by creosote bushes, but a major difference is the presence of microphyll woodlands of blue palo verde (*Parkinsonia florida*), smoke tree (*Psorothamnus spinosus*), and ironwood (*Olneya tesota*) in ephemeral stream channels separated by desert pavements or open desert with ocotillo (*Fouqueria splendens*) mixed with creosote bush, other shrubs, and cacti (Berry 1984).
>
> Tortoises occur in very low densities or are absent where shrub cover is sparse, precipitation is low and timing erratic, and annual food plants are available only intermittently (e.g., the lower elevations in Death Valley). They are also in low densities in moderately to severely disturbed areas, regardless of desert or region (e.g., Bury and Luckenbach 2002; Keith et al. 2008; Berry et al. 2013).”

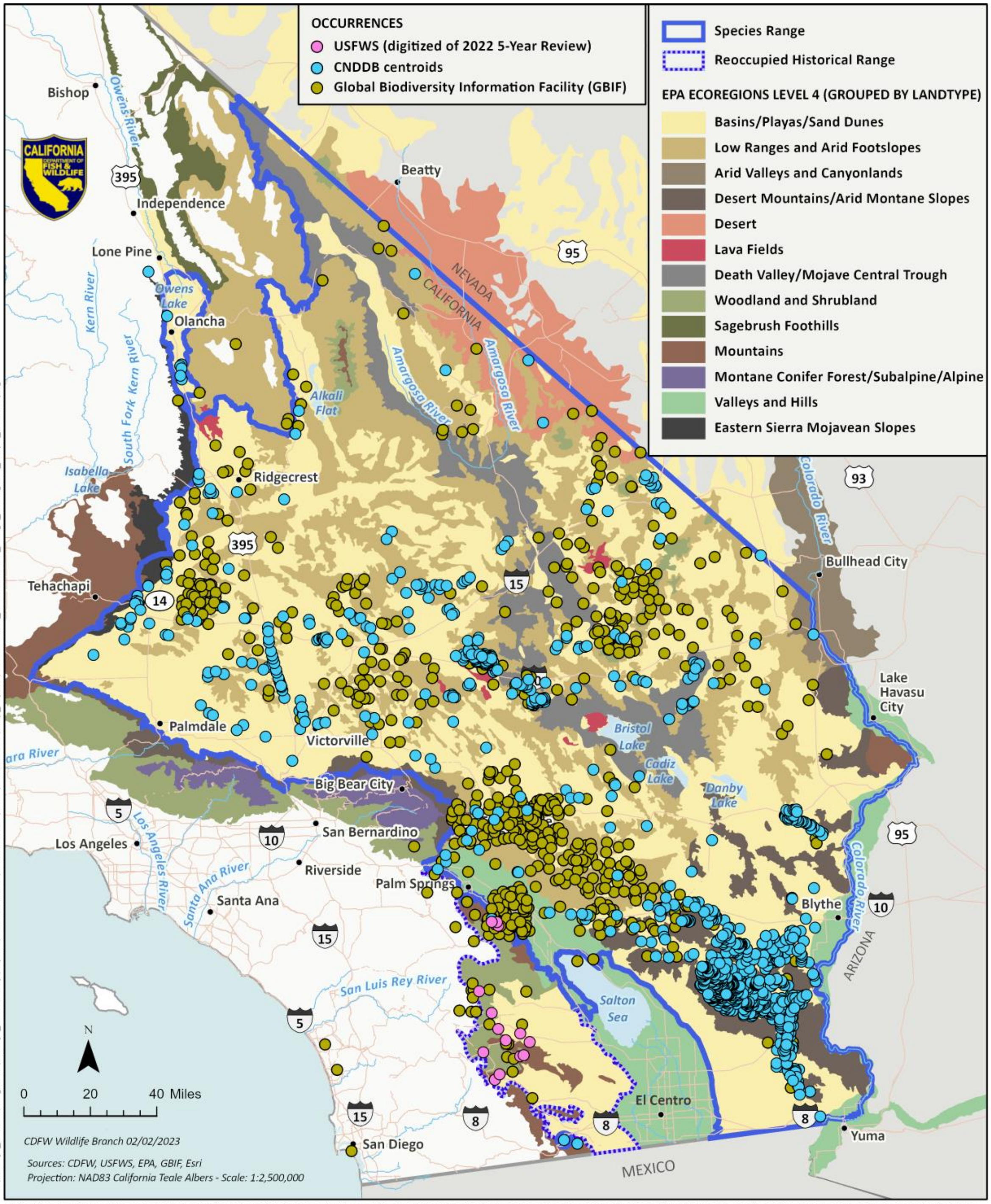
2.4 Range and Distribution

Range is the general geographical area in which a species occurs. For purposes of CESA and this status review, we are describing and evaluating the tortoise’s range in California. Distribution describes the sites where individuals and populations of the species occur, and the spatial arrangement of individuals within the species’ range.

In California, the range of the Mojave Desert Tortoise includes the Mojave Desert and portions of the Sonoran and Great Basin Deserts from the southern end of the Owens Valley south of the town of Lone Pine in Inyo County to the Mexican border near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Sierra Nevada, Transverse, and Peninsular mountains in the west (Berry and Murphy 2019).

The range of tortoises has also been dynamic due to the release of captive tortoises and potential immigration into areas from which they were previously extirpated. For example, tortoises were largely extirpated from the area of Anza Borrego Desert State Park by the 1940s (Manning 2018). In the early 1970s taking tortoises from the wild became illegal, and people began turning in their captive tortoises to the Department. Between 1970 and 1972 the Department released about 65 previously captive tortoises into the park. There were occasional sightings in the decades since, with more sightings since 2010. The tortoises there today could be descendants of released tortoises, however natural immigration to the park is possible as there is a tenuous corridor of suitable habitat that connects the park to habitat occupied by tortoises to the north. In 2016, park staff began surveying for tortoise and formally collecting incidental observation data, and subsequent genetic analysis of tortoise blood and scat suggested “evidence of a naturally reproducing Mojave Desert Tortoise population in Anza Borrego Desert State Park” (Manning 2018). These tortoises extend “the distribution of reproducing Mojave Desert Tortoises greater than 60 km south of Palm Springs and beyond the southern edge of the Colorado Desert Recovery Unit boundary depicted in the recovery plan (Service 2011a)” (U.S. Fish and Wildlife Service 2022*a*). We show this reoccupation of historical range in Figure 3, delineated using suitable ecoregion boundaries.

The distribution of desert tortoises within the California range is uneven, and portions of the range no longer provide suitable tortoise habitat due to agriculture, development, and military activity. Data on tortoise occurrences from the California Natural Diversity Database (CNDDB) and the Global Biodiversity Information Facility (GBIF) were used to plot distribution of observations in California (Figure 3). These datasets do not represent exhaustive and comprehensive inventories of desert tortoises in California and are largely presence-only datasets. While caution should be used in using these types of data, there appear to be fewer occurrences in the northern part of the range and in the Death Valley Mojave Central Trough (see grey area on Figure 3).



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

Figure 3. Map of the California range of the Mojave Desert Tortoise, occurrence locations, and Ecoregions. CNDDB data are sightings from 1935 to 2011. The GBIF occurrences are sightings that are confirmed by a picture from 1978 to 2022. The pink dots are the locations of tortoises in the reoccupied historical range as reported in U.S. Fish and Wildlife Service (2022a). Range boundary is from the California Wildlife Habitat Relationship System (California Department of Fish and Wildlife 2014).

2.5 Population Genetic Structure

For imperiled species, understanding the populations' genetic structuring is important for effective management. Head-starting and translocation are two actions used in desert tortoise conservation (see section 9.1 for more details), and the efficacy of both depends on knowledge of genetic boundaries to avoid the potentially negative impacts of artificially mixing individuals from different genetic populations (Sánchez-Ramírez et al. 2018).

The 1994 U.S. Fish and Wildlife Service (USFWS) Recovery Plan outlined recovery units consisting of "evolutionarily distinct" populations, with three recovery units occurring in California: Western Mojave, Eastern Mojave, and Colorado Desert Recovery Units (see section 3.1 for details). However, a recent study found that the best supported number of genetic clusters in California was five, with the Western Mojave Recovery Unit which encompasses much of the northern and western part of tortoise range in California, consisting of three genetic groups (Sánchez-Ramírez et al. 2018) (Figure 4). This differs from the earlier work of Hagerty and Tracy (2010) which found the Western Mojave Recovery Unit to be one genetic group. This means that populations within 200–300 km of each other which were previously considered genetically correlated and a single genetic unit for management purposes may actually be several genetically identifiable populations. Outbreeding depression has not been studied in *G. agassizii*, and the impacts of moving tortoises between genetic units are unknown, but Sánchez-Ramírez et al. (2018) advise caution when moving tortoises long distances for translocation or population augmentation. For more detail about translocations see section 9.1.

3. STATUS AND POPULATION TRENDS IN CALIFORNIA

3.1 Administrative Status

The Mojave Desert Tortoise has been protected as a threatened species under the California Endangered Species Act (CESA) (Title 14, §670.5) since 1989 and under the federal Endangered Species Act (ESA) since 1990. Unauthorized "take" of threatened and endangered species is prohibited. "Take" is defined under CESA as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (*Id.*, § 86).

The 1994 USFWS Desert Tortoise Recovery Plan designated six federal recovery units that cover desert tortoise range in California, Arizona, Nevada, and Utah. The recovery units were based on genetics, morphology, behavior, ecology, and habitat use, and each was considered an "evolutionarily distinct" population. These recovery units were revised in the 2011 Recovery Plan with better information and mapping tools. Of the six, all the Western Mojave, the majority of the Colorado Desert, and the western portion of the Eastern Mojave (formerly the Northeastern Mojave) Recovery Units are within California (Figure 4).

The Western Mojave Recovery Unit is differentiated from the other recovery units by rainfall and vegetation (U.S. Fish and Wildlife Service 2011). Summers are warm and winters are cold, with most rainfall occurring in fall and winter. Tortoises in the Western Mojave Recovery Unit dig deep burrows (usually located under shrubs on bajadas) for winter hibernation and summer

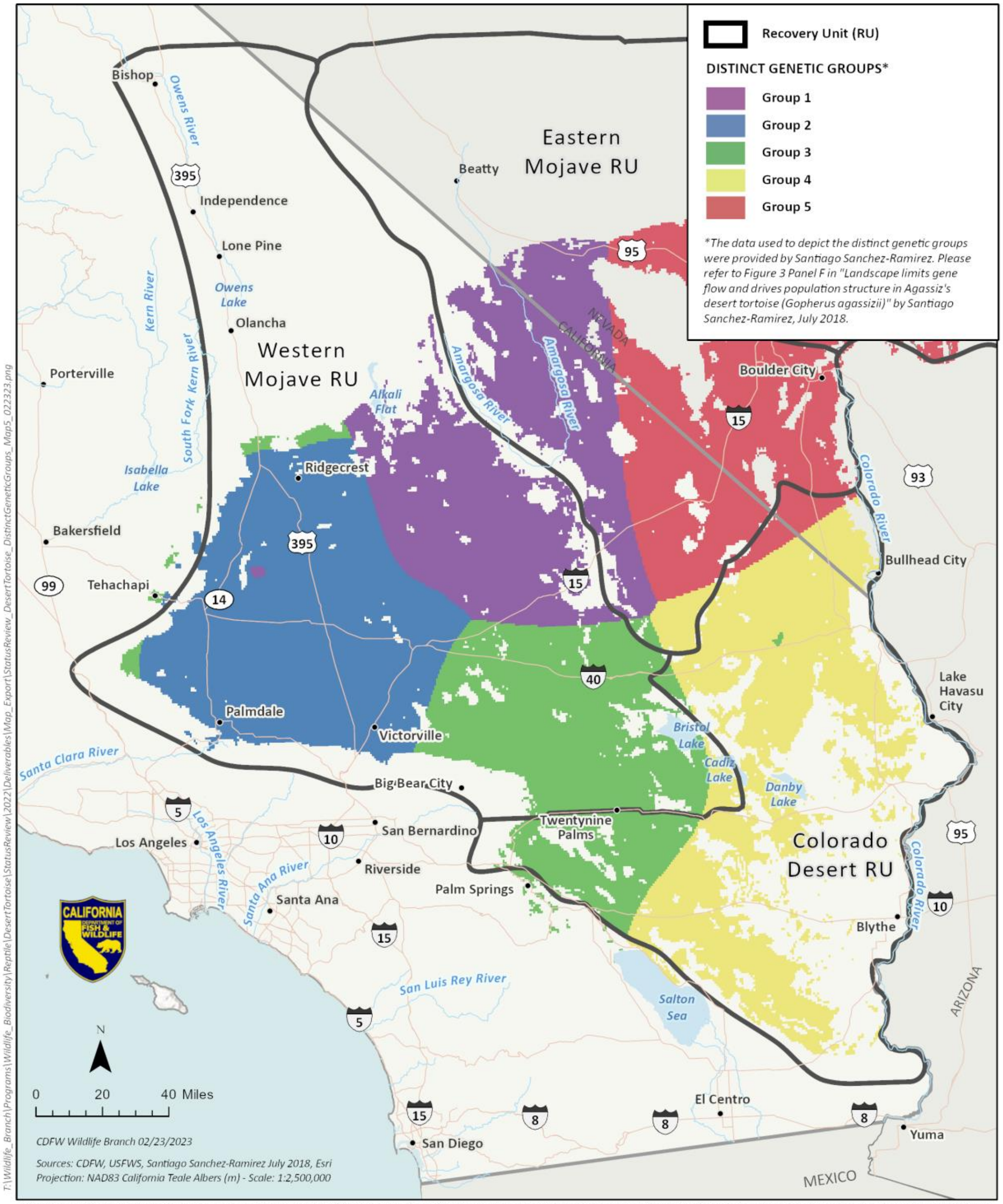


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Figure 4. Map of genetic groups of the Mojave Desert Tortoise. Superimposition of the boundaries of the Recovery Units over Figure 3 panel F in Sánchez-Ramírez et al. (2018). The base map is the "spatial interpolation of ancestry coefficients of Agassiz's desert tortoises using Krig modeling…combines areas of maximal ancestry proportion for each of the five genetic groups"

estivation. Above-ground activity occurs primarily in spring when winter annuals provide food (U.S. Fish and Wildlife Service 2011).

The Colorado Desert Recovery Unit receives about 1/3 of its annual rainfall in summer and supports distinct summer and winter annual plants that tortoises feed on. The climate is somewhat warmer than in other recovery units, with very few freezing days per year. Tortoises are found in the valleys, on bajadas, desert pavements, rocky slopes, and in the broad, well-developed washes (U.S. Fish and Wildlife Service 2011).

The Eastern Mojave Recovery Unit is separated from the Western Mojave Recovery Unit by an inhospitable barrier created by the Saline Valley, Death Valley, and Silurian Valley. Desert tortoises in the Eastern Mojave Recovery Unit are generally found in creosote bush scrub communities of flats, valley bottoms, alluvial fans, and bajadas. They are often active in spring, late summer, and early fall, as this region receives up to about 40% of its annual rainfall in summer and there are two distinct annual floras on which tortoises can feed (U.S. Fish and Wildlife Service 2011).

Each recovery unit contains one or more Critical Habitat Units (CHUs). Under section 3 of the ESA, the Department of the Interior is directed to designate the specific areas supporting those physical and biological features that are essential for the conservation of the species. The Department of Interior designated critical habitat areas for the Mojave Desert Tortoise in early 1994 (59 FR 5820) that encompass over 24,281 km^2 in the Mojave and Colorado deserts (U.S. Fish and Wildlife Service 2011). The critical habitat units are administrative areas managed to give reserve-level protection to desert tortoise populations while maintaining and protecting other sensitive species and ecosystem functions (U. S. Fish and Wildlife Service 1994). According to USFWS (2019a):

> "The specific physical and biological features of desert tortoise critical habitat are (1) sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; (2) suitable substrates for burrowing, nesting, and overwintering; (3) burrows, caliche caves, and other shelter sites; (4) sufficient vegetation for shelter from temperature extremes and predators; and (5) habitat protected from disturbance and human-caused mortality."

In California, federal critical habitat designation totals 19,239 km^2. Of this, 13,465 km^2 are Bureau of Land Management (BLM) land, 980 km^2 are military land, 538 km^2 are state land, and 4,255 km^2 are private land (U. S. Fish and Wildlife Service 1994) (Figure 5).

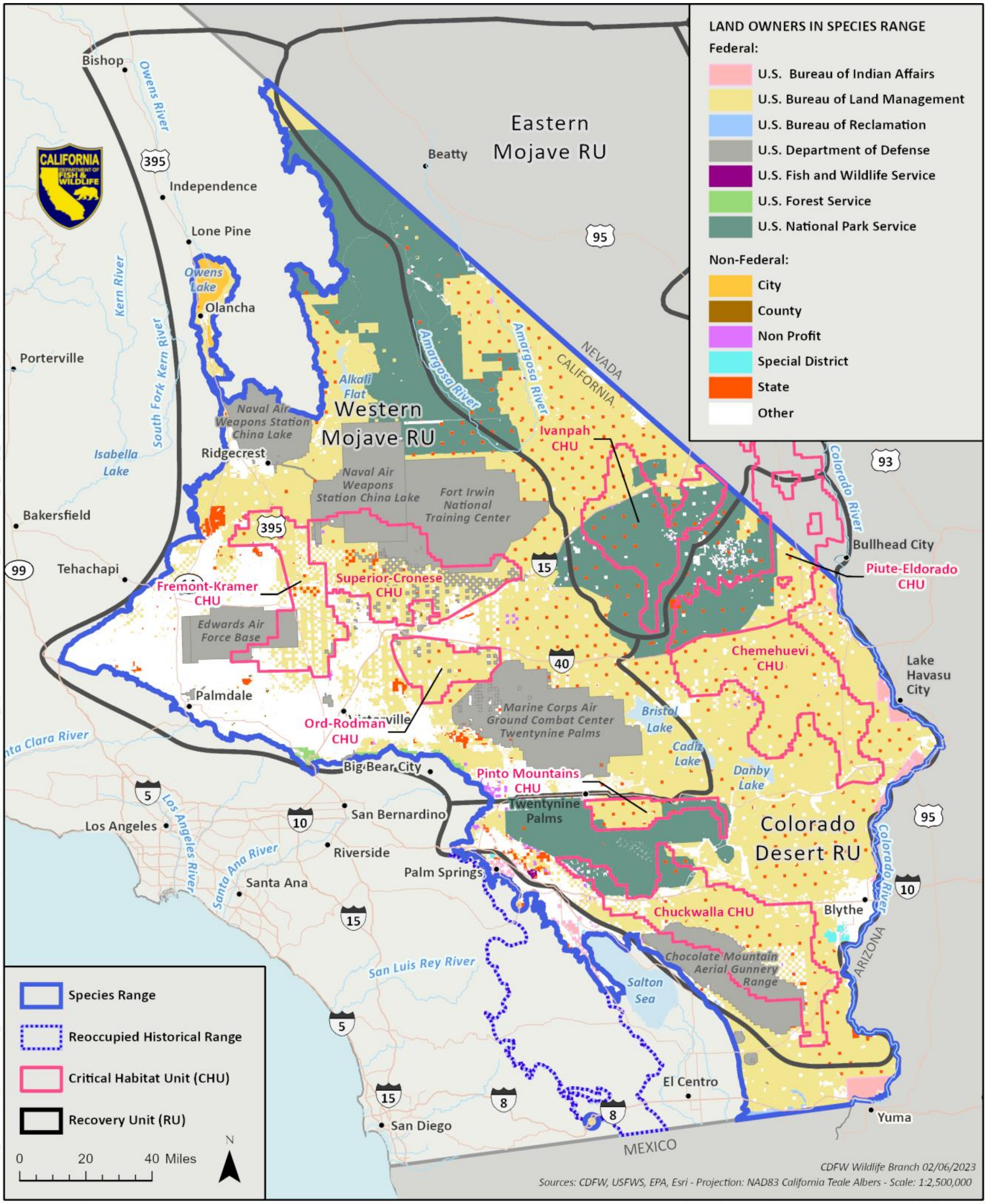

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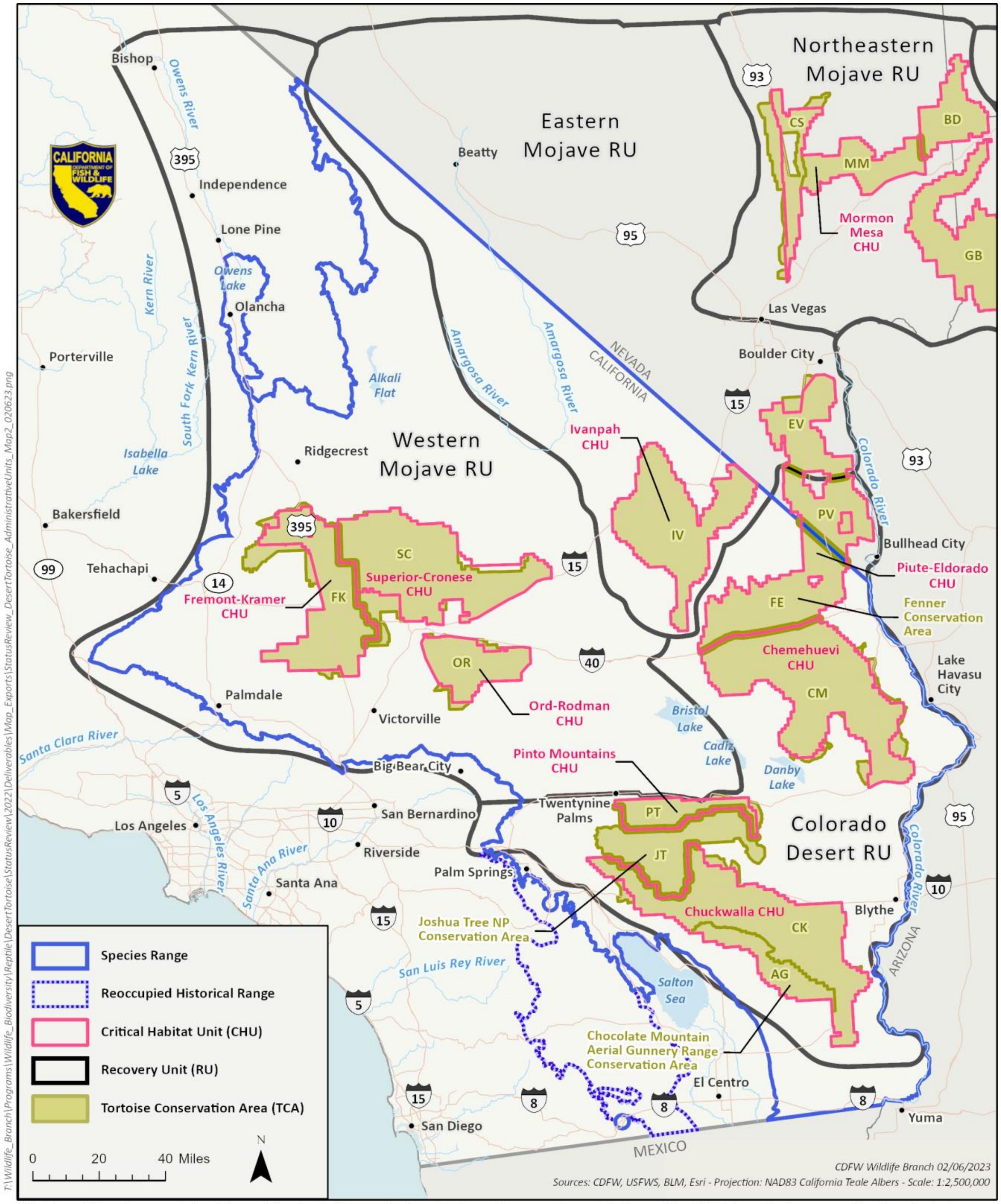
Figure 5. Landownership, RUs, and CHUs in the Mojave Desert Tortoise range in California.

Tortoise Conservation Areas (TCAs) are areas that mostly align with CHUs that the USFWS has designated for surveys to evaluate tortoise population status and recovery (see Figures 5, 6 and Table 1). They include "designated critical habitat as well as contiguous areas with potential tortoise habitat and compatible management" (U.S. Fish and Wildlife Service 2019*b*). The TCAs have the same name as the CHU they encompass, with a few exceptions where there are multiple TCAs within a CHU (Allison 2015), and Joshua Tree TCA which is not within a CHU. See Figure 6 for boundaries of CHUs and TCAs, and Table 1 for overall size and amount of habitat within the CHUs, and size of TCAs.

Table 1. Area of modeled desert tortoise habitat within California CHUs, and size of associated TCAs (U.S. Fish and Wildlife Service 2019a). Modeled habitat is suitable desert tortoise habitat per Nussear et al. (2009).

Recovery Unit	Critical Habitat Unit	Area (km^2)	Modeled Habitat (km^2)	Tortoise Conservation Area	Area (km^2)
Western Mojave	Fremont-Kramer	2,096	2,028	Fremont-Kramer	2,417
	Ord-Rodman	1,025	745	Ord-Rodman	1,124
	Superior-Cronese	3,104	2,934	Superior-Cronese	3,332
Eastern Mojave	Ivanpah	2,559	2,067	Ivanpah	2,567
Colorado Desert	Chuckwalla	4,130	3,275	Chuckwalla	3,509
	Chuckwalla			Chocolate Mountain Gunnery Range	755
	Chemehuevi	3,794	3,701	Chemehuevi	4,038
	Piute-El Dorado	3,928	3,764	Fenner	1,841
	Pinto Mountains	695	583	Pinto Mountains	751
				Joshua Tree	1,567



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

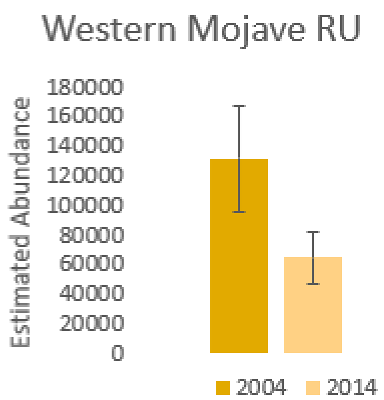
Figure 6. Mojave Desert Tortoise range, RUs, CHUs, and TCAs.

3.2 Trends in Density and Abundance

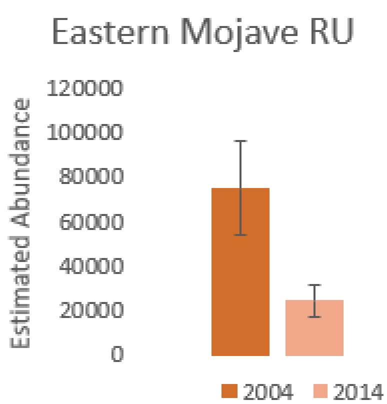
Tortoises are long lived, reach sexual maturity late, and have decades of reproductive life. These life history characteristics make it difficult to assess trends in tortoise populations. For such species, short- and medium-term studies (1–10 years) may not be long enough to adequately understand population trends (Tracy et al. 2004). Also, studies that cover only very small, localized portions of the tortoise's range have limited value in assessing the overall population status. This makes long-term studies with consistent methodology that cover large portions of the range in California key to understanding the extent to which tortoise populations are declining or recovering over time.

Since the species was listed as threatened under CESA in 1989, the most robust estimates of density over time come from long-term surveys of TCAs within each CHU using line distance sampling. Square transects with 3 km sides were set up to provide good coverage of each TCA, and a random selection of these transects are surveyed each year. Two surveyors walk line transects along the boundary of the square or as close to it as is feasible. They record the distance and bearing from the survey line to all tortoises seen and live tortoises are measured and sexed. In addition, data from tortoises carrying radio transmitters are used to estimate what portion of tortoises are above ground during the transects. Transects are scheduled in mid-March to May to maximize the chance tortoises will be active and above ground. Standard models are used to calculate density for the TCA from the line transect data in each sampling stratum. Funding for these efforts has varied, but in most years from 2001 to 2021 the USFWS has coordinated the distance sampling monitoring program for desert tortoises in the three recovery units that cover tortoise range in California (U.S. Fish and Wildlife Service 2015, 2019*b*, 2020*a*, 2022*b*, *c*). The years that each specific TCA was surveyed are presented in Table 2.

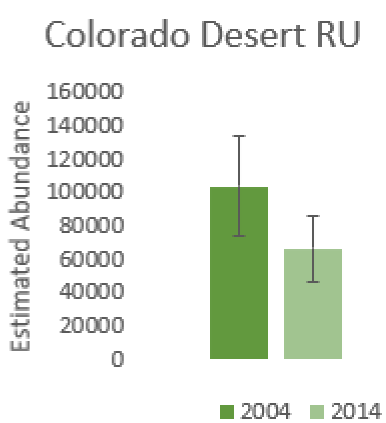
Despite the protections afforded though the federal ESA and CESA, tortoise populations have declined in recent decades. The 1994 USFWS Recovery Plan for desert tortoise identified 3.9 adult tortoises/km^2 as the minimum density necessary for population viability (U. S. Fish and Wildlife Service 1994, U.S. Fish and Wildlife Service 2011). Only one of the TCAs was below this threshold in 2004, but by 2014, 8 out of 10 were at or below it. Between 2004 and 2014, annual declines per year ranged from 3.3% in the Chocolate Mountain Gunnery Range to 10.8% in Chemehuevi (Allison and McLuckie 2018) (Figure 7). Joshua Tree was the only TCA in California where the population increased (6.2% annual rate of increase). However, Joshua Tree started with a very low estimated density of 1.9 tortoise/km^2 in 2004, most likely due to extended drought (Lovich et al. 2014, Allison and McLuckie 2018). These annual rates of decline are very high, and a species that reproduces as slowly as the desert tortoise will likely require a long time to recover from such losses.



Area	Annual Trend in Density 2004–2014
Fremont-Kramer TCA	-6.80%
Ord-Rodman TCA	-8.20%
Superior-Cronese TCA	-9.30%
Western Mojave RU	-7.10%



Ivanpah TCA	-7.40%
Eastern Mojave RU	-11.20%



Chocolate Mountain TCA	-3.30%
Chuckwalla TCA	-4.10%
Chemehuevi TCA	-10.80%
Fenner TCA	-7.30%
Joshua Tree TCA	6.20%
Pinto Mountains TCA	-8.30%
Colorado Desert RU	-4.50%

Figure 7. Estimated abundances (with standard errors) of adult Mojave Desert Tortoises (*Gopherus agassizii*) in 2004 and 2014 in the recovery units relevant to California (left). Estimated annual rates of change in density for recovery units and associated Tortoise Conservation Areas (right). Abundance estimates for recovery units are based on densities calculated from the model in Table 4 of Allison and McLuckie (2018) and applied to all areas of the associated recovery unit that meet criteria as modeled habitat. TCA annual trends in population are from U.S. Fish and Wildlife Service (2022a).

Allison and McLuckie (2018) estimated the abundance of desert tortoises in the three recovery units that fall within California in 2004 and 2014 from the density estimates in the TCAs (Figure 7). Abundance declined precipitously between 2004 and 2014 in the Western Mojave, Colorado Desert, and Eastern Mojave Recovery Units, with each of them losing between 35,000 and 65,000 adults. It should be noted that the Eastern Mojave and Colorado Desert Recovery Units each have one TCA outside of California so the abundance estimates are an over-estimate for California. Allison and McLuckie (2018) estimated that the Western Mojave Recovery Unit experienced a 51% decline in adults from 2004 to 2014.

Since 2014, densities have not declined as steeply as in the previous decade. Although no populations have reached pre-2014 highs, between 2015 and 2021, densities increased somewhat in Chemehuevi, Fenner, and Ivanpah. The declines continued in Chocolate Mountains, Ord-Rodman, Fremont-Kramer, and Superior-Cronese (U.S. Fish and Wildlife Service 2022*a*, *c*) (Figures 8 and 9, Table 2). The most recent surveys (2019–2021) show that in the Eastern and Western Mojave Recovery Units, all of the TCAs surveyed were below the 3.9 adult tortoises/km^2 threshold. In the Colorado Desert Recovery Unit, two were at the threshold, two were below it, and only one TCA (Fenner) was above (U.S. Fish and Wildlife Service 2022*a*) (Figures 8 and 9, Table 2). The declines in the TCAs occurred despite most of the land falling under federal land management agency ownership (Figure 5).

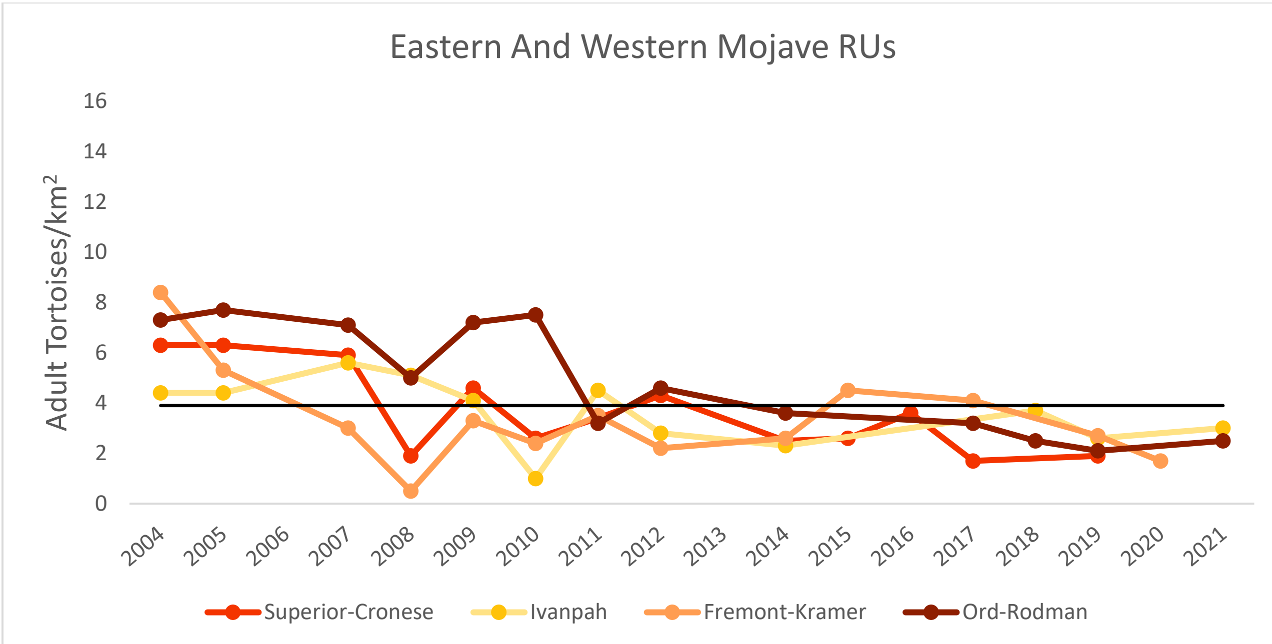


Figure 8. Estimated densities of adult tortoises (≥ 180 mm carapace length) in TCAs in the Eastern and Western Mojave RUs in California 2004–2021. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. For time series figures of individual TCAs including error bars, see Appendix A.

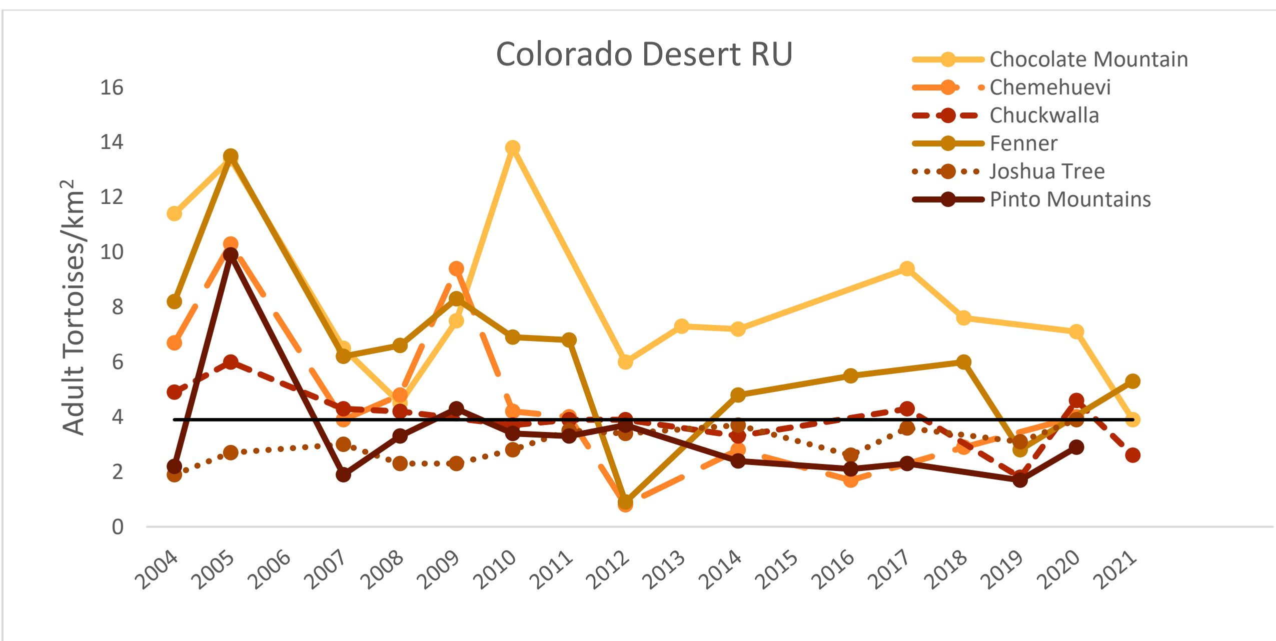


Figure 9. Estimated densities of adult tortoises (≥ 180 mm carapace length) in TCAs in Colorado Desert RU in California 2004–2021. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. For time series figures of individual TCAs including error bars, see Appendix A.

Table 2. Estimated densities of adult tortoises (≥ 180 mm carapace length) in Tortoise Conservation Areas in California. Estimates for 2004–2014 have standard errors (SE); estimates for 2015–2021 have coefficients of variation expressed as percentages. Data from (U.S. Fish and Wildlife Service 2015, 2016, 2018, 2019*b*, 2020*a*, 2022*c*, *b*, Allison and McLuckie 2018), and presented in Figures 8 and 9.

		Estimated Density (number/km^2)																
Recovery Unit	**TCA**	**2004**	**2005**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Western Mojave	Fremont-Kramer	8.4 (2.31)	5.3 (1.28)	3.0 (1.46)	0.5 (0.51)	3.3 (1.13)	2.4 (0.60)	3.5 (1.11)	2.2 (1.07)		2.6 (0.3)	4.5 (28.0)		4.1 (22.01)		2.7 (24.0)	1.7 (27.6)	
	Ord-Rodman	7.3 (2.25)	7.7 (1.80)	7.1 (3.26)	5.0 (5.34)	7.2 (2.65)	7.5 (1.85)	3.2 (1.18)	4.6 (2.14)		3.6 (0.4)			3.9* (19.84)	3.4* (20.79)	2.5* (20.33)		2.5* (24.3)
	Superior-Cronese	6.3 (1.84)	6.3 (1.32)	5.9 (2.28)	1.9 (1.19)	4.6 (1.12)	2.6 (0.49)	3.4 (0.79)	4.3 (1.41)		2.5 (0.6)	2.6 (26.7)	3.6 (26.3)	1.7 (23.76)		1.9 (23.7)		
Eastern Mojave	Ivanpah	4.4 (1.19)	4.4 (2.46)	5.6 (1.95)	5.1 (2.92)	4.1 (1.86)	1.0 (0.48)	4.5 (1.72)	2.8 (1.79)		2.3 (0.2)			3.7 (23.62)	3.7 (23.62)	2.6 (24.9)		3.0 (24.5)
Colorado Desert	Chocolate Mountain	11.4 (3.55)	13.4 (4.31)	6.5 (1.50)	4.5 (2.56)	7.5 (2.74)	13.8 (3.52)		6.0 (1.84)	7.3 (1.96)	8.4 (0.8)			9.4 (14.8)	7.6 (32.46)		7.1 (22.1)	3.9 (31.8)
	Chuckwalla	4.9 (1.49)	6.0 (1.77)	4.3 (1.19)	4.2 (2.84)		3.7 (1.14)	3.9 (1.37)	3.9 (1.62)		3.3 (0.4)			4.3 (15.7)		1.8 (28.8)	4.6 (19.4)	2.6 (24.0)
	Chemehuevi	6.7 (1.27)	10.3 (3.10)	3.9 (1.71)	4.8 (3.07)	9.4 (5.98)	4.2 (1.40)	4.0 (1.51)	0.8 (0.90)		2.8 (0.3)		1.7 (30.6)		2.9 (24.21)		4.0 (15.2)	
	Fenner	8.2 (1.94)	13.5 (2.80)	6.2 (2.37)	6.6 (3.05)	8.3 (4.01)	6.9 (2.49)	6.8 (2.78)	0.9 (0.95)		4.8 (0.5)		5.5 (30.0)		6.0 (26.25)	2.8 (29.8)		5.3 (19.8)
	Pinto Mountains	2.2 (2.12)	9.9 (3.58)	1.9 (0.98)	3.3 (3.53)	4.3 (2.38)	3.4 (1.85)	3.3 (1.39)	3.7 (1.57)		2.4 (0.3)		2.1 (31.6)	2.3 (32.7)		1.7 (31.8)	2.9 (20.6)	
	Joshua Tree	1.9 (0.53)	2.7 (0.79)	3.0 (1.94)	2.3 (1.75)	2.3 (1.56)	2.8 (1.56)	3.5 (1.33)	3.4 (1.63)		3.7 (0.4)		2.6 (34.7)	3.6 (22.5)		3.1 (20.2)	3.9 (23.3)	

*724 adults were translocated into the Ord-Rodman TCA in 2017–2019 due to expansion at 29 Palms Marine Corps Air Gunnery Command Center. These are included in these density estimates.

The long-term surveys in the TCAs provide robust data on declines in density since 2004. However, tortoise populations had been in decline for decades previously, and estimates of densities from before the species was listed under CESA in 1989 are important for understanding the scale of long-term decline. While there were no large scale or frequent systematic population monitoring programs in the 20th century, multiple regional or short-term surveys give snapshots of density in certain areas pre and post listing. Collectively, these studies give a broad picture of the state of tortoise populations in the past several decades.

Estimates of tortoise densities in California before the species was listed under CESA can be found in Berry (1986*a*):

> "Berry and Nicholson (1984a) developed a more detailed map of relative tortoise abundance throughout an area of over 100,000 km^2 using data from 1,808 strip transects. Transects, which were 2.4 km by 9.1 m, provided counts of tortoise signs (live individuals, carcasses, scats, cover sites, tracks, drinking sites, and courtship rings). Counts of signs were calibrated against counts along transects in areas where tortoise densities had been estimated by repeated censuses. The map prepared by this method showed five relative density classes: 0–8, 9–19, 20–39, 40–97, and >97 tortoises/km^2. Four major tortoise population centers or crucial habitats with densities of >77 tortoises/km^2 were identified: (1) Fremont-Stoddard in the western Mojave Desert (4864 km^2), (2) Ivanpah in the eastern Mojave Desert (918 km^2), (3) Fenner-Chemehuevi in the eastern Mojave and northeastern Colorado deserts (3881 km^2), and (4) Chuckwalla (1333 km^2) in the southern Colorado Desert."

In addition, in the 1970s the BLM established 27 2.6 km^2 (1 $mile^2$) survey sites in California (Berry and Turner 1986). Using mark recapture methods, researchers surveyed the plots over 60-day periods in the spring every 2–10 years (Berry and Medica 1995). Berry (1986*a*) reports that of those 27 sites, "eight had estimated densities of $\leq$8 tortoises/km^2, six had 8–39 tortoises/km^2, and 13 sites supported 42–184 tortoises/km^2", though the years those estimates come from are not reported. Multiple of these sites are located within the current Tortoise Conservation Areas, with sites in the Ivanpah, Chuckwalla, Fenner, and Chemehuevi TCAs. Using data reported in Berry and Medica (1995), rough comparisons can be made between the estimated densities in 1979–1992 and the 2004–2014 surveys. The earlier surveys covered the whole of the plot and did mark recapture methods to estimate density, while the later USFWS surveys used line transects. In addition, the BLM density estimates are only for the single plot per TCA, while the more recent line transects use multiple line transects per TCA to estimate density across the whole TCA. However, the combined density estimates provide a benchmark of declines over the past 50 years. The Desert Tortoise Natural Area overlaps with the northern border of the Fremont-Kramer TCA. Estimates of densities in 1979–1980 vary from 36 adults/km^2 in Chemehuevi to a high of 73 adults/km^2 in Fenner and Chuckwalla (Figure 10). By the early 1990s, density of adults had not fallen particularly dramatically except in Chuckwalla which had a 57% decline from about 73 adults/km^2 to about 31 adults/km^2, and the Desert Tortoise Natural Area which saw a 93% decline to 3.7 adults/km^2 which is below the density needed for population viability (Figure 10). However, on the scale of multiple decades, all the surveyed areas experienced very steep declines. From 1979–1980 to 2020–2021, densities of adults in the corresponding TCAs fell 93% in Fenner, 96% in Chuckwalla, 89% in Chemehuevi, and 93% in Ivanpah (Table 2 and Figures 8, 9,10).

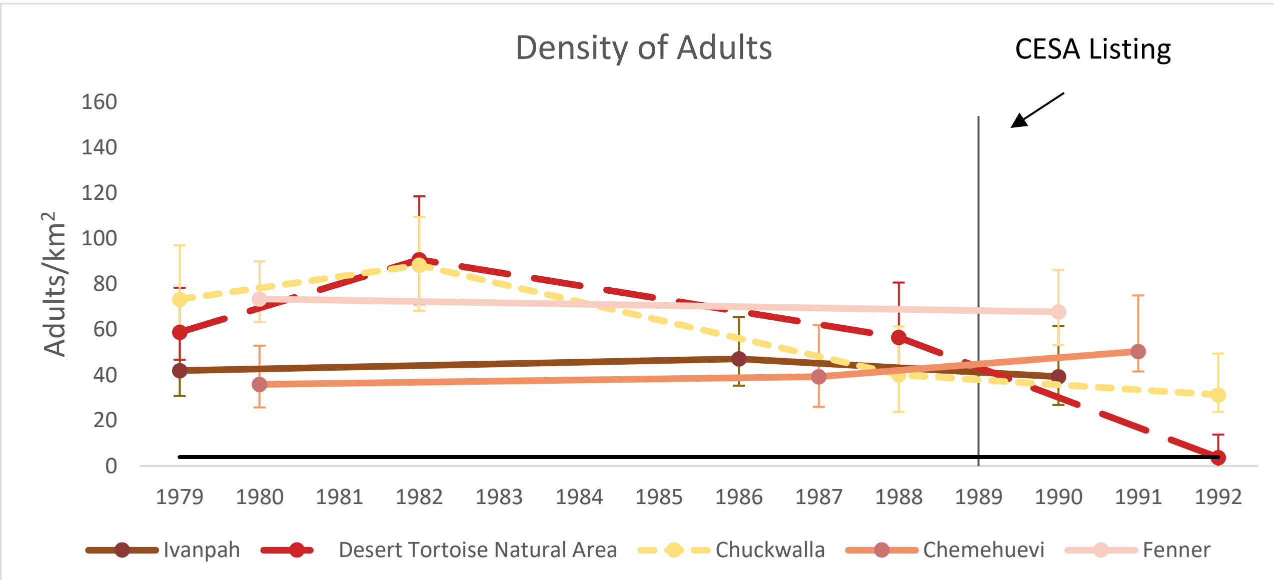


Figure 10. Estimated densities of adults/km^2 in plots surveyed 1979–1992 using mark recapture methods. The dot represents the midpoint of the density estimates, bars are 95% confidence intervals. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. Redrawn from figures in Berry and Medica (1995).

Berry et al. (2020b) continued the work of surveying tortoises at Desert Tortoise Research Natural Area in the western Mojave Desert for decades. Part of the site was fenced to keep out sheep, vehicles and humans but allow movement of tortoises, and surveys were done both inside and outside the fence. In 1979 when they started the surveys, estimated densities of all tortoises inside the fence were 103/km^2, and 79/km^2 outside the fence. In 2002 it had declined to 10.2/km^2 inside the fence and 4.17/ km^2 outside the fence. By 2012 densities had increased to 15.6/ km^2 inside the fence, and to 4.9/km^2 outside the fence. Counts of tortoises (from which densities were estimated) followed an estimated linear decline of 9.1% per year over the 30+ years of the study.

Other studies give rough estimates of historical density in other parts of the range. In the Pinto Basin of Joshua Tree National Park in 1991–1996, Freilich et al. (2000) used mark recapture methods to resurvey an area that had been surveyed in the 1970s. Their methods were designed to estimate abundance rather than density, and since they did not have a well-defined effective trapping area, their density estimates are rough. However, they report that in the 1970s the density estimates were 29–31 adults and juveniles/km^2, while their estimate for the early 1990s was 42 adults/km^2. Lovich et al. (2014) reports that surveys in the Pinto Basin in 1987–1988 estimated densities as high as 77 tortoises/km^2.

Medium-term tracking of densities did occur in four study sites in California at various times between 1977 and 1985 (Berry et al. 1986). At one site in the western Mojave Desert, Fremont Peak, sampling occurred three times (1977, 1980, and 1985) over a 9-year period and the population density declined from 27/km^2 in 1980 to 15/km^2 in 1985 (Berry et al. 1986). However, at three other sites there were no significant changes in density during those years. At the Kramer Hills site in the Western Mojave Desert there were an estimated 42 adults/km^2 in 1980 and 44 adults/km^2 in 1982. The Chemehuevi Wash site in the Colorado Desert was surveyed in 1979 and 1982 and saw a nonsignificant increase from 18 adults/km^2 to 22 adults/km^2. The Chuckwalla Bench study site also in the Colorado Desert had a non-significant increase in density from 75 adults/km^2 in 1979 to 87 adults/km^2 in 1982 (Berry et al. 1986), see Figure 10.

Although the density surveys in the 1970s and 1980s do not use the same methodology as later surveys and only cover small areas, they do give an idea of the range of tortoise densities in the decades before the start of the surveys in the TCAs, providing context for more recent density estimates.

Juveniles

Juvenile tortoises are easier to overlook during surveys than adults, and the U.S. Fish and Wildlife surveys in the TCAs do not report densities of juveniles (but see below). However, Berry and Medica (1995) report on the density of adults and all tortoises using mark recapture surveys in BLM plots from 1979 to 1992. From those we can roughly calculate historic density of juveniles (density of all tortoises minus density of adult tortoises) (Figure 11).

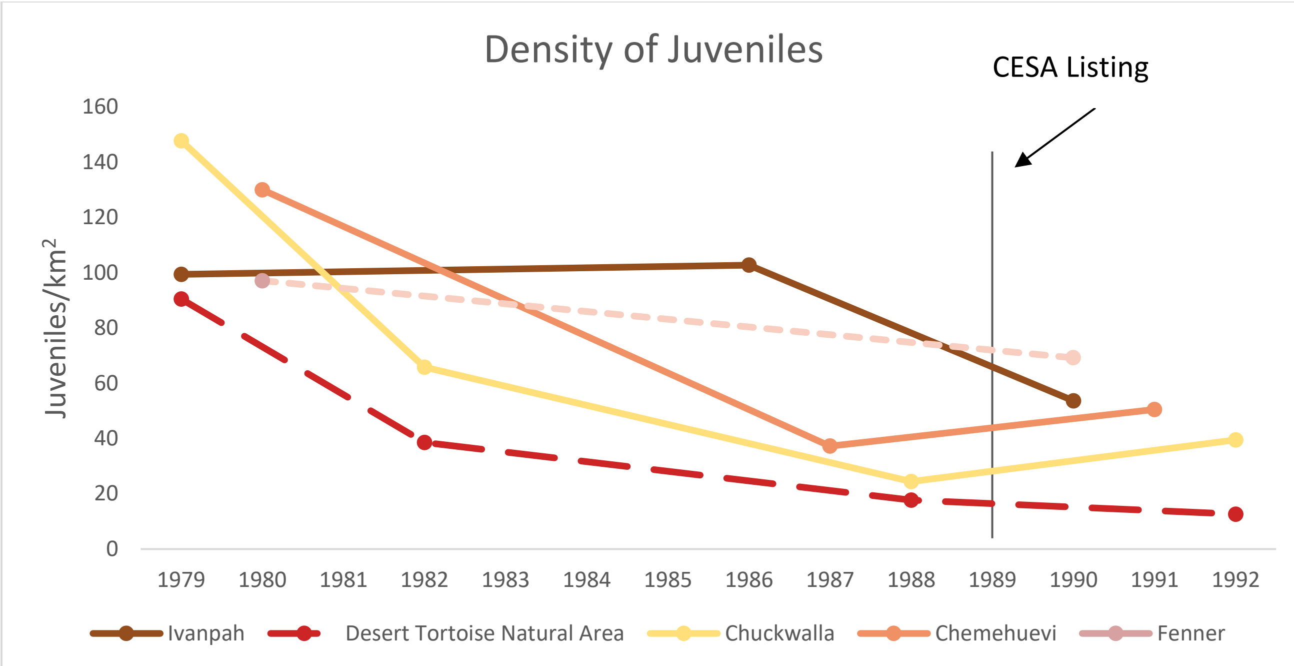


Figure 11. Density of juvenile tortoises in plots in California from 1979 to 1992. Juvenile density was calculated by subtracting density of adults from density of all tortoises presented in Berry and Medica (1995).

Between the late 1970s and early 1990s, the density of juveniles declined roughly 46% in Ivanpah, 86% in the Desert Tortoise Natural Area, 73% in Chuckwalla, 62% in Chemehuevi, and 29% in Fenner (Figure 11). While juvenile tortoises are expected to have low survival rates, this long-term loss of juveniles from the landscape is concerning, and there is evidence that it is continuing into recent years. In 2014 in the Western Mojave Recovery Unit, the density of adult tortoises was 49% of what it had been in 2004, and the proportion of juveniles in the population declined by 9% (Allison and McLuckie 2018). In the yearly transect surveys done in the TCAs, many fewer tortoises with midline carapace length <180 mm were found in 2007–2015 compared to 2001–2005 (Figure 12). In some areas, the youngest tortoises found in recent years were at least 30 years old (Holcomb 2022*a*). Even if conditions quickly improve for juveniles, such a long period with little recruitment of juveniles into the population will hinder population recovery significantly.

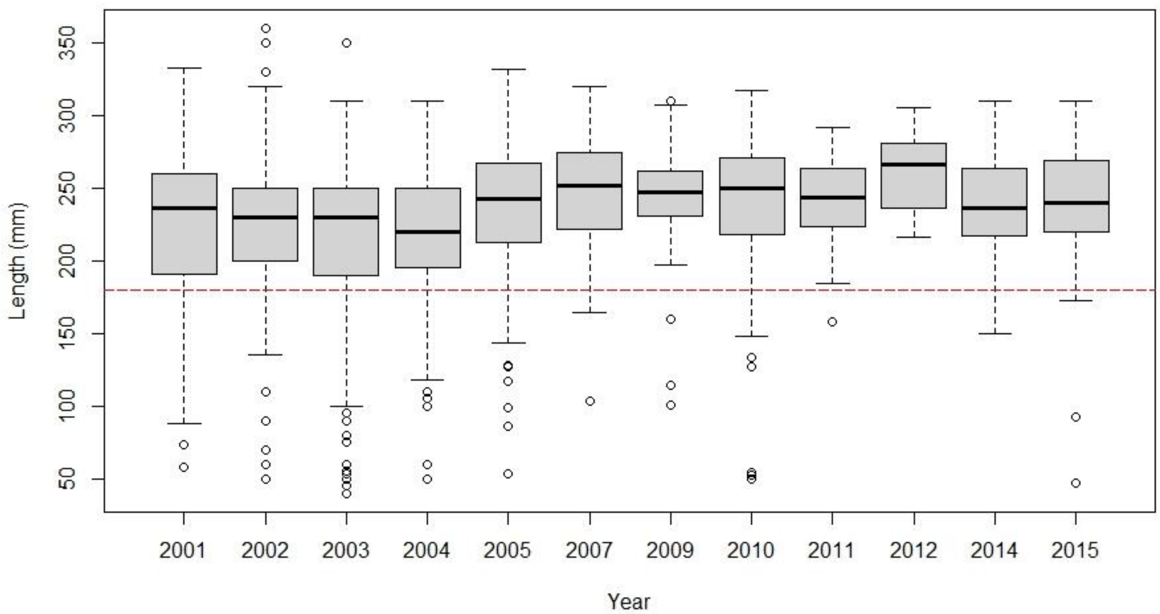


Figure 12. Midline carapace length of tortoises surveyed within the Western Mojave Recovery Unit Tortoise Conservation Areas, showing a reduction in observations of tortoises smaller than 180mm after about 2005. Described in Alison and McLuckie (2018), and figure made with USFWS unpublished data provided by K. Holcomb and used with permission. The horizontal dashed line at 180 mm represents the size over which tortoises are considered to be adults.

3.3 Mortality and Survival Rates

Adult and juvenile survival rates are important demographic factors that can affect whether a population is increasing, stable, or declining. Desert tortoises generally have low survival rates (i.e., high mortality rates) as hatchlings and juveniles, and relatively high adult survival rates (Berry and Murphy 2019). The adult survival rate needed for population stability depends on a number of factors, including population reproduction and/or recruitment rates, but the USFWS 1994 Recovery Plan estimated that an adult survival rate of 98% per year is needed for population growth of 0.5% per year. A more recent estimate that incorporated current adult densities and juvenile survival rates found that an adult survival rate of 93% per year was necessary for desert tortoise population stability (no growth or decline) (Holcomb 2022*a*). Estimates of survival/mortality rates come from a variety of studies within California, most of which were quite limited in geographic scale. When comparing survival rates to mortality/death rates, a broad rule of thumb is that mortality or death rate ≈ 1-(survival rate).

Adult tortoises are much easier to survey than juveniles, consequently most of the information about survival and mortality in the wild relates to adults. In the late 1970s and early 1980s, a study from four sites provided some limited information on annual mortality rates in stable and declining populations (Berry et al. 1986). At Fremont Peak in an area that became the Fremont-Kramer TCA, densities of adults and subadults declined significantly between 1977 and 1985, and the estimated annual mortality rate was 4.5% per year. In contrast, three other sites surveyed during that period that did not see significant declines in density had annual mortality rates of 2.2–2.9% (Berry et al. 1986). Berry et al. (2020b) estimated survival rates (1979–2012) of adults and juvenile tortoises inside and outside of the fenced portion of the Desert Tortoise Research Natural Area in the Western Mojave. As mentioned previously, in 1979 estimated densities of all tortoises was 103/km^2 inside the fence, and 79/km^2 outside the fence. By 2012 densities had decreased to 15.6/km^2 inside the fence, and to 4.9/km^2 outside the fence. During those years the population suffered an estimated 87.6% decline. Median annual survival probability (converted into percentages for ease of comparison) for adults inside and outside of the fenced area ranged from 79%–83% in 1979–1989, 71%–78% in 1989–2002, and 94%–96% in 2002–2012. These estimates are all well below the necessary survival rate identified in the USFWS 1994 Recovery Plan to achieve modest population growth. Juveniles had lower survival, their estimated median annual survival probability was 66%–73% in 1979–1989, 57%–65% in 1989–2002, and 90%-93% in 2002–2012.

In Eastern Joshua Tree National Park, tortoises were surveyed intermittently from 1978 to 2012 (Lovich et al. 2014). The authors tested the impact of rainfall on survival, and the best model of survival was based on the average estimated winter precipitation over the preceding three winters. They estimated a mean annual (apparent) survival rate of 0.87 (87%). Values below the mean occurred in 1991, 1997–2004 and 2008, which were years of lower rainfall (Lovich et al. 2014). Estimated survival was above the mean in 2010–2011. It should be noted that other factors that impact survival, such as predation and disease, were not tested independently. Instead, it was assumed that these factors would be mediated by rainfall (i.e., tortoises would be in poorer conditions in drier years and therefore they would be more susceptible to predation or disease).

Between 2002 and 2004, Berry and Keith (2008) evaluated the status of desert tortoise populations in Red Rock Canyon State Park in Kern County. Previous surveys had occurred in the 1970s, and density was estimated to be <8 tortoises/km^2. The death rate over four years was estimated at 67% for adults and subadults, and densities were between 2.7 and 3.6 tortoises/km^2.

In 2007–2008, Berry et al. (2020c) evaluated the status of a population of tortoises in the El Paso Mountains close to the Fremont-Kramer Critical Habitat Unit. Estimated density of adults was 4.8/km^2 and the annual death rate of adults in 2003–2008 was 6.9% (Berry et al. 2020*c*). The top causes of known death were mammalian and avian predators, gunshots, and vehicles. The authors concluded that “the high death rate of adults, low population density, high human visitor use, and ongoing decline in the adjacent critical habitat unit indicate that a viable population is unlikely to persist in the study area” (Berry et al. 2020*c*).

Esque et al. (2010) tracked several hundred adult tortoises before and after translocations from Fort Irwin National Training Center to neighboring public land in the Superior-Cronese Critical Habitat Unit. They monitored translocated tortoises, tortoises resident at the release sites, and control tortoises in nearby areas that were not affected by the translocations. In the first year (2008), 19% of control tortoises, 20% of resident tortoises, and 25% of translocated tortoises died. Most of the mortalities were thought to be due to coyote predation. As a comparison, at a different reference site in the Superior-Cronese Critical Habitat Unit, 8.3% of tracked tortoises died in 2008. At reference sites in other critical habitat units in California, percent mortality in 2008 ranged from 0% in Ivanpah and Ord-Rodman to 28–30% in Chemehuevi and Chuckwalla. Esque et al. (2010) also showed that mortality can vary greatly year to year in the same site. For example, at Soda Mountain outside of the Superior-Cronese Critical Habitat Unit, in 2006 at there was no mortality, in 2007 mortality was 17%, and in 2010 it was 43% (Esque et al. 2010).

In 2009, Berry et al. (2020a) surveyed about 93 km^2 of BLM land within the eastern Chemehuevi Valley, adjacent to the Chemehuevi Critical Habitat Unit. Based on the number of live and dead tortoises found, they concluded that the density of adults was 2.0/km^2 (+/- 1.0), and that the annual death rate in the four years prior to the survey was 13.1%/year. These data led them to conclude that the population was probably nonviable (Berry et al. 2020*a*).

Collectively, these data suggest that adult survival rates in most recently surveyed areas are too low to support stable populations and have been below the thresholds established by the USFWS 1994 Recovery Plan and by Holcomb (2022a) for some time (Table 3). Although survival rates have not been estimated systematically across the tortoise's range in California, rates appear to be particularly low outside of CHUs.

Table 3. Survival and mortality rates of adult and subadult tortoises in various studies.

Life stage	Survival vs Mortality	Rate	Location	Time scale	Reference
Adults	Median annual survival probability	79%-83%	Desert Tortoise Research Natural Area	1979-1989	Berry et al. 2020b
Adults	Median annual survival probability	71%-78%	Desert Tortoise Research Natural Area	1989-2002	Berry et al. 2020b
Adults	Median annual survival probability	94%-96%	Desert Tortoise Research Natural Area	2002-2012	Berry et al. 2020b
All	Mean annual survival	87%	Eastern Joshua Tree National Park	1978-2012	Lovich et al. 2014
Adults & subadults	Annual mortality	4.5%	Fremont -Kramer TCA	1977-1985	Berry et al. 1986
Adults & subadults	Annual mortality	2.2%-2.9%	Kramer Hills, Chemehuevi, Chuckwalla	1977-1985	Berry et al. 1986
Adults & subadults	Death rate over 4 years	67%	Red Rock Canyon State Park	2002-2004	Berry and Keith 2008
Adults	Annual death rate	6.9%	El Paso Mountains near Fremont-Kramer CHU	2003-2008	Berry et al. 2020c
Adults	Annual mortality	13%	Chemehuevi Valley	2005-2009	Berry et al. 2020a
Adults	Annual mortality	0%	Ivanpah	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%	Ord-Rodman	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%-31%	Chemehuevi	2006-2008	Esque et al. 2010
Adults	Annual mortality	9%-29%	Chuckwalla	2006-2008	Esque et al. 2010
Adults	Annual mortality	0%-44%	Soda Mountain	2006-2008	Esque et al. 2010

Adults	Annual mortality	6.3%-8%	Superior-Cronese	2007-2008	Esque et al. 2010

Juvenile Survival

In long-lived species like the tortoise, if adult survivorship drops, reproductive rates or juvenile survival would have to increase dramatically to keep populations stable. Analysis by the USFWS (1994) estimated that “a 10% increase in adult mortality can require a 300% increase in juvenile survivorship” to maintain a stable population. Many of the threats to adult survival affect juveniles, making it unlikely that juvenile survivorship can naturally increase to the levels needed to compensate for the decreasing adult survival documented above.

Several factors limit the number of hatchlings that are produced in the wild each year. Females lay a maximum of about 30 eggs per year, incubation success depends on temperature, and nest predation is common (Berry and Murphy 2019). After emerging from the egg, survival rates of wild hatchlings can be low. In the Ivanpah Valley between 2011 and 2014, Tuberville et al. (2019) compared survival and growth of free ranging hatchlings to those reared in pens under different rainfall scenarios. Both groups were hatched from eggs laid by wild females and brought into captivity for the study. Free ranging hatchlings were released into the wild between 0 and 18 months old. Estimated annual survival rates for the free ranging hatchlings was 48%–49% compared to 94% of those reared in pens.

We do not have much information on historical juvenile survival rates, but the impact of recent low survival rates can be seen in demographic information. As mentioned previously, in the yearly surveys performed in the Western Mojave TCAs, many fewer tortoises with midline carapace length <180 mm were found in 2007–2015 compared to 2001–2005 (Figure 12). One likely cause of juvenile mortality is raven predation. Holcomb et al. (2021) estimated that annual survival rates for 1–10-year-old tortoises in 5 CHUs averaged 63% when within 500m of a raven’s nest, and ~76% when the median distance to a nest was 1.72 km. See section 4.4 for more detail on predation.

One strategy to improve juvenile survival is to raise tortoises in captivity and then release them once they reach a certain size (referred to as head-starting; for more details see section 9.1). A study at the Fort Irwin National Training Center on head-started juvenile tortoises (Nagy et al. 2015*b*) found that in the two years after release, survivorship was 76–79%, but in the third year survivorship dropped to 53%, resulting in an overall three year survival rate of 32%. Survival was generally higher amongst tortoises with a carapace length of at least 100 mm (9 years old). Another study on head-starting found that found no significant difference in the survival rate of hatchlings released vs those reared indoors for 7 months vs those reared in outdoor pens for 7 months (Daly et al. 2019). Although the head-started tortoises grew quickly, the three groups combined annual survival after release was 44%, with the odds of survival increasing 51% for every 100m away from a raven’s nest. They predicted that survival would be near 100% if the nearest nest was more than 1.6 km away (Daly et al. 2019)

Even with head-starting, juvenile survival rates are often lower than the 59% average annual juvenile survival rate estimated by Holcomb (2022a) to be necessary for population stability if adult annual survival rates are 93% (Table 4). The available information suggests that low juvenile survival is one of the major reasons why there have been widespread declines in density.

Table 4. Survival and mortality rates of juvenile tortoises in various studies.

Life stage	Survival vs Mortality	Rate	Location	Time scale	Reference
Juveniles	Median annual survival probability	66%-73%	Desert Tortoise Research Natural Area	1979-1989	Berry et al. 2020b
Juveniles	Median annual survival probability	57%-65%	Desert Tortoise Research Natural Area	1989-2002	Berry et al. 2020b
Juveniles	Median annual survival probability	90%-93%	Desert Tortoise Research Natural Area	2002-2012	Berry et al. 2020b
Head started juveniles	Survivorship after 2 years	76-79%	Fort Irwin	2005-2007	Nagy et al. 2015
Head started juveniles	Survivorship after 3 years	53%	Fort Irwin	2005-2008	Nagy et al. 2015
Wild Hatchlings	Survival rate	48%-49%	Ivanpah Valley	2011-2014	Tuberville et al 2019
Head started juveniles	Annual survival after release	44%	Mojave National Preserve	2015	Daly et al. 2019
Juveniles	Annual survival close to ravens' nest	63%	Mojave Desert	2020	Holcomb et al. 2021
Juveniles	Annual survival far from raven's nest	76%	Mojave Desert	2020	Holcomb et al. 2021

For species like tortoise with slow growth, delayed maturation, and low reproduction rates (Shine 2005), factors that lower adult survival rates can have long-term negative impacts on abundance/density. Snapping turtles have similar life history traits as desert tortoises, and in a population in Ontario Canada, river otters killed about 50% of the adults over three years in the late 1980s (Keevil et al. 2018). Female annual survival rates fell from 94% to 76–86% during those years, and the population was reduced by about 40% (Keevil et al. 2018). Twenty-three years later, survival rates had returned to early 1980s level, but abundance did not rebound. This suggests that even if threats are removed, and survival rates increase, for a long-lived species like the desert tortoise, populations may not recover for several decades. The problem is magnified if juvenile survival is very low as is seen in multiple survey areas in California. Having breeding adults on the landscape is vital for population viability, and low rates of juvenile recruitment create an unstable demographic structure that will make it less likely for populations to recover and makes them vulnerable to any additional sources of mortality (Holcomb 2022*b*).

4 FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

Desert tortoise life history traits, including delayed reproductive maturity, relatively low annual fecundity, and low survival rates of juvenile tortoises cause populations to be vulnerable to a multitude of threats (Berry et al. 2020*b*). Their vulnerability is increased because many of the threats are interactive and amplify each other. For clarity, this document focuses on individual threats, but also recognizes that many of them are fundamentally intertwined. Many of the threats described in the initial desert tortoise status review and the USFWS Recovery Plans (U.S. Fish and Wildlife Service 1994, U.S. Fish and Wildlife Service 2011) continue to affect the species.

4.1 Habitat Modification and Destruction

Mojave Desert Tortoise range in California occurs on a variety of public and private land jurisdictions, the top three being BLM (39,251 km^2), National Park Service (NPS) (17,035 km^2), and Department of Defense (DoD) (13,018 km^2). The type of habitat modification and destruction permitted on each of these land types varies. BLM land is managed for a wide range of uses and stakeholders, and permitted activities that may impact tortoises include off-highway driving, mining, and renewable energy projects. Activities on NPS land are much more restricted; off-highway driving, mining, and renewable energy projects are not allowed. DoD land is not generally open to the public and uses range from extremely low impact to high impact live artillery use. See Figure 5 for more details on land ownership.

In the large majority of tortoise habitat, at least some alteration is allowed which can impact tortoises. Across all states, an estimated 66% of Mojave Desert Tortoise habitat has some development within 1 km, where development is defined as “urban development, cultivated agriculture, energy development (e.g., oil and gas well pads, solar energy facilities), surface mines and quarries, pipelines and transmission lines, and transportation (e.g., roads and railroads” (Carter et al. 2020). The direct impacts of development include removal of soil and vegetation, destruction of burrows, and creation of roads and other infrastructure that can kill tortoises or hinder their movements (Boarman and Sazaki 1996, 2006). An important indirect impact of development is subsidization of predators (see section 4.4) (Boarman et al. 2006).

Tortoises are less likely to occur in areas that have even a low level of development. Carter et al. (2020) found that “encounter rates of both live and dead Mojave Desert Tortoises combined decreased significantly with development levels” and that when “10% of the area within 1 km of that location has been altered by development” (10% development), it was rare to find live or dead tortoises at a location. The authors estimated that encounter rates for both live and dead Mojave Desert Tortoises decreased an average of 4% for every 1% increase in the development index (Carter et al. 2020).

In the Western Mojave Recovery Unit (which is wholly within California) 47% of tortoise habitat has almost no development (<1% within 1 km), and 5% of habitat has >10% development (U.S. Fish and Wildlife Service 2022*a*). For the Eastern Mojave Recovery Unit, the proportion of habitat with <1% development within 1 km is 58%, and 5% is at 10% development. In the Colorado Desert Recovery Unit, it is 65% and 4% respectively (U.S. Fish and Wildlife Service 2022*a*). However, those two units extend outside of California (see Figure 6), and it is unclear whether those percentages are representative of the range in California. In their 2022 5-year review, the USFWS concluded that "space does not appear to be a limiting factor to tortoise recovery". However, these categories of development used above do not take into account unpaved roads and tracks for off-highway vehicles (OHVs) which are allowed on BLM land (see section 4.2).

Driven by a number of forces, the human population in the inland deserts of California has increased significantly in the past 30 years. Between 1990 and 2022, the number of housing units increased 58% in Imperial County, 79% in Riverside County, and 37% in San Bernadino County (numbers calculated from State of California Department of Finance 2023). Urban or suburban development typically expands along the edges of previously impacted habitats which generally contain few tortoises. Therefore, we focus discussion on other types of projects that are more likely to have large-scale impacts on areas with desert tortoise populations.

Department of Defense

The Department of Defense is a major landholder in desert tortoise range. Military bases in California deserts include Fort Irwin, Naval Air Weapons Station China Lake, Edwards Air Force Base, George Air Force Base, Chocolate Mountain Aerial Gunnery Range, Marine Corps Air Ground Combat Center Twentynine Palms, and Marine Corps Logistics Base Barstow. In total, these bases encompass over 3 million acres (14.78% of the total tortoise range in California, see Figure 4). A wide variety of land uses occur on DoD property, and some of those uses are very compatible with desert tortoises while others are not. Training areas are generally high impact and tortoises in training designated areas are translocated to other sites. For example, according to the USFWS (2022c), the "Department of the Army (Army) expanded training onto 18,197 acres (73.6 km^2) of designated critical habitat on the southern area of Fort Irwin that had previously been off-limits to training, thus requiring the translocation of approximately 650 adult desert tortoises. In addition, the Army plans to expand activities onto and displace tortoises from up to 62,045 acres (~250 km^2) of its western training area in the near future, which is designated critical habitat and currently off limits to training. The Department of the Navy (Navy) expanded training for the Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms into approximately 167,982 acres (680 km^2) of public and private land, which required translocating approximately 1,000 adult tortoises." Around 700 of those tortoises were translocated into the Ord-Rodman TCA (see section 9.1 on Translocation).

Along with translocation of tortoises, other strategies used by the DoD to offset the impact of converting large areas of habitat into training grounds include acquiring land (making it federal) within a CHU, buying out grazing allotments, increased law enforcement in tortoise habitat, predator monitoring and targeted control within translocation sites, rehabilitation of closed routes, installation of off-highway vehicle barriers and desert tortoise exclusion fencing, and constructing perimeter fences to prevent public trespass into tortoise habitat (U.S. Fish and Wildlife Service 2022*a*). For more discussion of efforts to conserve tortoises, see section 5.2 Current Management Actions.

Given the relatively large amount of DoD land with land use practices that require translocation of tortoises, it is of interest whether and how quickly that habitat might become suitable again for tortoises if and when the areas are no longer used for training. Recovery from disturbance can take a long time in desert ecosystems. This has been documented in soils and vegetation of the Desert Training Center which spans parts of southern California, southern Nevada, and western Arizona. This area was used for military training exercises in the 1940s and 1960s, and 40–60 years later the soil in tank tracks remained compacted and rain infiltration rates were low (Prose and Wilshire 2000). These soil differences led to increased plant density in the tracks, but those plants had restricted growth. In addition, grass species with shallow fibrous root systems increased in density in the tracks while species with long tap roots had reduced density and cover (Prose and Wilshire 2000). USFWS (1994) estimated that areas where camps, roads, and parking lots were built would take "decades or centuries to recover." Other documented direct negative impacts to tortoises on military property include "vandalism, predation, mycoplasmosis and shell diseases" with "significantly more tortoises with shell disease…found on plots with current and recent military use than on plots with no history of military use" (Berry et al. 2006). For more detail on shell disease see section 4.7.

Renewable Energy Projects

Renewable energy projects, namely solar farms and wind energy facilities are a major source of development in desert tortoise habitat. These facilities are regarded as key to reducing CO_2 emissions, and their development has been prioritized on public land (e.g., American Reinvestment and Recovery Act 2008; National Energy Policy Act 2005, Infrastructure Investment and Jobs Act 2021, Inflation Reduction Act 2022). Unlike urban or suburban development, energy projects tend to be sited in mostly undeveloped public land, thus leading to the potential degradation and fragmentation of relatively high-quality tortoise habitat (Lovich et al. 2011).

The impacts of wind and solar energy facilities generally differ from more typical forms of development, primarily due to the diffuse nature of the infrastructure. Data specifically evaluating the impacts of renewable energy facilities on desert tortoises remains limited, however two studies suggest that tortoise survival rates are relatively high. A study near Palm Springs in Riverside County estimated tortoise survival rate within a wind energy facility (WEF) and a nearby wilderness area (NWA) using data from 1997–2000 and 2009–2014 (Agha et al. 2015). They found "long-term tortoise survivorship within the WEF (96.7 %) was significantly higher than in the nearby NWA (92.1 %)" (Agha et al. 2015). This counter intuitive result may have been due to tortoises at the WEF benefiting from "edge enhancement of vegetation (food resources), turbine pads (artificial rain catchments), reduced subsidized predators and low traffic." (Agha et al. 2015).

Lovich et al. (2011) tracked tortoises at a wind energy facility near Palm Springs for six field seasons (1997–2000 and 2009–2010). The facility contained turbines, electrical transformers, and an extensive network of roads (Lovich et al 2011). Their estimated annual survivorship rate of 91.6% (confidence interval 90.5–93.5%) was based only on adult females, which is a much higher survival rate than has been reported in many areas across the range in California (see section 3.3). The authors suggested a few characteristics of the site that might have led to high survival rates including very restricted public access and fewer ravens. However, they cautioned that without before-and-after studies of the impact of energy facilities, of which there are very few, it is hard to draw conclusions about the long-term impacts of energy facilities on desert tortoise.

Development of a wind power project results in a variety of disturbances that are classified as temporary or permanent. Permanent impacts include land occupied by wind turbine pads, access roads, substations, and transmission lines. Temporary direct impacts include temporary roads, staging areas, and substation/transmission construction (Denholm et al. 2009). However, in desert ecosystems, 'temporary' disturbances may have decades-long impacts if sites are not actively rehabilitated. Denholm et al. (2009) collated data on the size of several wind projects in California including total size (land associated with the complete wind plant project) and area of direct (permanent and temporary) impact. Of the four projects with complete data, direct impacts accounted for 1.5–7% of the total area of the project.

Solar power plants have a different design and land use than windfarms. However, similar types of impact classifications occur. Direct impacts occur where land is occupied by solar arrays, access roads, substations, service buildings, and other infrastructure (Ong et al. 2013). Three types of solar power plants were evaluated in one study, and the percentage of total land that was directly impacted was between 38% and 100% of the project site (N=12 projects) (Ong et al. 2013). The impact of infrastructure to wildlife extends beyond the habitat that is directly modified, including fragmentation and barriers to gene flow, effects due to noise, vibration, and shadow flicker, electromagnetic field generation, macro- and micro-climate change, predator attraction, dust and dust suppressants, and increased fire risk (Lovich and Ennen 2011, 2013). A study in southern California compared wind farms with nearby areas and found that species richness, evenness, and diversity was lower on the farm sites for reptiles, birds, mammals, arachnids, and plants (Keehn and Feldman 2018). Renewable energy facilities are not sited within tortoise CHUs, however they can be close enough that the impacts listed above spill over into critical habitat (K. Berry USGS, pers. comm 2022).

Renewable energy projects that could potentially cause 'take' of desert tortoises must apply for incidental take permits (ITPs) from the Department or from the USFWS depending on jurisdiction (see section 5.1 for more detail). Between 2010 and 2021, the Department issued ITPs for desert tortoise for 49 renewable energy projects. In 2022, the Department completed ITP permitting for six renewable energy projects within San Bernadino and Riverside counties that would have a total footprint of about 10,600 acres (43 km^2). As of October 2022, the Department was in the process of reviewing or issuing ITPs for 14 more renewable energy projects in Riverside and San Bernadino counties that could potentially have footprints of up to 20,750 acres (84 km^2). Not all of these projects are necessarily sited within the recovery units or will end up receiving permits from the Department. However, it does show that there is increasing demand to use land within the Mojave Desert for renewable energy projects (for more information about ITPs, see Section 5.2).

Cannabis Operations

Illegal cannabis farms are an emerging threat to tortoises and their habitat in the Mojave Desert. Habitat is destroyed to put up greenhouses, and there are potential associated spillover effects like chemical leakage into stream beds, trash dumps, and other land disturbances beyond the footprint of the greenhouses. In addition, water and trash may attract and increase densities of predators like coyotes and ravens, and guard dogs are thought to kill tortoises (CDFW unpublished data, Holcomb 2022a, U.S. Fish and Wildlife Service 2022a). In the Department's Region 6, which includes the majority of desert tortoise range, as of 2022 there had been 3,065 acres (~12 km^2) of illegal cannabis cultivation visited by law enforcement. However, the Department acknowledges that there are vastly more illegal sites within tortoise range for which a law enforcement response has not been possible, therefore these numbers likely underestimate the true impacts. The presence of illegal cannabis farms can have additional indirect impacts on tortoise conservation. For example, according to USFWS (2022a), "illegal cannabis farms have already led to the cessation of raven monitoring and management efforts in the Fremont-Kramer Critical Habitat Unit in 2021, with the likelihood that tortoise monitoring in the same unit scheduled for 2022 will be cancelled due to safety concerns for field workers."

Legal cannabis cultivation also occurs within the desert tortoise range. Currently in Region 6 there are 2,394 acres (~9.5 km^2) of legal cannabis cultivation that have Streambed Alteration Agreements. The Department evaluates each development project individually for the purposes of the California Environmental Quality Act, and there has not been a robust analysis of the cumulative impacts to the species resulting from cannabis development in the area. Due to the newness of the threat, the overall impact on tortoises from illegal and legal cultivation has not been quantified. However, it a matter of increasing concern, and the current tools of permitting and law enforcement resources may not be sufficient to lessen the negative impacts on tortoises.

While the long-term impact of habitat modification and destruction resulting from all the land use types described above, along with any associated mitigation measures, is not fully known, the USFWS (2019a) states the impacts are "unlikely to be positive, despite the numerous conservation measures that have been (or will be) implemented as part of the actions." Although there are multiple science-based measures enacted to manage and mitigate threats, U.S. Fish and Wildlife Service (2019a) warns that they "have been unable, to date, to determine whether the expected benefits of the measures have yet been realized, at least in part because of the low reproductive capacity of the desert tortoise. Therefore, the conversion of habitat into areas that are unsuitable for this species continues the trend of constricting the desert tortoise into a smaller portion of its range".

Across the entire species range, it has been estimated that 7.4% of modelled tortoise habitat is now completely unsuitable for tortoise survival due to development and recent fire (Holcomb 2022*a*). Additionally, habitat is degraded in many additional areas as a result of factors such as off-highway vehicle use, wildfire, invasive plan species, and increased temperature due to climate change Therefore, focusing solely on the proportion of direct habitat loss in the desert tortoise range may be misleading and create an overly optimistic picture. With more than 90% of historical habitat still accessible, tortoise populations have declined severely in the past two decades.

4.2 Vehicle Strikes, Roads, and Fencing

Development of all types creates roads and other transport corridors that impact tortoises directly through vehicle strikes and as barriers to movement. Indirect impacts of transport corridors include habitat degradation including the spread of invasive species (Boarman et al. 1997, Brooks et al. 2005).

Desert tortoises are particularly susceptible to being killed on roads due to their slow rate of travel. Human behavior also plays a role. Boarman et al. (1997) anecdotally reported drivers intentionally swerving to hit turtles and tortoises. Even if drivers are not intentionally hitting tortoises, speeding on all types of roads can lead to unintentional but deadly strikes on tortoises (A. Ellsworth pers. comm. Nov 2022). Boarman and Sazaki (1996) estimated a kill rate of 1 tortoise per 2.4 km of road per year on Highway 58 in the western Mojave Desert, but warned their estimate was likely low because carcasses disappear quickly in the desert (likely due to scavenging). Anecdotal evidence from the Mojave Desert Preserve indicates an average of 5.3 tortoises are killed per year on the 216 km of paved road in the Preserve. Using 2008-2010 data from the Preserve, Hughson and Darby (2013) estimated that 31 female tortoises per year killed (on top of natural mortality) would be unsustainable, concluding that road mortalities may account for about ~9% of the excess mortality per year (assuming equal sex ratios). Juvenile dispersing tortoises are more likely to be killed on roads compared to adults (Boarman and Sazaki 1996).

Tortoises are often attracted to roads within their home ranges as places where appropriate forage plants grow and rain runoff collects (Boarman et al. 1997). However, impacts from direct mortality and increased access for predators near roads can result in the creation of reduced occupancy zones along roads, whose width can vary (Boarman et al. 1997). Two-lane paved roads in Mojave National Preserve had reduced occupancy up to 400 m away from the road (Hughson and Darby 2013). Boarman and Sazaki (1996) studied Highway 58 in California and found reduced occupancy up to 800m away. If the roads occur at a sufficient density, these zones could impact enough habitat to affect tortoise density across large scales. Although these results are only correlative, the TCAs that have road densities above 0.75 km/km^2 all had declines in tortoise densities between 2004 and 2014, while TCAs with less dense roads had both increases and declines in tortoise density (U.S. Fish and Wildlife Service 2022*a*).

Keeping tortoises off roads is a conservation priority (U.S. Fish and Wildlife Service 2022*a*). Well-constructed fencing designed to stop tortoises from accessing roads can lead to 93% fewer tortoise carcasses along highways as well as reducing road kills of other small vertebrates (Boarman and Sazaki 1996). Properly designed culverts under roads facilitate tortoise movements and help prevent fences from fragmenting tortoise populations (Boarman and Sazaki 1996). According to the USFWS (2022c):

> "Through 2011 approximately 1,660 km of highway roadside (including both sides of roads for those fenced on each side) had tortoise exclusion fencing installed to prevent road mortalities. Unfortunately, only approximately 43 km of roadside have been fenced in the decade since 2011. Almost 500 km of roadside have been identified as priorities for fencing based on our current understanding of road-effect zone area, relative habitat potential, and locations of extant populations (Holcomb 2019)."

Considerations that can slow or prevent fence building include cost, maintenance, visual disruption of the landscape, and loss of habitat during construction. At the October 2022 Desert Tortoise Management Oversight Group Meeting, the BLM reported that 3.5 miles of I-40 in the Ord-Rodman CHU will be fenced soon, and 5 miles of fence will be built soon in Mojave National Preserve. Other strategies to reduce tortoise mortalities on roads such as lowering speed limits, installing warning signs, and driver education have not been shown to be particularly effective (Hughson and Darby 2013).

Off-highway vehicles

Off-roading is a popular pastime in the California's deserts. According to the BLM, in 2008 there were four times the number of off-highway vehicles in the West than in 1998 (Bisson 2008). In Desert Wildlife Management Areas and CHUs, OHVs are legally required to stay on established roads and trails, while on the remainder of BLM land they can travel cross-country, although local BLM offices can enact further restrictions. OHVs and their associated unpaved trails lead to habitat degradation, but the impacts are thought to be generally less severe than paved roads.

OHV trails are typically <4m wide with a dirt surface, and are unimproved (i.e., they have never been bladed or filled) (Brooks et al. 2005). When the trails are created, it alters soils, vegetation, and some types of wildlife may potentially be killed. Tortoises can be run over on and off these trails and vehicles can crush burrows, depriving tortoises of refuge from extreme temperatures and drought. In areas of very frequent OHV use, multiple routes may merge into broad areas devoid of perennial vegetation 10–100 m or more across. These extremely high impact areas are rare, however there are large networks of OHV trails across the Mojave Desert which collectively can create significant changes to habitat and soils (Brooks et al. 2005). OHV trails change water runoff patterns especially on slopes and lead to greater erosion (Brooks et al. 2005). In addition, roads of all kinds can serve as pathways for invasive species. Inholding of private parcels within BLM land often are set aside for conservation, and OHV trails formally stop and restart at the boundaries. However, drivers often trespass across those private parcels, creating negative impacts for the tortoises even in areas that are designated as protected (A. Ellsworth, CDFW pers. comm. Oct 2022). The ecosystem or landscape-wide impact of OHV use can be hard to tease out in areas like the Mojave Desert that have multiple land uses, and Brooks et al. (2005) warned that “dispersed landscape effects … should be generalized very cautiously”.

The extent of OHV trails in desert tortoise habitat is hard to quantify, however the recent expansion of the Spangler, El Mirage, and Johnson Valley off-highway vehicle recreation areas under the 2019 John D. Dingell, Jr. Conservation, Management, and Recreation Act opened up an additional 60,000 acres (~242 km^2) of public land to cross country OHV use (U.S. Fish andWildlife Service 2022a). At the October 2022 Desert Tortoise Management Oversight Group Meeting, the BLM reported that there is a multi-year restoration project in Fremont-Kramer CHU to monitor and restore OHV routes.

4.3 Impacts from Invasive and Non-Native Species

Invasive Grasses and Forbs

Like many of the processes threatening desert tortoise, the impacts of invasive species are often tied to and synergistic with other factors such as livestock grazing, drought, and wildfire. Fueled in part by nitrogen pollution carried by wind from the Los Angeles Basin which enriches desert soils (Fenn et al. 2010), invasive Mediterranean grasses have spread through much of the Mojave Desert. These grasses create fuel for wildfires (Drake et al. 2015) and outcompete native annual plants (DeFalco et al. 2003). In 1995, 34 plots in the Mojave Desert near Barstow had frequencies of occurrence of 17% for *Bromus* and 38% for *Schismus* (both invasive grasses) (Brooks 1999). A more recent study sampled 718 plots across the Mojave Desert in 2009–2013 to investigate invasive grasses (*Bromus* spp. and *Schismus* spp.) and an invasive forb *(Erodium cictarium*). At least one of the invasive taxa occurred in 91% of the plots with herbaceous cover, and two or more of the species co-occurred in 77% (Underwood et al. 2019). Although these two methodologies are different, the general trend of increasing cover of invasive grass and forb species has occurred broadly across the Mojave Desert.

Berry et al. (2020b) summarized the impacts of invasive grasses on desert tortoise:

> “Tortoises avoid plants high in potassium and do not thrive on diets of native or non-native grasses. Both juveniles and adults lose mass and are out of nitrogen balance when consuming grasses (Barboza 1995a, b; Hazard et al. 2009, 2010; Drake et al. 2016). Grasses are high in fiber, contain less digestible energy, and little protein (Hazard et al. 2009), causing juveniles to lose phosphorus and potentially shell volume (Hazard et al. 2010). Because of numerous human activities, invasive, non-native, and fire-prone grasses became established in tortoise habitat and now contribute substantially to the biomass of annual plants in late winter and spring, the principal feeding time for the tortoise (Brooks and Berry 2006, Brooks and Matchett 2006, Brooks et al. 2006, Minnich 2008). These grasses compete with native forbs for nutrients (Brooks 2000a). A diet of grasses is insufficient in nutrients and leads to water loss during digestion (Hazard et al. 2009, 2010). In experimental studies, 32–37% of neonates and yearlings did not survive on a diet of grasses, whereas individuals in these size groups fed native

> forbs or a mix of native forbs and grasses had better body condition, immune functions, growth, and survival rates exceeding 95% (Drake et al. 2016)."

In contrast to grasses, the alien forb *Erodium* provided sufficient nitrogen and is of similar nutritional quality as a native forb (Nagy et al. 1998), allowing juvenile tortoises fed on forbs to gain weight (Hazard et al. 2009).

Livestock and other grazers

Grazing by livestock is a major part of the recent history of the desert. Until the 1990 listing of the desert tortoise as threatened under the ESA, grazing by livestock was allowed on BLM land in tortoise range (Berry et al. 2014). After listing, BLM banned livestock grazing in the CHUs. However, grazing is allowed on private inholdings within the CHUs, which are often unfenced. The documented impacts of livestock on tortoises include competition for food, trampling to death, and causing the collapse of burrows (see Berry and Murphy (2019)). Livestock also degrade habitat by creating or expanding trails via trampling which reduces annual cover and disrupts the soil surface, thus promoting wind erosion, and compacts the soil which slows future growth of annual plants (Webb and Stielstra 1979, Lovich and Bainbridge 1999). Livestock increase browsing pressure on the trees and shrubs tortoises require for shade and for establishing burrows (Berry et al. 2020a). Artificial watering sites set up for livestock concentrate activity of wild and domesticated large herbivores, potentially changing aspects of soil nutrients, compaction, seedbanks, and density of invasive species nearby. In a grazing allotment on BLM land in the west central Mojave Desert, cover of native plants decreased with increasing proximity to water site, while cover of alien (but not necessarily invasive) species increased (Brooks et al. 2006). This change in plant composition was observed up to 800m away from the watering site. Ninety-six percent of the alien plant cover was made up of three species, including the forb *Erodium cicutarium* and the alien grass *Schismus* spp. (Brooks et al. 2006).

4.4 Predation

Predation affects tortoises across age classes, with different species predating various age classes. While there have always been predators that target tortoises, the number of predators and their distribution on the landscape has increased in tandem with human development.

The best studied predators of tortoises are ravens and coyotes. These species are generalist predators which utilize a variety of habitats including human modified ones. Human presence in tortoise habitat provides food resources such as unsecured trash, water, and road-killed carcasses, and buildings and other structures that provide shelter (Boarman et al. 2006, Kristan and Boarman 2007). These 'resources bonanzas' (Kristan and Boarman 2007) allow raven and coyote populations to flourish, increasing predation pressure on native prey.

Raven populations have drastically increased in the Mojave Desert since the 20th century and have become a major predator of juvenile tortoises. This contrasts with population trends for many other bird species. Between the early 20th century and 2013–16, survey sites in the

Mojave Desert lost 43% of their bird species on average (Iknayan and Beissinger 2018). Ravens were the only species to substantially increase across survey sites. The probability that ravens would be detected at a survey site was on average 35% in the first half of the 20th century and 76% in 2013–2016 (Iknayan and Beissinger 2018). In 2020, surveys in Fenner, Ivanpah, Fremont-Kramer, Ord-Rodman, and Superior-Cronese CHUs found average densities of 0.63 ravens/km^2 in Fenner in the east to 2.44 ravens/km^2 in Fremont-Kramer in the west (Holcomb et al. 2021). This expansion of raven presence in extent and abundance is due at least in part to increased anthropogenic subsidies (Boarman and Berry 1995). Ravens spend their time near these subsidies (Boarman and Berry 1995, Boarman et al. 1995, 2006), which is one of the factors that leads to higher mortality for tortoises near human infrastructure than in open desert (Berry et al. 2006, Esque et al. 2010). As human infrastructure has increased in the Mojave Desert, the impact of raven predation on desert tortoise populations has likely increased. Nagy et al. (2015b) released 53 tortoises on Fort Irwin National Training Center in 2005, and 78% of the mortality of smaller tortoises (carapace 45–80 mm) was due to ravens, while coyotes were a major source of mortality for larger (111–175 mm) tortoises (Nagy et al. 2015*b*). High levels of raven predation on juveniles are thought to have led to far fewer juveniles being observed in the annual TCA surveys. In an area with a raven density of 2.4/km^2, the USFWS estimated survival of 0–12-year-old tortoises at 51%, which is much lower than in areas without ravens (Holcomb 2022*b*). Distance to the nearest raven nest impacts the survival rates of 0-10 year old tortoises. Using decoy tortoises, Holcomb et al. (2021) found that juvenile tortoises on average had an annual survival rate of 63% 500m from a raven's nest, while tortoises 1.72 km away had ~76% annual survival rates. They estimated that in areas where there were more than 0.89 ravens/km^2, and tortoises were less than 1.72 km from a nest, juvenile mortality would be great enough to cause population decline. If these criteria were applied to the Fremont-Kramer CHU, raven predation alone would likely have caused "inadequate" recruitment of juvenile tortoises across the majority of the CHUs over the past 20 years (Holcomb et al. 2021). Ivanpah and Fenner CHUs have fewer anthropogenic subsidies for ravens and therefore lower raven densities. However, the densities in those CHUs are high enough that predation pressure combined with drought, road mortality and invasive species together permit sustained recruitment of juvenile tortoises only in a few places. (Holcomb et al. 2021)

Predation pressure by ravens is not even across the tortoise range. In a study in the El Paso Mountains east of Bakersfield between 2008 and 2009, avian predators (mostly ravens) accounted for only 2.5% (on plot) and 3.7% (off plot) of observed mortalities (Berry et al. 2020*c*).

Coyotes are a major predator of adult tortoises. In a translocation study in the Superior-Cronese CHU, 158 tortoises were translocated from Ft. Irwin in 2008. Ten years later, 104 were dead, an estimated 60% of which were killed by coyotes (Mack and Berry 2023). Kelly et al. (2021) found that coyotes in the Mojave Desert predated more adult than juvenile tortoises while desert kit foxes focused on juveniles. In an examination of the dead tortoises found in the El Paso Mountains east of Bakersfield between 2008 and 2009, 20% of the carcasses found on the survey plots and about 52% of those found off plots were killed by mammalian predators including coyote, kit fox, and badger (Berry et al. 2020*c*).

There is also some evidence that canid predators focus more on females than males. In the Superior-Cronese CHU in 2008, Esque et al. (2010) found that tortoises suffered high levels of mortality (8.3–25% of tracked tortoises died in the year covered by the study), with the majority of tortoises found dead having been killed by predators (likely coyotes) and that females were more likely to be killed because they were smaller. They also looked at reference sites across the Mojave Desert and found that coyote predation on tortoises was strongly associated with the size of nearby human populations (Esque et al. 2010).

Other predators of tortoises include fire ants, white-tailed antelope squirrels, bobcats (Nagy et al. 2015*a,b*), red-tailed Hawks (Anderson and Berry 2019), rattlesnakes (Berry et al. 2016), domestic dogs (Berry and Murphy 2019), and badgers (Smith et al. 2016).

Like many threats facing desert tortoises, predation may be influenced by other factors including drought (Esque et al. 2010). The periods of extended drought may exacerbate coyote predation pressure due to low rodent and lagomorph numbers and coyotes switching to relying more on tortoises for food, however data on small mammal abundances that would provide direct evidence of this is lacking (Esque et al. 2010).

4.5 Climate Change and Drought

Anthropogenic climate change has led to higher annual average air temperatures in general as well as increased volatility of California's climate. Extreme events like drought and heat waves are more frequent, rainfall is increasingly variable, and flow regimes of rivers are changing (Bedsworth et al. 2018). These changes have led to observable shifts in species distributions and timing of life history events (Office of Environmental Health Hazard Assessment 2018). In California, Mojave Desert Tortoises inhabit the relatively cooler high Mojave Desert, and the hotter low Sonoran Desert. The western part of the tortoise range in the Mojave Desert gets most of its precipitation in the winter with only about 15% from summer monsoons, whereas the monsoons account for about 30% of yearly precipitation in the eastern deserts (Hopkins 2018).

Impacts of Increased heat

In the inland deserts of California, daily maximum temperatures warmed by 0.4–0.7°F (0.2–0.38°C) when 1976–2005 was compared to a historical base line of 1961–1990 (Hopkins 2018). Annual average maximum daily temperatures are projected to rise 5.6–8.8°F (3.1–4.9°C) by 2100 across the state generally as compared to a historical average from 1976–2005. In the already hot inland deserts, maximum daily temperatures are projected to see increases of up to 8–14°F (4.4–7.7°C) by 2070–2100, depending on the future emission levels of greenhouse gases (Hopkins 2018). It is projected that there will up to 141 days a year in the Mojave Desert when the temperature exceeds 95°F (35°C), with minimum daily temperatures projected to rise 4–7°F (2.2–3.8°C) by 2070–2100 (Hopkins 2018).

Under warming scenarios described above, desert tortoises will have fewer areas where they can stay within their physiological limits. As habitat area shrinks, tortoises are already heading upslope in some areas to escape the heat of the valley bottoms, a distribution known as the ‘toilet bowl effect’ (W. Campbell pers. comm. May 2022). This type of movement may become more difficult as temperatures increase and suitable upslope areas shrink. Sadoti et al. (2017) found that tortoises restrict their movements when it is hotter. While this is not necessarily surprising, if there are more days when it is too hot for tortoises to move, they might find it harder to move to avoid those hot temperatures and will have limited opportunities to disperse or find mates. However, the degree to which increased heat in the summer will shift mating season or impact reproductive success is unknown. Increased temperatures will make burrows as refugia from the heat more critical. Since only certain types of soils and substrates allow for creation of adequately long tunnels, available tunnel sites may become a critical habitat concern in the future and should be taken into consideration in conservation efforts (Mack et al. 2015).

Impacts of drought

Desert tortoises are adapted to drought and heat. However, increasing levels of both are likely to cause physiological stress, alter the availability of edible vegetation, and increase the impact of predation. Barrows (2011) lists some of the physiological and behavioral impacts of drought:

> “Drought conditions result in reduced tortoise activity (Duda et al., 1999) and lower metabolic and reproductive rates (Peterson, 1996a; Henen, 1997; Henen et al., 1998) although some breeding activity occurs even during periods of water stress (Henen, 1997). Despite these behavioral and physiological adaptations, during droughts tortoises experience as much as 40% loss of body mass and a 60% loss of water volume relative to body mass as well as large variations in blood osmolarity (Peterson, 1996b) and can have higher levels of mortality (Turner et al., 1984).”

California has undergone extreme drought recently with the 2000–2021 span being the driest in the southwestern US in the past 1,200 years (Williams et al. 2022). Although there is significant uncertainty regarding projected precipitation changes, current models show that winter precipitation is likely to increase in the inland deserts, but the summer monsoon precipitation could decrease up to 40% (Hopkins 2018). Precipitation events are likely to be more intense and at the same time soils are predicted to be drier, leading to more flash flooding (Hopkins 2018). The projected warmer and periodically drier conditions during the 21st century may increase the risk for more severe drought (Hopkins 2018).

Long-term drought has caused die offs of perennial plants in desert tortoise habitat, likely driven by lack of winter rain (McAuliffe and Hamerlynck 2010). Die offs were extensive but not homogenous, and soil conditions likely played a role (McAuliffe and Hamerlynck 2010). Tortoises are selective herbivores that will feed from a wide variety of available plants if necessary but primarily focus their observed foraging effort on a small set of species, many of which are so rare on the landscape they were not detected during plant surveys (Jennings and Berry 2015). Given predictions that winters may become wetter but summers drier (Hopkins

2018), the impacts of future droughts on the vegetation that tortoises rely on is unclear. Some invasive species of *Bromus* grasses are successful in disturbed habitats, and their presence in desert habitat has helped alter the fire cycle (Brooks 1999, Bradley et al. 2016). However, germination, growth, and reproduction are limited by temperature and rainfall which makes it difficult to predict the relative success of invasive grasses vs. native forbs under predicted climate changes (Bradley et al. 2016). It is possible that tortoises will also face increased nutritional stress if preferred plants die off and more nutrient poor grasses like *Bromus* remain available.

Lovich et al. (2014) used surveys in Joshua Tree NP from 1979 to 2012 to estimate the impact of persistent and recurrent drought on tortoise survival. Estimated population size decreased dramatically from 1996 to 2012, with high survival in 1978–1996, and lower survival in 1997–2002. The lower survival rates were concurrent to persistent drought, and estimated survival rates were best explained by winter precipitation. Being in a national park, tortoises in Joshua Tree should be sheltered from many anthropogenic impacts including large scale habitat modification and degradation and direct killing by humans. In addition, in 2012, many of the dead tortoises showed signs consistent with death by dehydration and starvation. Therefore, the authors concluded the decline was likely the result of reduced survival rates due to drought (Lovich et al. 2014). Other populations of desert tortoises have also shown a negative impact of drought on survival and abundance. Populations in Arizona of *G. agassizii* and *G. morafkai* were surveyed multiple times between 1990 and 2017 and experienced very low survival (30% in the Black Mountains and 34% in the Hualapai Mountains) during a drought, which led to a drop in adult abundances of about 50% (U.S. Fish and Wildlife Service 2022*a*).

Another potential source of indirect stress from increasing drought comes from predators. Under drought conditions, the rodents and lagomorphs that coyotes regularly prey on tend to be depleted, and it is likely that this leads to increased predation pressure on tortoises (Esque et al. 2010, Nagy et al. 2015*b*). Ravens particularly target juvenile tortoises, but since they are heavily subsidized by human activities, drought may have less of an impact on their predation behavior.

A major question is how much desert tortoise habitat will become unsuitable in the future due to heat and drought. Species have shifted altitude and/or latitude as climate has changed (Vanderwal et al. 2013, Wolf et al. 2016), but species that are not nimble dispersers may have trouble accessing new areas, and those areas may not contain the full suite of conditions necessary for survival. However, within current habitats, local refugia may persist in future climatic conditions and allow species to persist. Barrows et al. (2016) evaluated potential habitat refugia on US Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms and found that 33% of the study area (283,900 ha) supported desert tortoise habitat at the time. With a simulated 1°C (1.8°F) of warming, the amount of habitat shrunk by 25%, with remaining habitat occurring at higher elevation. Under a simulated 3°C warming, habitat area shrunk by 56% (to 127,650 ha). Of the remaining available habitat, 91% overlapped with current tortoise habitat, suggesting that climate refugia would be relatively easy for tortoises to access. However, it should be noted that while Barrows et al. (2016) considered 3°C (5.4°F) to be an end of century level of warming, California's 4th Climate Change Assessment from 2018 predicts that level of warming to occur in the inland deserts by 2039 (Bedsworth et al. 2018). In Joshua Tree National Park, desert tortoises are found in both the Mojave and Sonoran desert portions. Modelling by Barrows (2011) predicts that under 2°C (3.6°F) of warming with 50 mm decrease in precipitation, habitat area will decrease by about 88% in the Sonoran Desert portion and by about 66% in the Mojave Desert portion.

4.6 Fire

Desert tortoise habitat historically experienced few fires due to low plant productivity and sparse fuel loads, and those that did occur tended to burn in a patchy mosaic pattern (Esque et al. 2003). Consequently, desert tortoise are not well adapted to fire, although use of burrows can prevent mass casualties in fires (Esque et al. 2003). The expansion of invasive plants (primarily grasses like *Bromus*) has increased fuel loads in the Mojave Desert (Brooks 1999), and fire frequency in the California portion of the Mojave Desert increased between 1980 and 1995 (Brooks and Esque 2002). However, longer term studies looking at fires in 1980–2004 (Brooks and Matchett 2006) and 1992–2011 (Hegeman et al. 2014) in the Mojave Desert show no clear increase in numbers of fires or acres burned per year, though 2005 stood out since "the amount of area burned in the Mojave Desert was 385,357 ha (952,238 acres) (M. Brooks unpublished data), representing 132% of the total area that burned during the previous 25 years (Brooks and Matchett 2006). However, those time series do not include the 2020 Dome Fire in Mojave National Preserve which burned 43,273 acres (175 km^2) of higher elevation tortoise habitat (U.S. Fish and Wildlife Service 2022*a*). Fire-caused tortoise death is summarized in Berry and Murphy (2019)):

> "Woodbury and Hardy (1948) reported deaths of about 14 tortoises from a fire covering ca. 5.2 km^2 on part of the Beaver Dam Slope south of Bunkerville in 1942. In a post-fire study, Lovich et al. (2011c) described a fire in the western Sonoran Desert that killed an adult female tortoise and injured five other adult tortoises. Nussear et al. (2012) reported that three of 30 tortoises died from fire during a comparative study of translocated and resident tortoises. In the Red Cliffs Desert Reserve and critical habitat in Utah, 687 tortoises died in 2005 in a fire that burned ca. 23% of the approximately 251 km^2 habitat (A. McLuckie, pers. comm.). Drake et al. (2012) described a tortoise recovering from burns three years post-fire."

The effects of wildfire on vegetation can negatively impact tortoises. A study in the low elevation Mojave Desert shrubland found that invasive *Bromus* cover increased after one fire but did not continue increasing after additional fires (Brooks 2012). However, native vegetation cover decreased with multiple fires, with percentage cover dropping from about 25% to about 1% when fire frequency increased from one every ten years to three every ten years. Given the poor nutritional content of *Bromus*, increasing fire frequency threatens tortoises' ability to find sufficient and adequate food. Tortoises tend to remain in same areas after fire (Lovich et al.

2018), foraging for annuals in the burned areas, while using the cover of perennial shrubs only found in unburned areas (Drake et al. 2015).

The effects of a changing climate on wildfire size and frequency in desert tortoise habitat are uncertain. Increased winter rain could promote biomass growth that dries out in the hotter summers and increases fuel load (Tagestad et al. 2016). Alternately, the predicted increase in drought like conditions may keep fuel loads low. Another variable is the cause of ignitions. In the past 40 years, human caused fires were more prevalent in areas with high visitation levels such as low to mid elevation and desert montane zones, while lightning caused fires were more common in the central and eastern areas that get summer monsoons (Brooks and Matchett 2006). There are widespread campaigns and regulations aimed at reducing the chances that visitors will cause fires in the desert, and the efficacy of these campaigns may influence fire frequency and spatial distribution in the future. Overall, Hopkins (2018) suggests that strong temporal and spatial variability in precipitation and fuel load across the desert makes long-term and widespread trends in fire regime hard to predict.

4.7 Disease and Parasites

Desert tortoises are susceptible to a variety of diseases, some of which are likely to have caused or contributed to population declines. Upper respiratory tract disease (URTD) has been cited as a cause of population declines in desert tortoise and was a reason for listing under the ESA in 1990 (U.S. Fish and Wildlife Service 1990).

The disease can be caused by the bacteria *Mycoplasma agassizii* and *Mycoplasma testudineum*, while herpesviruses can cause similar symptoms (Johnson et al. 2005, Jacobson et al. 2014). The disease presents as lesions in the nasal cavity and inflammation of mucosa of the upper respiratory tract, mucal discharge from the nares, damaged nasal scales due to chronic mucal discharge, wheezing breath, swollen and watery eyes, and extreme lethargy (Jacobson et al. 1995, 2014, Johnson et al. 2005, Sandmeier et al. 2013). Tortoises that do not show clinical signs of infection can still serve as a reservoir for the disease and likely can transmit it to healthy tortoises (Jacobson et al. 1995). Transmission is most likely through direct contact that happens during courtship, mating, and fighting, and aerosol transmission is not likely (U.S. Fish and Wildlife Service 1990, Jacobson et al. 2014). The disease both directly kills tortoises and can interfere with their sense of smell and therefore their ability to forage for food and can potentially negatively affect their reproductive fitness (Germano et al. 2014, Jacobson et al. 2014). Sandmeier et al. (2013) found evidence that longer and colder winters correlated positively with the proportion of tortoises exhibiting URTD, possibly because time spent underground depresses the tortoise immune system or allows the bacteria to flourish.

Outbreaks of the disease occurred in the Desert Tortoise Natural Area in Kern County in 1989 when 627 dead tortoises were recovered during a survey, and 43% of 468 live tortoises had signs of the disease (Jacobson et al. 1991). The population declined by 90% between 1979 and 1992 (Berry and Medica 1995). In 1990–1995, Christopher et al. (2003) sampled tortoises in three sites in the Mojave Desert:

> "Of 108 tortoises, 68.5% had clinical signs of upper respiratory tract disease consistent with mycoplasmosis at least once during the study period. In addition, 48.1% developed moderate to severe shell lesions consistent with cutaneous dyskeratosis. Ulcerated or plaque-like oral lesions were noted on single occasions in 23% of tortoises at Goffs and 6% of tortoises at Ivanpah. Tortoises with oral lesions were significantly more likely than tortoises without lesions to have positive nasal cultures *for Mycoplasma agassizii* (P=0.001) and to be dehydrated (P=0.0007)"(Christopher et al. 2003).

More recent studies have found much lower prevalence of URTD. In the central Mojave Desert in 2005–2008, Berry et al. (2015) found only 1.49% of sampled tortoises were antibody positive, and a study in a similar area in 1997–2003 found 2.2% antibody positivity rate.

It is thought that the high prevalence of the disease in wild populations in the 1970s–1990s was due in part from infected captive tortoises being released into the wild. A number of factors are correlated with outbreaks of the disease, mainly factors that increase physiological stress in tortoises such as drought, heavy metal pollution, and human disturbance (Jacobson et al. 2014). Berry et al. (2015) pointed out that many of the stressors that increase tortoise vulnerability to disease, especially drought and proximity to human populations, are increasing in desert tortoise range. However, there have not been any large outbreaks documented in California recently, and in the Desert Tortoise Natural Area the disease has "evolved from an acute, epizootic disease with high mortality to a chronic endemic disease with variable morbidity, low mortality"(Jacobson et al. 2014). Reflecting the decreased level of threat currently posed by the disease, in their 2022 5-year review the USFWS stated that "direct disease management of wild tortoise populations is less important (other than in translocations of tortoises between populations) than managing factors that affect their habitat and its capacity to support healthy tortoises" (U.S. Fish and Wildlife Service 2022*a*).

Being captured by humans for research and/or translocation can stress tortoises and make them more susceptible to URTD. Therefore, official handling protocols have strict guidelines in place to minimize stress as much as possible (U.S. Fish and Wildlife Service 2020*b*, *a*). In addition, translocating sick individuals runs the risk of spreading URTD, so translocation protocols involve health assessments and quarantine to minimize disease transfer between populations (U.S. Fish and Wildlife Service 2020*b*). However, disease can be transferred by tortoises naturally dispersing, and reservoirs of the disease in populations outside of California should be considered in discussions of connectivity (Burgess et al. 2021).

Shell diseases like cutaneous dyskeratosis also affect tortoises and present as "abnormal conformation and loss of normal integrity of the horny layer (scute) of the shell and cutaneous scales. Deep shell defects may expose dermal bone" (Homer et al. 2001). Shell lesions were associated with high mortality rates of desert tortoises in Chuckwalla Bench in 1982–1988 (Figures 10 and 11, Jacobson et al. 1994). In 1979, 56% of the tortoises surveyed had shell lesions. The proportion of effected tortoises increased to 65% in 1982, to 90% in 1988, and remained high in 1990 at 87%. During those years the density of all tortoises (adults and juveniles) fell from 221/km^2 to 71/km^2, a 68% decline (Berry and Medica 1995). While the declines in population cannot be definitively tied to shell lesions, they could be a sign of a deficiency disease or toxicosis (Jacobson et al. 1994). There has been very little reported on shell disease in wild tortoises in California since the mid-1990s.

4.8 Overexploitation

Under the California Fish and Game Code, desert tortoises have had some legal protection from take or collection since 1961 (Fish & G. Code, § 5000). However, vandalism (gunshots) and collecting for pets were listed as reasons for population declines in the USFWS's 1990 decision to list the desert tortoise as threatened (U.S. Fish and Wildlife Service 1990). Before tortoises were listed, Berry (1986*b*) found that percentage of tortoise deaths from gunshots in California deserts (1972–1982) ranged from a low of 1.8% at Chuckwalla Bench to a high of 28.9% in the Fremont Valley. Overall, 14.3% of carcasses found had evidence of gunshots, with the areas with the highest percentage in the Western Mojave. In a 2008–2009 study in the El Paso Mountains in Kern County, 6 of 67 carcasses had evidence of gunshots (Berry et al. 2020*c*). Direct take of tortoises has been illegal since the species was listed under the ESA and CESA, however shooting of tortoises still occurs. Berry and Murphy (2019) reported gunshot deaths subsequent to listing in Fort Irwin National Training Center (1997-2003), Red Rock State Park (2002-2004), and the Desert Research Natural Area (2011).

Despite legal protection, Berry et al. (1996) (reported in Berry and Murphy (2019)) estimated that more than 2,000 tortoises were removed from four study areas over a 10-year period from the mid-1980s to the mid-1990s. It is likely some tortoises are still being taken from the wild, with those near roads most vulnerable. A study in the Sonoran Desert of Arizona in 2008–2009 placed decoy tortoises on roads and found 1.4% of drivers stopped and tried to collect the decoy by placing it in their vehicle. Drivers were more likely to notice the tortoises on maintained gravel roads compared to paved roads or unmaintained gravel roads. However, road type did not influence the probability a driver would try to collect the tortoise (Grandmaison and Frary 2012).

4.9 Other Human-related Activities

Mining and pollution

Although Spanish colonizers panned for gold in the Chocolate Mountains in the late 1700s, commercial mining in California deserts began in the 1800s. Prospectors and miners dug shafts to extract gold, tungsten, silver, copper, and other valuable materials (Shumway et al. 1980). Some of these shafts remain open and unfenced, and tortoises can fall in and become trapped (Berry and Murphy 2019). Mining also leaves behind pollutants of various types including mercury, arsenic, and lead that impact soil and plants (including those favored by tortoises) up to 15 km from mining sites (Chaffee and Berry 2006). These pollutants can enter tortoises via breathing, ingestion of impacted plants, or absorption through skin, and there is some concern that exposure to these toxins may make tortoises more susceptible to disease (Berry et al. 2015, Berry and Murphy 2019). Tortoises collected from the Kelly Rand Ming District northeast of California City and from Edwards Airforce Base had bioaccumulated arsenic in their shell plates compared to tortoises from areas with minimal land disturbance (Foster et al. 2009). However, Cohn et al. (2021) analyzed the blood of tortoises in the Ivanpah Valley and found that heavy metal levels in the blood were generally low (0%–7%), heavy metal levels in the soil did not exceed soil health guidelines, and there was no relationship between metal concentrations and body health or disease prevalence suggesting that tortoises were not negatively impacted by mining pollution in that area.

Deliberate Releases

Based on public comments received by the Department, well-meaning individuals may release captive tortoises, believing it will help wild populations. People may also release animals they no longer wish to keep as pets. The deliberate release of captive tortoises presents several issues. Captive tortoises can have high prevalence of respiratory diseases which could be passed on to wild tortoises if they are released (Berry et al. 2015). Releasing animals of unknown genetic origin, or even different species like *G. morfaka* or the Texas tortoise (*G. berlandieri*), could result in hybridization with wild *G. agassizii* (U. S. Fish and Wildlife Service 1994). The release of diseased captive tortoises was a large enough concern to be mentioned as reason for population declines in the 1994 Recovery Plan (U. S. Fish and Wildlife Service 1994), but we lack robust recent data on the current prevalence of releases and their effects. A public education campaign highlighting the downsides to freeing captive tortoises may help address this threat. Translocations of captive tortoises into the wild are also discussed in section 9.1.

4.10 Vulnerability of Small Populations

Desert tortoises occupy a large range in California, and even at very low densities, populations in conservation areas can still number in the thousands. However, the various factors described above have nonetheless led to dramatic declines in density and abundance across the surveyed critical habitat units (Figure 7, Tables 2 and 5. The most recent estimates of abundance in the Tortoise Conservation Areas are from 2014. In 2014, tortoise density in all the TCAs except Chocolate Mountain and Fenner was below the estimated 3.9 tortoises per km^2 needed for population viability (Table 2). Estimated abundances ranged from 1,241 in the Pinto Mountains TCA to 10,469 individuals in Chemehuevi TCA (Table 5). Although these estimates remain in the thousands, most of these areas encompass hundreds to thousands of square kilometers (see Table 1).

Table 5. Estimated abundance in the Tortoise Conservation Areas within California in 2014. Reported in U.S. Fish and Wildlife Service (2022a) using data from Allison and McLuckie (2018).

Recovery Unit	Tortoise Conservation Area	Estimated Abundance in 2014
Western Mojave	Fremont-Kramer	6,196
	Ord-Rodman	3,064
	Superior-Cronese	7,398
Eastern Mojave	Ivanpah	5,578
Colorado Desert	Chocolate Mountain	5,146
	Chuckwalla	9,304
	Chemehuevi	10,469
	Fenner	8,517
	Pinto Mountains	1,241
	Joshua Tree	4,319

Since 2014, estimated densities have declined in all the TCAs in the Western Mojave, Chuckwalla, and dramatically in the Chocolate Mountains. Ivanpah and Pinto Mountains TCAs have increased in density since 2014 but are still below the 3.9 adults/km^2 threshold. Chemehuevi and Fenner have both increased in density since 2014 and are above the viability threshold, while Joshua Tree has increased slightly in density and was at the 3.9 adults/km^2 threshold in 2020. We do not have estimated abundances that are based on these most recent density estimates, and the 2014 abundance estimates are based on amount of potential habitat in Nussear et al. (2009). Given all of the factors mentioned in the previous sections, it is likely that some suitable habitat has been lost since then due to destruction and degradation, meaning that in the TCAs where densities have gone up, abundances may not have increased concordantly. Systematic surveys of populations are not conducted outside of the TCAs, but Berry et al. (2020a, c) concluded densities and survival rates in the El Paso Mountains and the Chemehuevi Valley were so low that the populations were unviable.

Desert tortoise populations are currently vulnerable to demographic pressures that are likely to exacerbate declining trends if not addressed. Foremost is the lack of recruitment. Low reproductive output and high predation pressure on juveniles has led to a worrying lack of young tortoises (Figure 12). Even with thousands of adults in a population, if sufficient juvenile tortoises are not surviving to breeding age, the population will decline without interventions like head-starting.

The threshold density for population viability of 3.9 adults/km^2 assumes equal sex ratios in the population (U.S. Fish and Wildlife Service 2011). Unequal sex ratios are thought to lower effective population size which in small populations with limited connectivity could exacerbate inbreeding (Frankham 1995). Unfortunately, there are no published data on sex ratios in the 17 TCAs (Berry and Murphy 2019), and the recent data we have are from very limited short term sampling efforts elsewhere. Berry and Keith (2008) surveyed a ~4 km^2 plot in Red Rock Canyon

State Park, and in 2004 they found three males and one adult female. Five subadult or adult females and four subadult or adult males had died 2–4 years previously, and the authors point out that if those animals had survived, the sex ratio of the population would have been much more balanced. In a 1 mi^2 study plot in Joshua Tree NP, “Sex ratios, defined as the number of live males divided by the number of females, ranged from unity, to male biased (5:1), to female biased (0.22:1) across years with no trend in any one direction” (Lovich et al. 2014). As mentioned in the section on life history, the sex of the hatchling is heavily influenced by incubation temperature. As temperatures rise and heat extremes become more common due to anthropogenic climate change, it is likely that sex ratios at hatching will skew to be more female dominated, however the degree to which this will impact adult sex ratios is unknown. Increased reporting of the sex ratios during surveys in the TCAs would illuminate the severity of this issue and allow detection the predicted skew toward females if it were to occur.

5 EXISTING MANAGEMENT

5.1 Regulatory Status and Legal Protections

Federal

Federal Endangered Species Act
In August 1989, the USFWS listed the Mojave population of desert tortoise as endangered on an interim basis. Eight months later in April 1990, it issued a final rule to list it as threatened (U.S. Fish and Wildlife Service 1990). In July 2002, the USFWS received a petition to reclassify the species from threatened to endangered. In 2017, the USFWS announced a 90-day finding that the petition did not present substantial scientific or commercial information indicating that reclassifying the Mojave population of the desert tortoise may be warranted, and no status review was initiated in response to the petition. The USFWS has published status reviews in 2010 and 2022, both recommending that the threatened status be retained (U.S. Fish and Wildlife Service 2010, U.S. Fish and Wildlife Service 2022a). The 2022 status review uses much of the same data presented here and acknowledges that “the status of the Mojave Desert Tortoise had not improved by 2014 and most threats to the species persist at or above 2010–2011 levels. These conditions portend further status deterioration in the absence of concerted efforts by land managers to meaningfully reduce predator subsidies, vehicle-caused tortoise mortalities, and invasive annual plants in important tortoise habitats” (U.S. Fish and Wildlife Service 2022*a*). The recommendation to retain the threatened status was based on finding about a dozen *G. agassizii* in Arizona, east of the Colorado River and outside the boundaries of the recovery units, recognition that the range-wide population of tortoises is in the hundreds of thousands, and optimism that conservation actions will eventually result in population improvements (U.S. Fish and Wildlife Service 2022*a*).

National Environmental Policy Act
The National Environmental Policy Act (NEPA) requires federal agencies to assess the environmental effects of their proposed actions prior to making certain decisions. Using the NEPA process, agencies evaluate the environmental and related social and economic effects of

their proposed actions. Agencies also provide opportunities for public review and comment on those evaluations. Title I of NEPA contains a Declaration of National Environmental Policy. This policy requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 102 in Title I of the Act requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are to prepare detailed statements assessing the environmental impact of and alternatives to major federal actions significantly affecting the environment. These statements are commonly referred to as Environmental Impact Statements and Environmental Assessments.

5.1.2 State

California Law/Fish and Game Code

California law has long included protections for Mojave Desert Tortoise. In 1939, California state law prohibited purchase or sale of the species. In 1961, and additional law was passed to prohibit shooting, harming, or possessing the species (Fish & G. Code, § 5000). In 1972, the Fish and Game Code was amended to allow possession of tortoises as long as the tortoise was legally acquired (Fish & G. Code, § 5001).

California Endangered Species Act

On August 3, 1989, the Commission listed the desert tortoise as a threatened species under CESA. CESA prohibits the import, export, take, possession, purchase, or sale of Mojave Desert Tortoise, or any part or product of Mojave Desert Tortoise, except as otherwise provided by the Fish and Game Code, such as through a permit or agreement issued by the Department under the authority of the Fish and Game Code (Fish & G. Code, § 2080 *et seq.*). For example, the Department may issue permits that authorize the incidental take of listed and candidate species if the take is incidental to an otherwise lawful activity, the impacts of the authorized take are minimized and fully mitigated, the activity will not jeopardize the continued existence of the species, and other conditions are met (Fish & G. Code, §§ 2081, subd. (b).). The Department may also authorize incidental take through voluntary local programs and safe harbor agreements (Fish & G. Code, §§ 2086 and 2089.2 et. *seq.*) and for scientific, educational, or management purposes (Fish & G. Code, § 2081, subd. (a).). If the species is listed under both the federal ESA and CESA, a project that has received a federal incidental take statement or incidental take permit that is consistent with CESA can receive a consistency determination (CD) from the Department (Fish & G. Code, § 2080.1.).

Given the predominance of federal land in desert tortoise range, it should be noted that federal agencies undertaking federal projects on federal land are usually not subject to CESA and instead must typically consult with the USFWS to “ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats” (U.S. Fish and Wildlife Service 2022). However, non-federal entities working on federal lands are subject to CESA. For example, timber companies with permission to harvest timber on U.S. Forest Service lands must comply with both federal and state wildlife laws.

In 2000 and 2005, the Department prepared summary status reports describing the status of desert tortoise as declining (California Department of Fish and Wildlife 2000, California Department of Fish and Wildlife 2005). These reports summarize the status of all species listed as endangered, threatened, or candidate under CESA (Fish and G. Code § 2079), and are made available to the public on the Department's website. The 2005 report described the desert tortoise as severely threatened by population losses and further stated that tortoise populations were extremely low in some areas and may not have been viable (California Department of Fish and Wildlife 2005).

<u>California Environmental Quality Act</u>

State and local agencies must conduct environmental review under the California Environmental Quality Act (CEQA) for discretionary projects proposed to be carried out or approved by the public agency unless the agency properly determines the project is exempt from CEQA (Pub. Resources Code, § 21080). If a project has the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species, the lead agency must make a finding that the project will have a significant effect on the environment and prepare an environmental impact report (EIR) or mitigated negative declaration as appropriate before proceeding with or approving the project (Cal. Code Regs., tit. 14, §§ 15065(a)(1), 15070, and 15380.). An agency cannot approve or carry out any project for which the EIR identifies one or more significant effects on the environment unless it makes one or more of the following findings: (1) changes have been required in or incorporated into the project that avoid the significant environmental effects or mitigate them to a less than significant level; (2) those changes are in the responsibility and jurisdiction of another agency and have been, or can and should be, adopted by that other agency; or (3) specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or alternatives identified in the environmental impact report (Pub. Resources Code, § 21081; Cal. Code Regs., tit. 14, §§ 15091 and 15093.). For (3), the agency must adopt a statement of overriding considerations finding that the overriding benefits of the project outweigh the significant effects on the environment. CEQA establishes a duty for public agencies to avoid or minimize such significant negative effects where feasible (Cal. Code regs., tit. 14, § 15021.). Impacts to Mojave Desert Tortoise, as a CESA-threatened species, must be identified, evaluated, disclosed, and mitigated or justified under the Biological Resources section of an environmental document prepared pursuant to CEQA.

Nonregulatory Status

<u>Natural Heritage Program Ranking and IUCN Red List</u>

Natural heritage ranking does not provide any regulatory protections but is often considered during the CEQA process (Hammerson, G.A. et al. 2008). All Natural Heritage Programs, such as the CNDDB, use the same ranking methodology originally developed by The Nature Conservancy and now maintained by NatureServe. This ranking methodology consists of a global rank describing the rank for a given taxon over its entire distribution, and a state rank describing the rank for the taxon over its state distribution. Both global and state ranks reflect a combination of rarity, threat, and trend factors. The ranking methodology uses a standardized calculator that uses available information to assign a numeric score or range of scores to the taxon, with lower scores indicating that a taxon is more vulnerable to extinction, and higher scores indicating that a taxon is more stable (Faber-Langendoen et al. 2012). The rank calculation process begins with an initial rank score based on rarity and threats, with rarity (multiplied by 0.7) factored more heavily into the calculator than threats (multiplied by 0.3). The combined rarity and threat rank is then either raised or lowered based on trends. When there is a negative trend, the rank score is lowered, and when there is a positive trend the rank score is raised. Short-term trends are factored more heavily into the calculator than long-term trends. International Union for Conservation of Nature (IUCN) and NatureServe assess extinction risk for species using a time period of 10 years or 3 generations, whichever is longer, up to a maximum of 100 years (Faber-Langendoen et al. 2012).

Mojave Desert Tortoise has been assigned a global rank of G3 indicating the species is “vulnerable and at moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors”. This species has been assigned a state rank of S2 indicating the species is locally imperiled and “at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors”. The factors cited for this rank include widespread habitat loss, degradation, and fragmentation, and human-associated factors that cause mortality (NatureServe 2022).

The IUCN Red List provided a global scope assessment of Mojave Desert Tortoise in October 2021 (Berry et al. 2021) resulting in a designation of critically endangered. This Red List category represents the highest risk of extinction and is assigned when a taxon has been evaluated against the ranking criteria and is not yet designated Extinct in the Wild, but qualifies above endangered, vulnerable, and near threatened. The species was originally assessed as vulnerable in 1996 and its designation has steadily increased in severity (Berry and Murphy 2019).

5.2 Management Efforts

Due to its large range and the decades since it was formally protected under the ESA and CESA, a diverse suite of government and other entities are involved in land ownership and management within the range of Mojave Desert Tortoise (Table 6). The majority of land is managed by federal agencies, but the range also includes a substantial portion of private lands. The BLM is responsible for managing nearly 11,000 km^2 of Mojave Desert Tortoise critical habitat and is the largest landowner within the species range. The NPS is responsible for the next largest section of the range, most of which is congressionally designated Wilderness Areas where motorized vehicles are prohibited. Private lands and DoD lands comprise most of the remaining land ownership within the species range.

Table 6. Land ownership within the entire range of Mojave Desert Tortoise and within designated critical habitat.

Land Management Entity	Landownership in Species Range (Km^2)	Percent of Landownership in Species Range (%)	Landownership in Critical Habitat (Km^2)	Percent of Landownership in Critical Habitat (%)
United States Bureau of Land Management	37,960	42.5	10,917	56.6
United States National Park Service	18,418	20.6	3,702	19.2
Private Lands	15,147	17	1,730	9.0
United States Department of Defense	13,018	14.6	2,270	11.8
State of California	2,018	2.3	485	2.5
Cities, Counties, Non-Profits, Special Districts	995	1.1	114	0.6
Other Public or Private Lands	391	0.4	30	0.2
Other Federal	79	0.1	19	0.1
United States Bureau of Indian Affairs	689	0.8	NA	NA
United States Forest Service	242	0.3	NA	NA
United States Bureau of Reclamation	181	0.2	NA	NA
United States Fish and Wildlife Service	89	0.1	NA	NA

Partnerships and Working Groups

The Desert Tortoise Management Oversight Group (MOG), formed in 1994, is comprised of senior managers from USFWS, BLM, state transportation agencies, state wildlife agencies, county governments, and non-governmental organizations (NGOs) that work in the tortoise range in Arizona, Nevada, and California. This group identifies regional recovery priorities, addresses issues common to multiple agencies, and shares information and updates about tortoise status and their recovery activities.

The Recovery and Sustainment Partnership (RASP) is comprised of DoD and Department of Interior agencies and is intended to provide increased flexibility for the use of land for military operations (i.e., make it easier to conduct training in areas with tortoise populations) in return for developing recovery initiatives. Under this partnership, agencies contribute to a pooled funding source to implement recovery actions such as raven management in California. Pooled funding and the Memorandum of Understanding between RASP partners allows for increased flexibility and reduced regulatory hurdles for implementation of broad, regional scale recovery actions.

The California Desert Conservation Act (Fish & G. Code, § 1450 et seq.) became effective on January 1, 2022, and establishes a California Desert Conservation Program within the California Wildlife Conservation Board with the goals of protecting habitat in California's Mojave and Colorado deserts by planning and implementing land acquisition and restoration projects. The California Desert Conservation Program could result in increased conservation or restoration of Mojave Desert Tortoise habitat in California.

United States Fish and Wildlife Service

The USFWS has developed and revised range-wide Recovery Plans for Mojave Desert Tortoise that encourage collaboration, identify research priorities, and encourage management actions for the benefit of the species. In 1994, the USFWS published the first Recovery Plan and designated more than 25,000 km^2 of critical habitat, most of which is in California (U.S. Fish and Wildlife Service 1994). The plan identified Desert Wildlife Management Areas and included management recommendations such as landscape-level management and monitoring, public education, and habitat protection (U.S. Fish and Wildlife Service 1994). In 2008 and 2011, the USFWS published revisions to the Recovery Plan which identified research priorities and recovery actions, including facilitation of recovery partnerships, protection of existing populations and habitat, supplementing populations, and implementing adaptive management (U.S. Fish and Wildlife Service 2011). In 2010, the USFWS published its first 5-year review for Mojave Desert Tortoise across its multi-state range, in which they assigned a recovery priority number indicating that the species faces a moderate degree of threat, has a low potential for recovery, and faces conflict with construction or other development projects or other forms of economic activity. The USFWS recommended no change in status from threatened to endangered, in part because implementation of the 2008 Revised Recovery Plan was expected to resolve key uncertainties and improve recovery potential. In 2022, the USFWS published another 5-year review reporting the continuing declines in density in all of the California Tortoise Conservation Areas except Joshua Tree in 2004–2014 (see Table 2), but also recommended no change in the listing status of the Mojave Desert Tortoise (U.S. Fish and Wildlife Service 2022*a*). For more detail see section 5.1.

As part of the revised 2011 Recovery Plan, Recovery Implementation Teams were developed, which are "composed of representatives from government agencies and non-profit organizations. Participants in these teams prepare proposals for recovery actions, seek funding to support the proposals, and assist with implementation when funding becomes available" (Berry and Murphy 2019). Recovery Implementation Teams have focused on restoration of habitat burned and/or denuded by livestock, trash management to subsidize predators, invasive plant control, roadway fencing, and other conservation and management actions (Berry and Murphy 2019).

Bureau of Land Management

The 2016 Desert Renewable Energy and Conversation Plan (DRECP) Land Use Plan Amendment to the California Desert Conservation Act Plan of 1980 guides management of 10 million acres (~40,469 km^2) of BLM lands, some of which is Mojave Desert Tortoise habitat. The entire DRECP Plan Area covers approximately 22.5 million acres (~91,054 km^2) of federal and non-federal land. Phase I of the DRECP focused on the BLM lands and was released as a Land Use Plan Amendment (LUPA). Phase II will focus on county-level planning designed to work in conjunction with the LUPA. Along with many other agencies and stakeholders, the Department was involved in the development of the DRECP but is not a signatory to the 2016 LUPA.

Under the DRECP, 11,290 acres (~46 km^2) of modeled desert tortoise habitat would eventually be developed for renewable energy, with a streamlined permit review process (Bureau of Land Management 2016). The LUPA contains numerous conservation and management actions, including establishment of a cumulative limit (no more than 1%) on ground-disturbing activities within BLM-owned portions of TCAs and mapped linkages. The plan amendment further prohibits long-term habitat removal in high density tortoise areas (more than five tortoises at least 160 mm carapace length per square mile, or more than 35 individuals in total), but gives an exception for transmission projects. Outside of the development focus areas intended for renewable energy, the plan amendment includes actions that are more protective of desert tortoises than direction contained in the previous land use plan (U.S. Fish and Wildlife Service 2022*a*).

National Park Service

Management of the Mojave Desert Tortoise on NPS lands is guided by the NPS Organic Act of 1916, the ESA of 1973, the Wilderness Act of 1964, the 2006 NPS Management Policies, and each unit's General Management Plan (GMP), Superintendent's compendiums, and Resource Stewardship Strategies. Broad conservation actions are outlined in GMPs and specific closures and updates to prohibited actions are contained in the Superintendent's compendium. Examples include prohibitions on use of Unmanned Aircraft Systems (drones), limits on use of artificial lights to view wildlife, requirements for food storage and trash management, and commitments for restoration of disturbed areas and/or mitigation of direct vegetation impacts.

In desert tortoise range, the NPS administers Joshua Tree National Park, Death Valley National Park, and Mojave National Preserve. The majority of lands across these three units are congressionally designated Wilderness, including nearly 50% of lands in Mojave National Preserve, approximately 85% of lands in Joshua Tree National Park, and roughly 93% of lands in Death Valley National Park. The Wilderness Act of 1964 is intended to preserve places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (Wilderness Act section 2, subd. I). Most notably, use of offroad vehicles and motorized equipment is prohibited in Wilderness areas.

The NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the NPS "shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations…to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The NPS Management Policies indicate that Parks will "meet its obligations under the National Park Service Organic Act and the Act to both pro-actively conserve listed species and prevent detrimental effects on these species." This includes working with other agencies and partners to implement management programs which inventory, monitor, restore, and maintain listed species habitats. The Mojave Desert Inventory & Monitoring Network of the NPS regularly implements monitoring programs at all three NPS units focused on desert spring riparian vegetation and water quality as well as upland vegetation and soil characteristics that might influence the survival of Mojave Desert Tortoise.

United States Department of Defense

The Sikes Act was established in 1960 to ensure conservation and protection of natural resources used by the DoD. The U.S. Congress amended the Sikes Act in 1997 requiring the DoD to develop and implement Integrated Natural Resources Management Plans (INRMPs). These plans outline how each military installation will manage its significant natural resources holistically while maintaining military readiness. Since these lands are often protected from access and use by the general public, they may contain some of the more significant remaining large tracts of habitat and play important roles for species conservation and habitat connectivity.

Under the ESA, the DoD is responsible for managing and protecting the threatened and endangered species found on its installations. DoD is required to consult with the USFWS and National Oceanic and Atmospheric Association (NOAA) Fisheries to manage their threatened and endangered species efforts (Dalsimer 2016).

DoD facilities within the Mojave Desert Tortoise range include Naval Air Weapons Station China Lake, Edwards Air Force Base, Fort Irwin, the Marine Corps Air Ground Combat Center, and the Chocolate Mountain Aerial Gunnery Range. DoD is an active collaborator in the MOG and RASP partnerships and contributes funding to many recovery actions. Unlike most other federal land, tortoise habitat under DoD jurisdiction is “subject to more dramatic changes in management or use than other Federal lands depending on the changing national security situation” (U.S. Fish and Wildlife Service 2011). This means that large tracts of desert tortoise habitat can relatively quickly be converted to uses that are incompatible with desert tortoise, requiring translocation of large number of tortoises (see section 4.1 for more details). To offset these losses of tortoise habitat, the DoD undertakes a variety of actions such as purchasing land in critical habitat units, increasing law enforcement, predator control and monitoring, rehabilitation of closed roads, and installation of fencing.

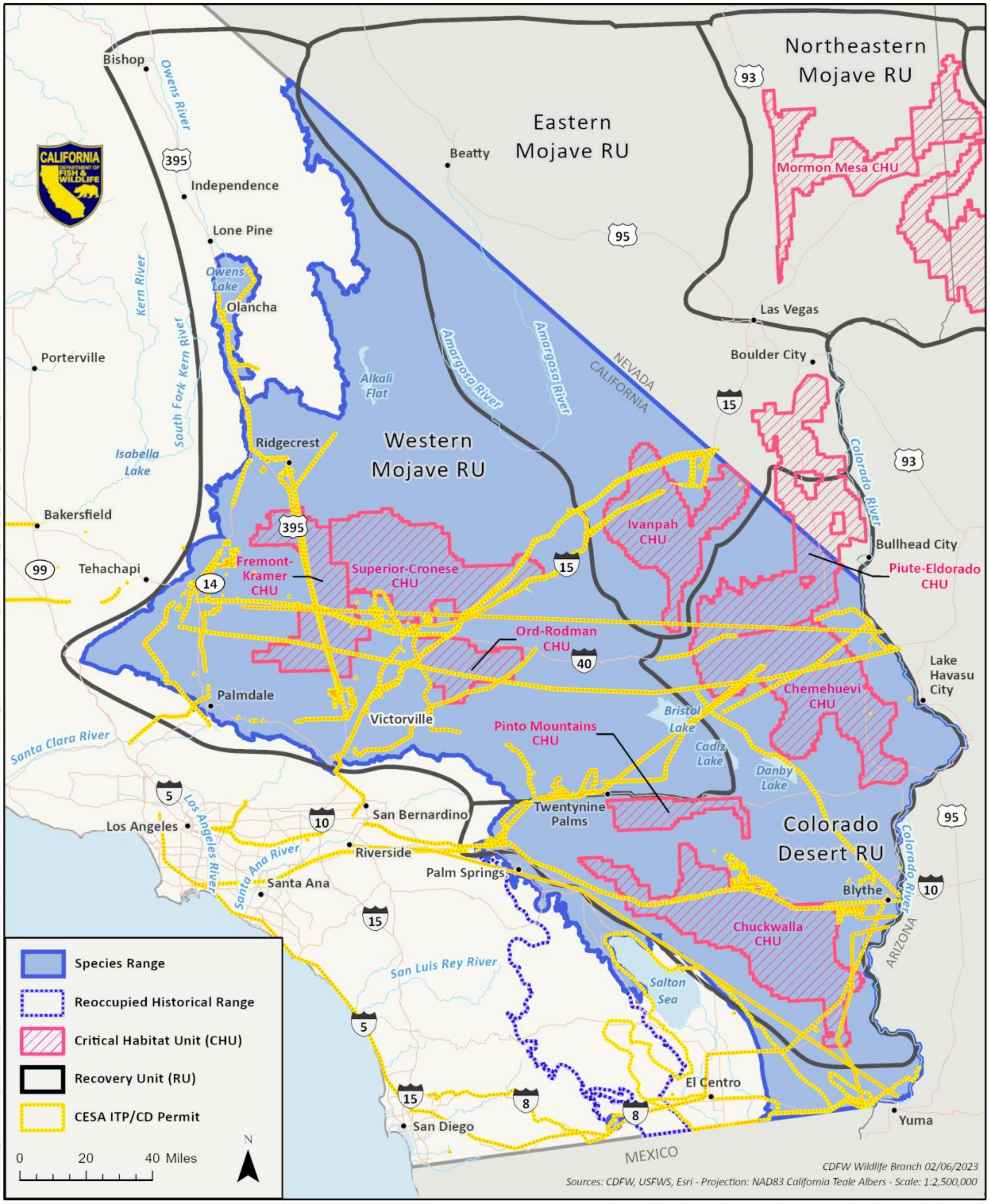
California Department of Fish and Wildlife

CESA prohibits the unauthorized take of desert tortoise, but the Department may permit take that is incidental to otherwise lawful activities if the impacts of the take are minimized and fully mitigated. These permits are commonly called incidental take permits.

The Department is required to determine what qualifies as "full mitigation" for each permit on a case-by-case basis. As a practical matter, perpetual protection and management of habitat mitigation lands has often been the type of mitigation required. In addition, projects may have to implement a variety of measures to minimize take of tortoises including but not limited to surveying and monitoring for their presence, fencing to keep tortoises out of the project site, relocating of nests to safe offsite locations, translocating tortoises on the project site, and managing ravens on the site.

Since 1989, CDFW has issued 192 ITPs and 49 CDs covering incidental take of Mojave Desert Tortoise; the most common project types include renewable energy, transportation, and utility infrastructure (for locations of permitted projects see Figure 13). The Department's records are not complete; however, at minimum these permits authorize 62,131 acres (~250 km^2) of permanent impacts and 14,672 acres (~59 km^2) of temporary impacts (based on data available about temporary acres from 36% of ITPs and 79% of ITPs for permanent impacts). The ratio at which projects have to protect and manage mitigation habitat varies on a project-by-project basis, however projects sited in federally designated Critical Habitat are generally mitigated at a 5:1 ratio and other habitats at around a 3:1 ratio depending on quality. Permit holders have multiple options when choosing mitigation lands but must typically provide for permanent protection and perpetual management of habitat for the listed species either on the project site or at another location approved by the Department. This requires transfer of fee-title and/or recordation of a conservation easement, to which the Department must be at least a third-party beneficiary, funding of short-term management practices and a long-term management endowment, and monitoring to ensure compliance with the conservation easement. Alternatively, permittees may purchase credits at conservation and mitigation banks.

The desert tortoise is addressed in several Natural Community Conservation Plans (NCCPs) and Habitat Conservation Plans (HCPs) in California, including the West Mojave Plan, the Coachella Valley Multi Species Habitat Conservation Plan (MSHCP), and the California Energy Commission's Habitat and Species Protection Research Project. The Coachella Valley MSHCP area supports a small, but significant population of desert tortoise in Riverside County (CDFW 2005). This MSHCP includes all federally designated critical habitat within the plan area as part of the Desert Tortoise and Linkage Conservation Area.



Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.

Figure 13. Map of Incidental Take Permits (ITPs) and Consistency Determinations (CD) in the general area of Mojave Desert Tortoise range in California. The linear permit areas are for energy transmission lines, pipelines, fiber optic lines, and other linear features. Other types of projects are represented as polygons.

6 SUMMARY OF LISTING FACTORS

The preceding sections of this status review describe the best scientific information available to the Department, with respect to the key factors identified in the regulations. This section considers the significance of any threat to the continued existence of Mojave Desert Tortoise for each of the factors.

6.1 Present or Threatened Modification or Destruction of Habitat

Like many species, habitat loss and degradation are major concerns for desert tortoise. Tortoises are sensitive to habitat alteration by development and an estimated 66% of Mojave Desert Tortoise habitat has some development within 1 km (Carter et al. 2020). The direct impacts of development include removal of soil and vegetation, destruction of burrows, and creation of roads and other infrastructure that can kill tortoises or hinder their movements (Boarman and Sazaki 1996, 2006). Large amounts of desert tortoise habitat are open to renewable energy development, off road driving, or is under DoD jurisdiction and could be used for training or associated infrastructure development. For example, in the past 10 years, a net of ~150,000 acres of the ~3,000,000 acres (~607 km^2 of ~12,140 km^2) of viable desert tortoise habitat under DoD jurisdiction have been eliminated (U.S. Fish and Wildlife Service 2022*a*).

Tortoises are less likely to utilize areas that have even a low level of development. Carter et al. (2020) found that "encounter rates for both live and dead Mojave desert tortoises combined decreased significantly with increased development levels" and that when "10% of the area within 1 km of that location has been altered by development", it was rare to find live or dead tortoises at that location. To date, models show that only 5% of Mojave Desert Tortoise habitat falls into that category (Carter et al. 2020). However, as the demands for housing and renewable energy facilities increase in the desert, it is likely that the amount of development within or near tortoise habitat will continue to increase.

Currently there are about 62,000 acres (about 250 km^2) permitted to be permanently impacted by renewable energy projects within desert tortoise range in California. Wind and solar farms alter the habitat in permanent and temporary ways (though some alterations considered to be temporary can have impacts lasting decades in the desert. Studies of the impacts of wind farms on tortoises indicate that tortoises can survive on some farm sites, and that in some cases their survivorship may be higher on farms than in surrounding areas. However, such studies are few and the impacts of wind and solar farms on tortoises remain uncertain. Roads and OHV routes are a direct threat to tortoises through roadkill, as well as habitat degradation and fragmentation. The proliferation of such features in desert tortoise habitat adversely impacts tortoises, especially since the installation of exclusion fencing has been limited over the past decade. Other factors that degrade habitat include increasing temperatures and potential drought frequency, which are expected to reduce the ability of current habitat areas to support tortoise populations in the future.

Invasive grasses have caused widespread impacts to desert tortoise habitat. These grasses, mostly *Bromus* and *Schismus* species, are outcompeting native grasses and forbs that tortoises preferentially eat. The invasive grasses lack sufficient levels of the nutrients that tortoises need to survive and consuming them leads to increased water loss. The impact seems especially acute on juvenile tortoises and is likely being a factor in the low survival rates for juveniles seen in some areas. The grasses also intensify the fire cycle which in turn decreases the amount of native vegetation that is an important food source for tortoises.

Loss of habitat is traditionally considered to be one of the major drivers of species declines worldwide. However, direct loss of habitat may be less of an issue for desert tortoises than habitat degradation. Although current estimates indicate more than 90% of historical habitat still available (only 7.4% of modelled habitat is currently considered completely unsuitable (Holcomb 2022*a*)), tortoise populations have declined severely in the past two decades. Habitat degradation through road construction and off-vehicle vehicle use, fire, invasive species outcompeting native plants, and increasing temperatures due to climate change have likely reduced the quality of much of the remaining habitat. Therefore, focusing solely on the proportion of habitat loss in the desert tortoise range as a means of measuring population impacts may be misleading and create an overly optimistic picture.

6.2 Overexploitation

People still shoot and collect desert tortoises but seemingly not at the frequencies seen in the late 20th century. This may have to do with changing human behavior patterns or because there are simply fewer tortoises on the landscape for humans to encounter. Overexploitation is not currently considered a major threat to Mojave Desert Tortoise.

6.3 Predation

Predation, especially by ravens and coyotes, is a significant factor in desert tortoise population decline. Ravens (and to lesser extent coyotes) are subsidized by the infrastructure, water, and food around human development, and their populations have dramatically increased in recent decades. Ravens preferentially target juvenile tortoises, and since clutch sizes are low and tortoises can take 12–20 years to become sexually mature, decreased juvenile survival is likely an important factor in many areas with declining tortoise densities. Given the slow life history traits of tortoises, lower juvenile survival will be a long-term issue for the population, impacting populations for decades. Coyotes can kill older tortoises, and in some areas are a significant cause of death meaning that even in the unlikely scenario where the threat from ravens is eliminated quickly, predation could remain an issue and recovery is unlikely to be swift.

6.4 Competition

There is some direct competition with livestock for food however there is not much recent data on the severity of the impacts specifically in California. In a recent paper on anthropogenic stressors to desert tortoises, livestock grazing is listed as a threat in Nevada but not California (Tuma et al. 2016).

6.5 Disease

Upper respiratory tract disease has been cited as a cause of population declines in desert tortoise and was a reason for listing under the ESA in 1990. It is thought that its high prevalence in wild populations in the 1970s through 1990s was due in part to infected captive tortoises being released into the wild. Drought, heavy metal pollution, and human disturbance increase physiological stress in tortoises and are correlated with outbreaks of the disease (Jacobson et al. 2014). Berry et al. (2015) points out that many of the stressors that increase tortoise vulnerability to disease, especially drought and proximity to human populations, are increasing in desert tortoise range. However, there have not been any large outbreaks causing mortality documented in California since the 1990s. There is not currently significant concern about the disease in wild populations, although great care still needs to be taken during translocations to prevent any accidental spread.

6.6 Other Natural Occurrences or Human-related Activities

Climate Change

Climate change is a major threat which will also intensify other threats. The predicted increase in heat and periodically drier conditions increase the chances drought in California through the end of the century will increase the amount of time tortoises experience physiological stress, decrease the amount of suitable habitat, and likely negatively alter the vegetation they rely on. Climate change in general is causing governments to invest in the expansion of wind and solar farms, and the number of proposed renewable energy projects in desert tortoise habitat are increasing. The DoD considers climate change a major threat to global stability (U.S. Department of Defense 2021) and predicts that global climate change will intensify political unrest worldwide. This makes it possible that training activity in the many military bases in desert tortoise habitat will increase in the future, converting more land from suitable tortoise habitat to training areas, and requiring large scale translocations of resident tortoise as mitigation.

Fire

Desert tortoise habitat historically experienced few fires due to low plant productivity and sparse fuel loads, and those that did ignite generally burned at low severity in a patchy mosaic pattern. Consequently, desert tortoise and the vegetation they rely on are not well adapted to fire. Tortoises have some direct protection from fire as they spend much of their time underground. The expansion of invasive plants (primarily invasive *Bromus* species) has increased fuel loads, though over the long-term fires have not become more common in the desert. Fire directly causes some tortoise death and further changes the vegetative community making it more difficult for tortoises to find nutritious foods.

Mining

Mining has a long legacy in desert tortoise habitat. Some mining shafts remain open and unfenced, and tortoises can fall in and get trapped inside. Mining leaves behind pollutants of various types including mercury, arsenic, and lead that impact soil and plants (including those favored by tortoises) up to 15 km from mining sites. Tortoises can absorb the pollutants via breathing, eating impacted plants, or absorption through skin, and exposure to these toxins may make tortoises more susceptible to disease. Though there is evidence pollution from mining has negative impacts on tortoise health, it does not appear to be a major threat to tortoise populations.

6.7 Summary of Key Findings

Historical and current conservation efforts have not proven sufficient to halt the population declines of desert tortoise. The most robust estimates of densities come from annual systematic surveys done in the Tortoise Conservation Areas, which include the Critical Habitat Units and contiguous areas with potential tortoise habitat and compatible management. These surveys began in 2004 and cover large areas of the best tortoise habitat. Taken as a whole, these surveys provide strong evidence that most tortoise populations in California have declined rapidly over the past two decades. Estimated rates of annual decline in density in the TCAs for 2004–2014 were between 3.3% and 10.8% per year, which is unsustainable for most species, but especially for such a long-lived and slow-reproducing species as the desert tortoise. Sixty percent of the TCAs currently have densities below 3.9 adult tortoises/km^2 which is the density considered necessary for population viability, while another 30% are at the threshold. Only one TCA currently has density above the 3.9/km^2 population viability threshold. While we do not have estimates of density in all the TCAs prior to the desert tortoise being listed as threatened, densities in the early 1980s in select TCAs varied between 35 and 90 adults/km^2, and between 35 and 70 adults/km^2 when they were listed as threatened under CESA in 1989. It is estimated that densities of adults in certain TCAs fell between 89% and 97% from the early 1980s to 2020–2021. Since the late 1970s, the number of juveniles detected on surveys has also fallen sharply, to the point that in recent surveys in the Western Mojave almost no juveniles were found. Overall, the population data available from the last 20 years continue to document tortoise declines in most sampled areas populations in in many TCAs, which represent much of the best habitat, are no longer considered viable.

Due to the slow components of tortoise life history, if past and current management is successful at mitigating threats and adverse impacts to tortoises, it would still take at least 25 years of positive population growth to reach the USFWS Recovery Criteria (U.S. Fish and Wildlife Service 2022*a*). For example, in the USFWS 1994 Recovery Plan they estimate that when adult survivorship is 98%, population growth would be less than 0.5% per year, and would take 140 years to double in size. Annual survival rates for both adults and juveniles in many areas are much lower than 98%, making population stability, let alone growth, unlikely. Collectively, the available data show that despite 30 years of state and federal protection, in the critical habitat units (which are considered to be the best tortoise habitat), most tortoise populations have continued to decline and do not show consistent signs of recovery. In most regularly surveyed areas, tortoise densities are below the thresholds considered to represent population viability.

The dramatic declines in Mojave Desert Tortoise populations have likely resulted from the extensive number and interconnected nature of the threats facing tortoises in California. The important threats fall in two categories, those that directly kill adults and juveniles, and changes in habitat suitability that make it less likely to support healthy populations.

Particularly in long-lived species that are slow to reproduce, decreased survival has long lasting impacts on the population and can alter demographic patterns for decades. Predation pressure from ravens and coyotes reduce the survival of juvenile and adult tortoises respectively. Increasing development removes or reduces habitat suitability and creates roads and increased traffic that can endanger tortoises. Extensive networks of trails for off-highway vehicles on public lands increase the chance that tortoises will be run over even in areas without paved roads. Well-designed fences and culverts can help prevent tortoises and other wildlife being killed by vehicles along major roads, but many primary roads remain unfenced and little fencing has been built since 2011.

Habitat modification and destruction reduces the amount of habitat that can support tortoises in the long-term. Development in the desert will likely continue and possibly speed up given California’s need for housing and renewable energy (Office of Governor Gavin Newsom 2021). The Department of Defense is a large landowner in desert tortoise range and frequently expands the areas that it uses for training, requiring translocation of hundreds of tortoises. Large scale tortoise translocations do not tend to have high survival rates. It is hard to predict the amount of land the DoD will convert into training areas in the future, but given the increases of the federal defense budget over the past 20 years (Wikipedia 2023), military training needs are not likely to decrease.

Additional factors have direct and indirect impacts on tortoises and their habitat. Climate change, which is likely to make desert tortoise range hotter and drier, will increase tortoise physiological stress and change activity patterns. The nutritious native plants tortoises preferably feed on are being outcompeted by nutritionally poor invasive grasses, which can lower tortoise survival rates. Fires fueled by invasive grasses are becoming more common, which decreases the amount of native vegetation available for tortoises to feed on.

Some threats appear to be declining. Upper respiratory tract diseases were a major concern when tortoises were listed as threatened. Encouragingly, the prevalence of diseased tortoises is lower than in previous decades, and it does not currently appear to be an acute threat to wild populations. The prevalence of gunshot deaths also decreased in the past several decades, but it is unclear if this is due to change in human behavior or simply reflects a lower tortoise encounter rate due to declining tortoise density.

There is still a large amount of available habitat and even at low densities, in 2014 there were estimated to be more than 61,000 adult tortoises within the TCAs. However, that is a decrease from an estimated ~310,000 adults in 2004, and as densities have continued to fall since 2014, current abundance is likely lower than 60,000 adult tortoises, and in 60% of the TCAs the populations are below the densities needed for viability. Given that there are multiple interacting threats that are reducing the amount and quality of viable habitat and lowering survival rates of adults and juveniles, the available information suggests that tortoise populations will continue to decline for the foreseeable future. However, several of the major threats like raven predation on juveniles and the lack of fencing on highways can be minimized with the appropriate resources and policy changes. Implementing these actions where appropriate to improve survival in the short term is critical to give desert tortoises the resilience to be able to weather longer term habitat and climactic effects.

7 PROTECTION AFFORDED BY LISTING

It is the policy of the state to conserve, protect, restore and enhance any endangered or any threatened species and its habitat (Fish & G. Code, § 2052). If listed as an endangered rather than a threatened species pursuant to CESA, unauthorized “take” of Mojave Desert Tortoise will remain prohibited and its conservation, protection, and enhancement will remain a statewide priority. As the Mojave Desert Tortoise is already listed as threatened, public agency environmental review is required under the California Environmental Quality Act (CEQA) and its federal counterpart, the National Environmental Policy Act (NEPA). There are no changes in legal protections under CESA for species changed from threatened to endangered.

However, if the status of the Mojave Desert Tortoise is changed to endangered under CESA, it may increase the likelihood that state and federal land and resource management agencies will prioritize and allocate more funds towards protection and recovery actions. The federal and state listings of the desert tortoise as threatened stimulated a great deal of interest and funding in addressing basic questions about the species, with expanded research into status and distribution of populations, ecology, genetics, and diseases, as well as collaborations to minimize conflict among the many users of desert tortoise habitats. It also triggered the creation of a federal Recovery Plan and the numerous conservation and management measures outlined in the Existing Management Section. However, funding for species recovery and management is limited, and there is a growing list of threatened and endangered species. Therefore, while a status change pursuant to CESA will highlight the urgency of tortoise conservation needs, the management effects of such a change are uncertain.

8 RECOMMENDATION FOR THE COMMISSION

CESA requires the Department to prepare this report regarding the status of Mojave Desert Tortoise in California based upon the best scientific information available to the Department (Fish & G. Code, § 2074.6). CESA also requires the Department to indicate in this status review whether the petitioned action is warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)). Based on the criteria described above, the best scientific information available to the Department indicates that Mojave Desert Tortoise is in serious danger of becoming extinct in California due to one or more causes including present or threatened degradation and loss of habitat, predation, and other natural occurrences and human-related activities.

The Department recommends that the Commission find the petitioned action to change the status of Mojave Desert Tortoise from threatened to endangered to be warranted.

9 MANAGEMENT RECOMMENDATIONS

CESA directs the Department to include in its status review recommended management activities and other recommendations for recovery of Mojave Desert Tortoise (Fish & G. Code, §

2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f).). The USFWS created a Recovery Plan for desert tortoise in 1994 which was revised in 2011. This is currently the most comprehensive framework of actions needed to recover the desert tortoise, and many of the recommendations are still very relevant. For our recommendations we borrow heavily from the framework in the 2011 revised Recovery Plan, include examples of recent progress, and point out specific areas where the Department could engage more. We also focus on specific actions like translocation and head-starting that have been in use for multiple years to examine what evidence there is that they have been effective.

9.1 Actions

This document is not a Recovery Plan; however, it is useful to identify the conservation goals that the management recommendations are meant to achieve.

In brief, the USFWS Recovery Plan includes the following objectives:

1. Maintain self-sustaining populations of desert tortoises within each Recovery Unit into the future.
   – Criteria: Rates of population change (λ) for desert tortoises are increasing (i.e., $\lambda > 1$) over at least 25 years (a single tortoise generation)
2. Maintain well-distributed populations of desert tortoises throughout each recovery unit.
   – Criteria: Distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years (i.e., ψ [occupancy] > 0)
3. Ensure that habitat within each recovery unit is protected and managed to support long-term viability of desert tortoise populations.

The major elements of the USFWS Recovery Plan strategy to achieve these objectives are:

1. Develop, support, and build partnerships to facilitate recovery.
2. Protect existing populations and habitat, instituting habitat restoration where necessary.
3. Augment depleted populations in a strategic manner.
4. Monitor progress toward recovery.
5. Conduct applied research and modeling in support of recovery efforts within a strategic framework.
6. Implement a formal adaptive management program.

For each of the strategies in the Recovery Plan, the USFWS includes specific measures to contribute to those strategies. We do not list all of these specific measures here, but instead discuss the strategies and measures that are most relevant and important to recovery in California and highlight those which the Department may have a role in implementing.

1. Develop, support, and build partnerships to facilitate recovery.

There are multiple existing partnerships to facilitate recovery of desert tortoise (see section 5.2 Management Efforts). The Department could become more active in the MOG, participate in Recovery Implementation Teams, and strengthen maintain relationships with state and federal agencies to collaboratively address priorities such as highway fencing and translocation.

2. Protect existing populations and habitat, instituting habitat restoration where necessary.

Here we focus on the issues most relevant to California.

a. Conserve intact desert tortoise habitat
The majority of land (63.1%) in the tortoise range is under stewardship of the BLM or the NPS and receives some level of protection (see Table 6). Future habitat conservation efforts should consider how habitat suitability will change in the coming decades under predicted climate change and ways in which habitat can be restored and made more resilient and/or habitat degradation can be ameliorated.

b. Secure lands/habitat for conservation.
Projects that will potentially result in incidental take of tortoises may apply for an ITP from the Department. As a condition of the ITP, the Department must require any impacts to the desert tortoise to be fully mitigated. This requirement is most often met through the perpetual protection and management of off-site habitat. CDFW should continue to focus on securing high quality habitats through the ITP process and through other means (e.g., facilitating recovery land acquisitions through grants, facilitating conservation easement, etc.). The USFWS also issues take authorizations that ask for mitigation in the form of land protection. For more detail see section 5.2 Management Efforts.

As mentioned previously, “the Army acquired approximately 100,000 acres (~405 km^2) of nonfederal land within the Superior-Cronese Critical Habitat Unit for conservation management of desert tortoises. It also purchased the base property of three cattle allotments on which the Bureau subsequently re-allotted the forage to wildlife” (U.S. Fish and Wildlife Service 2022*a*).

c. Connect functional habitat
Low genetic differentiation among desert tortoise populations in California (Hagerty and Tracy 2010) suggests that historically there were few barriers to movements and mixing, aside from large mountain ranges and other significant climatic or vegetative barriers. However, this is effectively no longer the case, and instead there is what is more accurately described as a metapopulation (Berry and Murphy 2019, Desert Tortoise Council 2022) where habitat patches are separated by roads, housing, agriculture, industry, energy projects, and military activities.

The strategy outlined in the 1994 Recovery Plan suggests that habitat patches of at least 2590 km^2 (1,000 mi^2) are needed in each recovery unit to “contain a viable population of desert tortoises that is relatively resistant to extinction processes” (U.S. Fish and Wildlife Service 1994). Multiple TCAs are smaller than 2,590 km^2, therefore protecting corridors between TCAs so that tortoises can disperse is key for conservation of metapopulations. Tortoises within isolated patches are at higher risk of extirpation due to the usual risks to small populations—

stochastic catastrophes like drought and fire, reduction in genetic variation, and potential associated losses of fitness (Boarman et al. 1997, Berry and Murphy 2019, U.S. Fish and Wildlife Service 2022*a*). While many of the patches share the same threats, given the differences in land use and management across the desert tortoise's range, individual patches should be managed to minimize the most severe threats for that patch. The USFWS (2019a) points out that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas) will make "recolonization of extirpated areas difficult, if not impossible."

Land is not equally protected across CHUs, creating potential barriers between areas of functional habitat. We recommend focusing the compensatory habitat purchases and other types of land acquisitions on connecting functional habitat. The BLM is acquiring several thousand acres of checkerboard inholding in Chuckwalla Critical Habitat Unit which will improve connectivity to Joshua Tree National Park.

d. *Fence, restrict, designate, close roads and routes*

In order for functional habitat to be connected, tortoises need to be able to move and not be isolated in patches. A major action to achieve this is to erect tortoise fencing and crossings along roads.

Erecting tortoise exclusion fencing along major roadways and funneling them into well designed crossings is a key recovery action. There are 500 kms (~310 mi) of road identified as priority for fencing (U.S. Fish and Wildlife Service 2022*a*). Currently, the regulations on highway fencing have made it extremely difficult and expensive to install tortoise fencing and are a major reason that there was very little tortoise exclusion fencing installed between 2011 and 2022. Under current practice, when an applicant applies for an ITP for a road project that includes tortoise exclusion fencing and culverts for crossing, the area of land inside of the fence including the median between lanes of traffic is considered to be habitat that is impacted and the impacts need to be fully mitigated through land acquisition. The costs of procuring land adds substantial costs to fencing projects, to the point that much needed fencing is not getting built. To speed up the building of fences, the Department can work with CalTrans and other agencies to reduce cost and administrative burden of building tortoise exclusion fencing. Having more flexibility in the measures that are used to fully mitigate the impacts of road projects will help speed up progress on recovery actions. At the moment there are some fencing projects in process, including the first phase of a BLM effort to build 3.5 miles of fencing along I-40 in the Rod-Ordman Critical Habitat Unit. In the Mojave National Preserve there is a road rebuilding project that includes 5 miles of tortoise fencing.

In addition to fencing paved roads, we recommend closing and restoring unauthorized OHV routes in CHUs.

e. Minimize excessive predation on tortoises

Implementing multiple actions simultaneously is necessary to slow the expansion of predator populations. The DoD and the USFWS have active programs to reduce anthropogenic subsidies to ravens and coyotes by securing trash and water sources and reducing the number of nesting and roosting sites created by infrastructure. The USFWS has a program to reduce raven populations via egg oiling with a goal of no raven nests in areas that are a priority for tortoise recruitment (K. Holcomb, USFWS Raven Management in CA. MOG April 16 2022).

f. Restore desert tortoise habitat

Restore closed OHV trails, and work to reduce non-native invasive grasses from desert tortoise habitat. Areas degraded by off road vehicles in Fremont Kramer Critical Habitat Unit are being restored by the BLM and Marine Corps Air Ground Combat Center Twentynine Palms is restoring habitat as part of implementing RASP.

g. Minimize factors contributing to disease (particularly upper respiratory tract disease)

Continue to discourage the release of pet tortoises into the wild. Monitor and quarantine translocated tortoises to make sure they are not diseased before relocation following recommendations in U.S. Fish and Wildlife Service (2020b).

h. Establish/continue environmental education programs

Environmental education is a preventative action that has been shown to effectively change learned behavior and can be used to reduce stakeholder conflict before it happens (Hungerford and Volk 1990). An educated public is more likely to be aware of the consequences they can have on desert tortoises and to be more willing to take responsibility for their actions than those with less knowledge (Vaske and Donnelly 2007). Aggressive and widespread efforts in museums, hunting clubs, and in BLM and NPS visitor centers and interpretive sites are needed to inform the public about the status of the desert tortoise and its recovery needs (U.S. Fish and Wildlife Service 2011).

Interpretive kiosks or visitor centers should be used to disseminate information about the desert tortoise and the need for regulated access and use of habitat. Education programs should include such subjects as husbandry and adoption programs for captive tortoises, the importance of discouraging unauthorized breeding of desert tortoises in captivity, and the illegality under State laws of releasing captive tortoises into wildlands. Education efforts should be focused on groups that use the desert on a regular basis, such as rock-hounds and off-highway vehicle enthusiasts. Additional educational tools include public service announcements, news releases, informational videos, brochures and newsletters, websites, and volunteer opportunities (U.S. Fish and Wildlife Service 2011).

i. Increase law enforcement.

Increase efforts to enforce rules banning off-roading by OHVs in Desert Wildlife Management Areas and CHUs.

3. Augment Depleted Populations through a Strategic Program

Population augmentation is currently accomplished through two types of projects, translocation and head-starting. Translocation involves moving tortoises from a site where they would be harmed and into an appropriate recipient site. Head-starting is a strategy to reduce predation mortality on juvenile tortoises by hatching and rearing juveniles in captivity until they are large enough to avoid most predators.

a. Translocation

Proposed projects that could result in incidental take of tortoises may apply for an ITP. As part of the minimization measures, tortoises in the project area are translocated to pre-approved recipient sites.

There are a number of considerations that need to be taken into account when tortoises are translocated as laid out in the USFWS Plan Development Guidelines (U.S. Fish and Wildlife Service 2020*b*). Major concerns include the habitat suitability of potential translocation sites and the possibility of disease transfer from transplants to resident tortoises. The Department requires that ITP holders monitor any tortoises translocated, and has teams carefully examine recipient sites for soil and vegetation communities that are suitable for all life stages of tortoise, evaluate the presence and abundance of predators, and make sure there are sufficient burrows of appropriate size so that translocated tortoises can quickly find shelter. Most of the tortoises translocated under ITPs granted by the Department are placed within 4 miles of the donor site and the number of tortoises translocated for any project is usually less than 50. Due to the consistent efforts to find suitable recipient sites, deaths from translocation via dehydration or predation are rare (CDFW unpublished data, W. Campbell pers comm Jan 2023). However longer-term success of those translocations is not known.

However, there is evidence that larger scale translocations are not very successful. This is likely because it is much more difficult to find recipient sites that are suitable for larger numbers of tortoises. If donor sites are chosen because resident populations are depleted or have low densities, they may not have the capacity to maintain higher densities of tortoises in general and might not be able to support large numbers of translocated animals (U.S. Fish and Wildlife Service 2011). For example, sites with a depleted population due to habitat modification or degradation may currently be at a low carrying capacity and not be able to support many transplants because the site lacks sufficient food or burrows to support more individuals, or it simply is too hot. In the spring of 2008, 570 tortoises (184 females, 293 males, 93 juveniles) were translocated from the southern edge of Fort Irwin National Training Center to neighboring public land in the Superior-Cronese Critical Habitat Unit. Esque et al. (2010) tracked the survival of the translocated tortoises and within a year, 25% of them died. In the same translocation event, (Mulder et al. 2017) found that the males that survived were not fathering hatchlings. Even though translocated males made up 46% of the males they genotyped in the population, all hatchlings that could be assigned fathers were sired by resident males. A different study examined drivers of survival when 158 adult tortoises were translocated from Ft. Irwin to release sites 7.36–42.54 km from their home sites (Mack and Berry 2023). The tortoises were tracked for 10 years. Thirty-nine percent died in the first year, more than 50% were dead by the end of the third year, and after 10 years about 66% were confirmed dead and another 15% missing. Most of the dead tortoises were killed by coyotes. After 10 years, survival was highest in the site closest to the site they had been taken from, and across the study males were more likely to survive. Low survival is not limited to the translocated tortoises; in the same time period the density of resident tortoises also declined. Supplementation of the resident population by translocated individuals does not appear to stabilize populations, as explained by (Mack and Berry (2023):

> "In 2004–2005, prior to translocation, the USFWS (2015) estimated densities of resident adult tortoises at 6.4 adults/km2 for the Superior-Cronese critical habitat unit where the translocation later occurred. In contrast, densities of adults on release plots at the time of release were approximately 40/plot or 15.5/km2, more than two times that of the surrounding resident population. Several decades ago, habitat may have supported ≥15 adult tortoises/km2 in the region (USFWS 1994, Berry and Murphy 2019). Declines in abundance occurred prior to, during, and after the release; the USFWS (2015) reported a 61.5% decline in adult tortoises in the Superior-Cronese critical habitat unit between 2004 and 2014 to 2.4 adults/km2, despite additions of several hundred tortoises from the NTC translocation project in 2008. By 2017, the density of adults had declined further to 1.7 adults/km2 (USFWS 2018)."

Further evidence that translation has not necessarily increased the recipient populations in California comes from Ord-Rodman Critical Habitat Unit. In 2014, the estimated density of tortoises in Ord-Rodman was 3.6 adults/km^2 with an estimated abundance of about 3000 adults (Tables 2 and 5). Between 2017 and 2019, 724 adult tortoises were translocated into the Ord-Rodman TCA due to expansion at 29 Palms Marine Corps Air Gunnery Command Center. From 2017 on, the surveys kept track of the densities of all adults and of residents adults only (Figure 14) (U.S. Fish and Wildlife Service 2018, 2019*b*, 2020*a*, 2022*c*, *b*). Although the initial influx of a large number of translocated adults pushed the population back up to 3.9 adults/km^2 in 2017, in subsequent years the density of residents and all adults fell and has stayed below the threshold for population viability since.

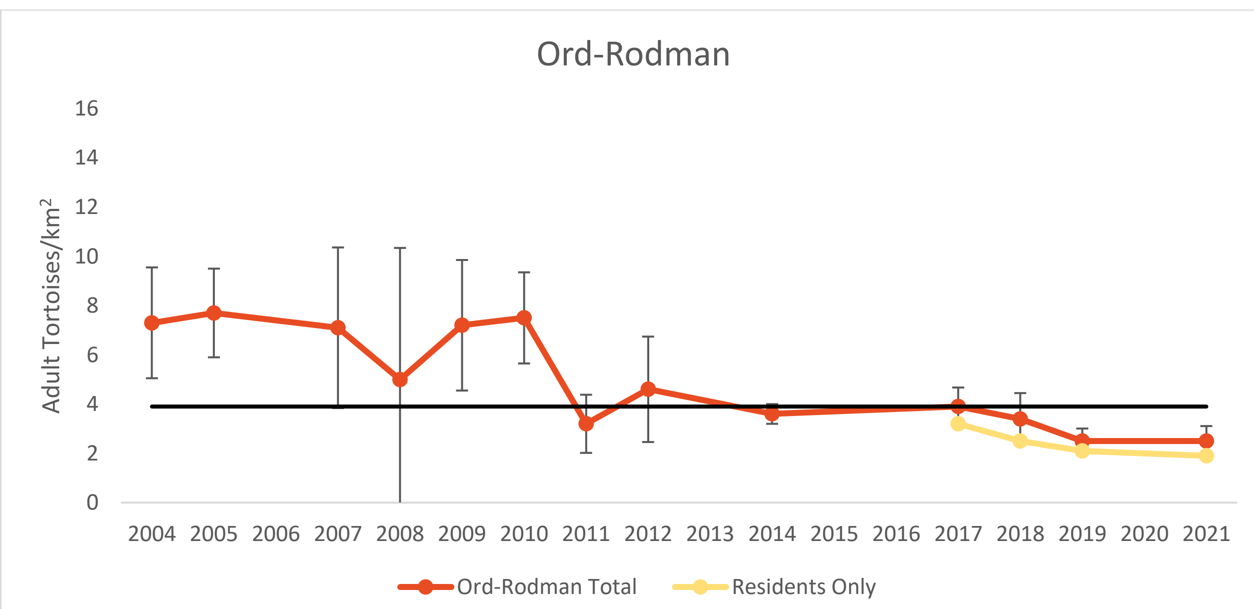


Figure 14. Estimated densities of adult tortoises (≥ 180 mm carapace length) in the Ord-Rodman TCA in the Western Mojave Recovery Unit 2004–2021. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. Error bars are standard errors calculated from reported coefficients of variation. The Residents Only density is for adults that were not translocated, the Ord-Rodman Total is the density of residents plus the translocated tortoises starting in 2017.

Nor has translocation been successful just across the Nevada border from the Ivanpah Critical Habitat Unit. As Scott et al. (2020) reported:

> "In 1996, the 100-km^2 Large-Scale Translocation Site (LSTS) was established. The LSTS is located in the Ivanpah Valley near Jean, Nevada, within the natural range of the tortoise, and is surrounded by either a tortoise-barrier fence or relatively inhospitable mountains….Between 1997 and 2014, ~9,105 tortoises (~50.2% of which were adults) of unknown provenance were translocated to the LSTS, where they intermingled with an estimated 1450 adult local tortoises that were natural residents at the site. Most native and translocated tortoises in the LSTS have since died, consistent with steep declines in neighboring populations and likely furthered by high post-translocation densities and less comprehensive health screening during the first decade of the translocation program. However, roughly 350 adults were estimated by line-distance surveys to be alive in 2015"

The failure of these large and long-term translocations to either keep translocated tortoises alive or the resident population stable suggests translocation may often not be an effective management strategy. The majority of the tortoises translocated into LSTS came from captivity and were likely not well adapted to surviving in the wild, which is likely a factor in their high death rates. Most official translocations in California involve moving wild tortoises from a project site to a nearby area, and so may not face the same difficulties in survival that releasing captive tortoises appear to create. However, the evidence from Ord-Rodman suggests that even an addition of large numbers of new adults to a nearby area can slow but does not prevent population declines. The low survival rates of translocated adults and the lack of genetic integration of males suggest that large scale translocation may not provide much recorded benefit to recipient populations and does not necessarily remove the translocated tortoises from harm's way. Thus, identification of the reasons for the depleted population in the recipient site is important to ensure translocation is conducted in a manner appropriate to facilitate survival, and to prevent its failure as a minimization measure.

An additional consideration is how far to translocate individuals. When tortoises must be translocated from large tracts of land such as on military bases, translocating individuals close to their home ranges is not feasible. Long distance translocation involves potential mixing of genetic subunits and possible maladaptation to the environment, and investigations into the genetic makeup of the source and recipient populations can help mangers make appropriate decisions (Weeks et al. 2011). Averill-Murray and Hagerty (2014) used microsatellite loci and concluded that "releasing tortoises at recipient sites within a straight-line distance of 200 km from the source population would most conservatively maintain historic genetic population structure.” However more recent work by Sánchez-Ramírez et al. (2018) using Single Nucleotide Polymorphisms (SNPs) suggests that there are there are three genetic subunits within the Western Mojave Recovery Unit and translocating them at distances of 200 km away could mix individuals from different genetic units.

Given the long-term decline of tortoise populations, understanding the population impacts of translocation across the state is critical. ITP holders monitor translocated tortoises for 5 years and submit reports to the Department. These data should be organized and analyzed in order to understand long-term survival rates of translocated individuals and the impacts of potential population fragmentation (see section 9.3). Increased collaboration should occur between agencies that perform translocations to understand the landscape and population impacts of short- and long-range translocations and coordinate research on disease dynamics, recruitment rates, and gene flow (U.S. Fish and Wildlife Service 2020*b*).

b. Head starting

Head-starting is a strategy to try to circumvent the high mortality of juvenile tortoises in the wild (see sections on Survival and Predation). Population modeling suggests that increased juvenile survival can improve population growth rates and is a factor managers can manipulate relatively easily (Berry and Murphy 2019). Eggs are hatched in captivity and juveniles are reared until they reach a certain size and then released. There is some evidence that this strategy appears to be effective at least in the short term (Nagy et al. 2015*a,b*, Tuberville et al. 2019), however, mortality is high for juveniles smaller than 100 mm in length. When Daly et al. (2019) monitored head started tortoises after release in the Mojave National preserve, annual survival was 44% and short-term survival was better if tortoises were more than 1.6 km from a raven’s nest. Daly et al. (2019) points out that by itself, head-starting is unlikely to lead to population recovery if larger issues such as raven density and habitat degradation are not addressed. Nagy et al. (2015*a*) recommends not releasing head-started tortoises until they are over 100 mm, which requires keeping them in captivity for about 9 years and is a considerable investment of time and resources. There is currently a head-starting program at the Ivanpah Desert Tortoise Head-starting Facility in Mojave National Preserve, a joint project between the University of Georgia and UC Davis. They have produced more than 675 hatchlings, released 324 which have been radio-tracked following release, with another approximately 275 for upcoming releases (Tuberville 2022). Another head-start program is on Edwards Air Force Base and involves San Diego Zoo, the U.S. Geological Survey, Cadiz Inc., and the BLM (San Diego Zoo Wildlife Alliance 2018).

7. Monitor progress toward recovery.

The USFWS does yearly surveys of the Tortoise Conservation Areas which are used to generate estimates of density, abundance, and annual rates of change. The results of this monitoring are summarized in section 3.2 Trends in Density and Abundance. Along with the data and estimates that are currently published in the report, making sex ratio data public would help stakeholders better understand demographic trends, especially as they are influenced by climate change.

The USFWS (2011) has more detailed recommendations on how to monitor populations on the scale of recovery units.

The Department collects a variety of data on tortoises from holders of ITPs and Scientific Collecting Permits. Improving the capacity of the Department to summarize and analyze these data to identify the cumulative impacts of permitted projects on tortoise populations will help expand the geographic scope of monitoring and is key to developing criteria for decisions on potential limits to take for desert tortoise. Sharing this information with other state and federal agencies through the MOG will help bring a broader and more comprehensive understanding of the state of tortoise populations in California. In addition, the Department should continue to engage with the USFWS and other partners to address high priority monitoring needs through the Cooperative Endangered Species Conservation Fund (Traditional Section 6) Grant Program See sections 9.2 and 9.3 for more detail.

5. Conduct applied research and modeling in support of recovery efforts within a strategic framework.

The 2011 USFWS Revised Recovery Plan includes many specific research and modeling actions that are needed to address recovery of desert tortoise. Funding for continued long term monitoring at sites outside of TCAs such as the Desert Tortoise Natural Area would expand our understanding long term trends in areas with different types of management. The Department should continue to engage with the USFWS and other partners to address high priority research needs through the Cooperative Endangered Species Conservation Fund (Traditional Section 6) Grant Program and other funding opportunities.

6. Implement a formal adaptive management program.

The USFWS Recovery Plan includes steps to

1. Revise and continue the development of a recovery decision support system.
2. Develop and revise recovery action plans.
3. Amend land use plans, habitat management plans, and other plans as needed to implement recovery actions.
4. Incorporate scientific advice for recovery through the Science Advisory Committee.

The Department has authority to develop and implement non-regulatory Recovery Plans and recovery criteria for CESA-listed species with the goal of improving the status of species and managing threats to the point where CESA listing may no longer be appropriate or necessary. The Department should consider whether adoption of the federal Recovery Plan, potentially with amendments, is warranted.

9.2 Regulations and Policy

Due to the number of interacting threats facing the desert tortoise, there is an opportunity to be more flexible with what is considered appropriate mitigation for ITPs. Acquiring land is an important measure, but it only addresses a few of the recovery actions for the desert tortoise. The Department should consider all available actions that meet the “fully mitigated” standard for offsetting project impacts. All measures that support and improve populations should be considered as mitigation, including installing tortoise fencing along highways, habitat enhancement, management and control of raven populations, and measures that improve connectivity. Focusing on land acquisition at the expense of other measures could result the protection of high-quality habitat but limited reductions in broader factors causing direct mortality or restricting movement between protected areas.

Another useful step would be to review the ITPs issued and the implementation of mitigation measures since CESA listing and assess their impact on tortoise populations in general. Section 2081 c) states “No permit shall be issued …if issuance of the permit would jeopardize the continued existence of the species.” Given the long-term decline of desert tortoise populations, the Department should include evaluations of the success of mitigation measures as a part of assessments of the cumulative impacts that inform the Department’s decisions about issuing permits. See section on Capacity Building below.

9.3 Capacity Building CDFW

a) Personnel

For these Management Recommendations to be most consistently implemented and successful, staffing and/or funding capacity that can be devoted to developing, supporting, and building partnerships to facilitate recovery of the Mojave Desert Tortoise is needed. Adequate staffing facilitates internal coordination, continuity of institutional knowledge, and coordination with other agencies and organizations to address the most important issues. If CDFW had staffing dedicated to tortoise recovery, there could be a primary point of contact for desert tortoise permitting and better coordinate collaborate internally and externally with those working on tortoise conservation and management.

b) Upgrading Systems

Currently, much of the CDFW review and issuing of ITPs for Mojave Desert Tortoise is done on a project-by-project basis, with some take permitted through Natural Community Conservation Plans and Habitat Conservation Plans like the Coachella Valley Multi Species Habitat Conservation Plan. Projects that apply for ITPs are required to collect data and submit compliance reports to the Department. If a project is required to translocate tortoises, they need to be monitored for five years and data reported to the Department. There is currently no central location for those types of data and reports at the Department. Much of the old data, reports, and information is in paper form and is stored in various Department offices and is functionally inaccessible. Data on project locations, recipient sites, release points, disease testing locations with test results, and mitigation lands need to be stored digitally and made available in compliance with relevant CDFW scientific data policies. Without a central repository for data and platforms where it can be accessed and used by staff it is difficult to understand the scope and extent of impacts of development on tortoises. Consequently, the Department does not have a complete view of how many acres have been impacted, or the amount and location of habitat that has been conserved as mitigation and the success of that mitigation. However, a permitting system is currently in development that is intended to centralize and streamline the issuing of ITPs and other permits that will make it easier for the Department to make informed decisions on future incidental take permits and jeopardy determinations.

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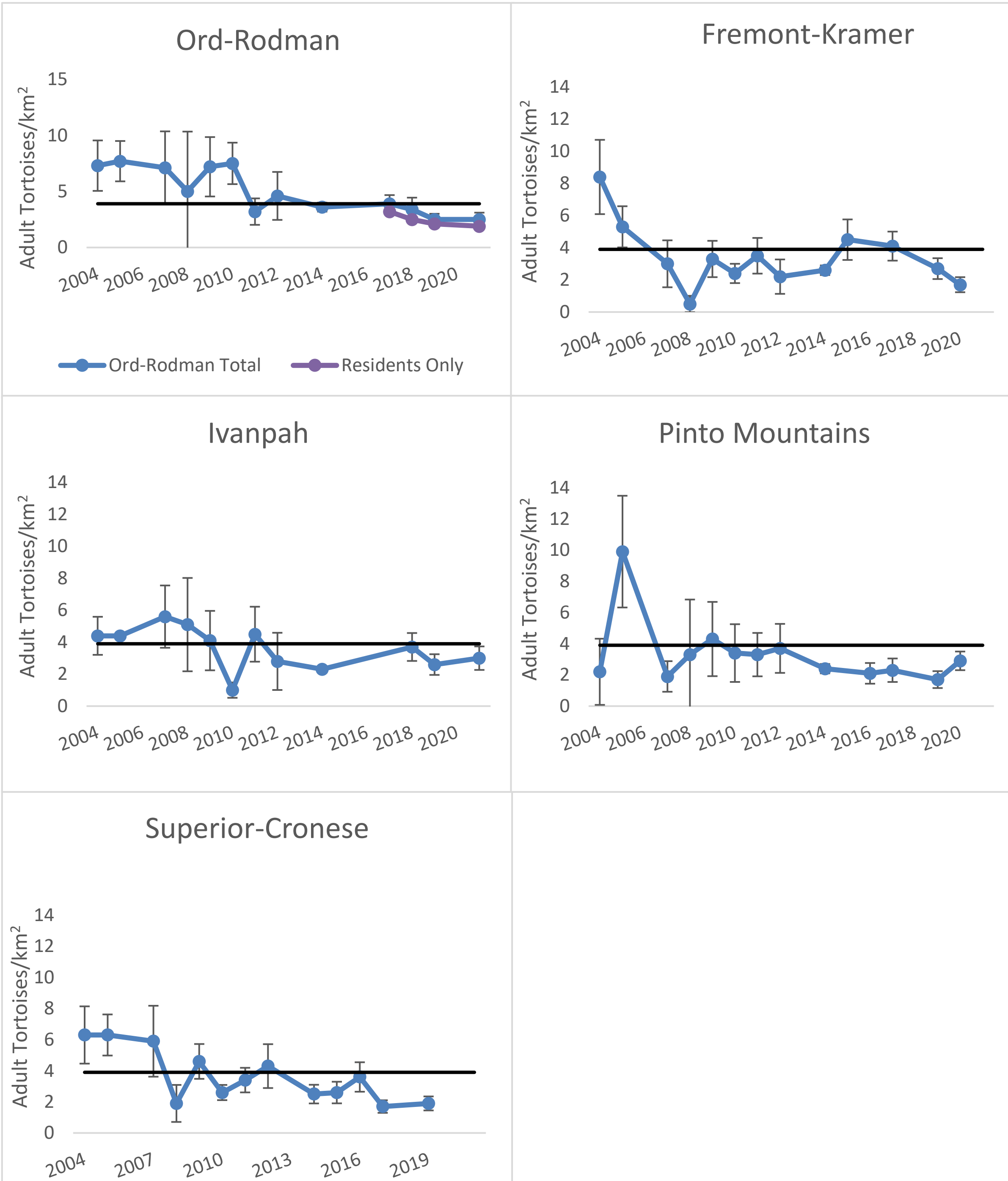
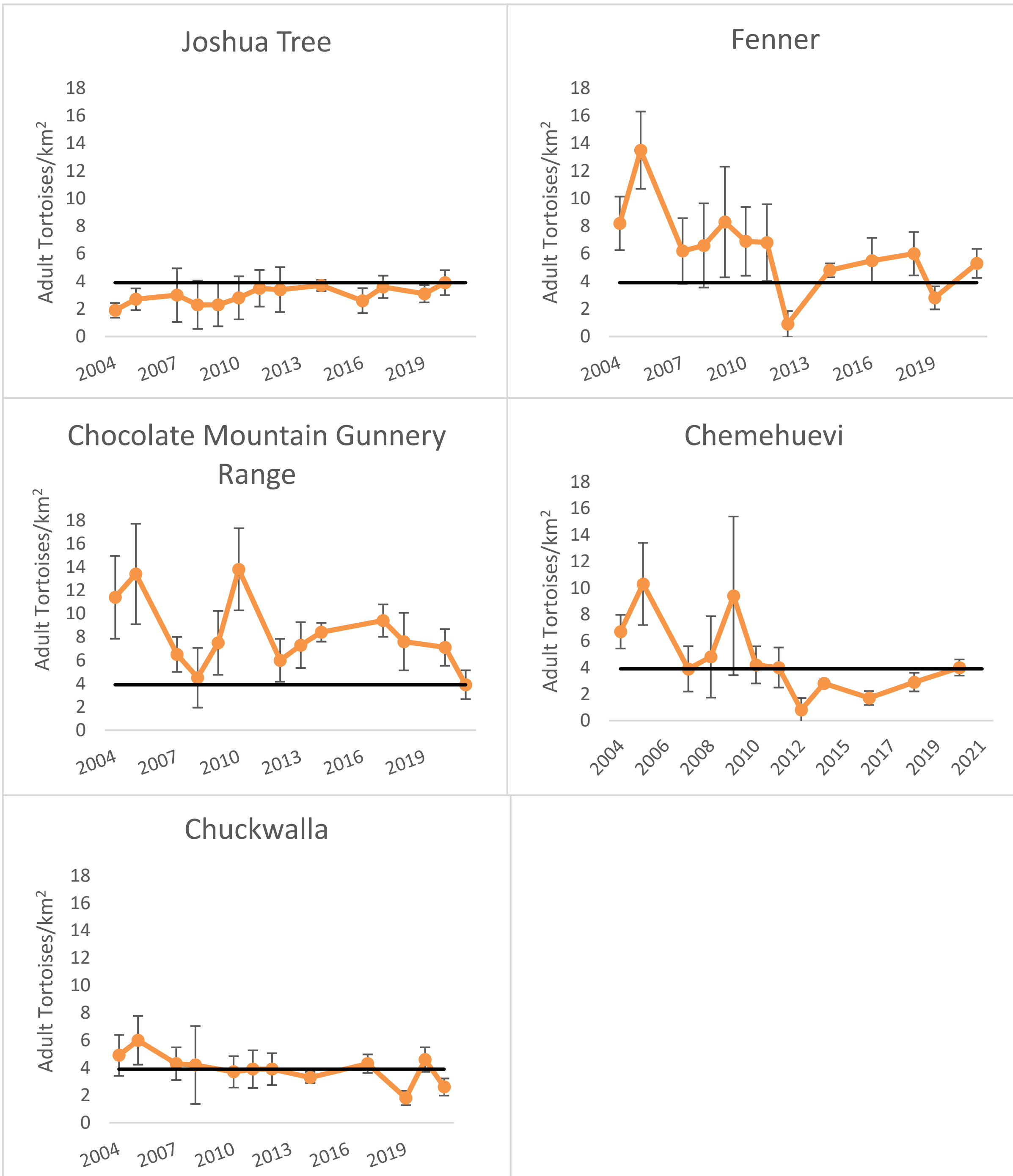
APPENDIX A FIGURES



Appendix Figure 1. Estimated densities of adult tortoises (≥ 180 mm carapace length) in Tortoise Conservation Areas in the Eastern and Western Mojave Recovery Units in California 2004–2021. Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. 2004–2014 have standard errors (SE), 2015–2021 have coefficients of variation that have been converted to standard errors.



Appendix A Figure 2. Estimated densities of adult tortoises (≥ 180 mm carapace length) in Tortoise Conservation Areas in the Colorado Desert Recovery Units in California 2004–2021.

Black horizontal line represents 3.9 adults/km^2, the estimated minimum density needed for population viability. 2004–2014 have standard errors (SE), 2015–2021 have coefficients of variation that have been converted to standard errors.

Pursuant to Fish and Game Code section 2074.6, the review process included independent and competent peer review of the draft status review by persons in the scientific/academic community acknowledged to be experts on Mojave Desert Tortoise and related topics, and possessing the knowledge and expertise to critique the scientific validity of the status review contents. Appendix B contains the specific comments provided to the Department by the individual peer reviewers, the Department’s written response to the comments, and any amendments made to the status review (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Independent experts that reviewed the status review are listed in Table 1, below.

Table 1. Status Review Peer Reviewers

Name	Affiliation
Reviewer 1 name	
Reviewer 2 name	
Reviewer 3 name	

MOJAVE DESERT TORTOISE

STATUS REVIEW

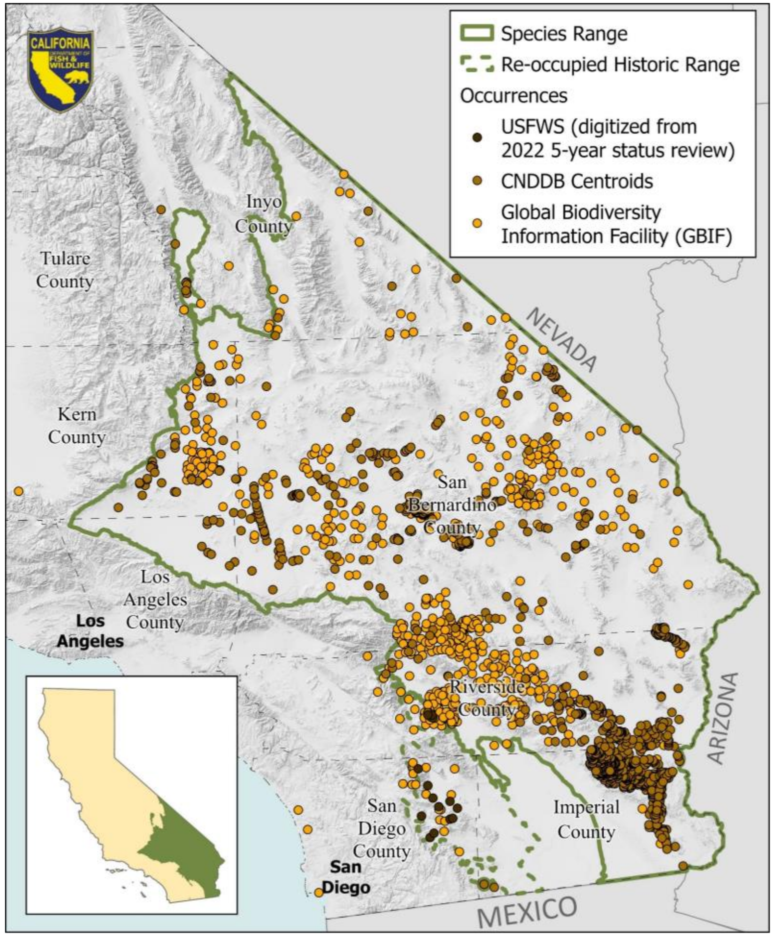
PRESENTATION TO THE CALIFORNIA FISH AND GAME COMMISSION

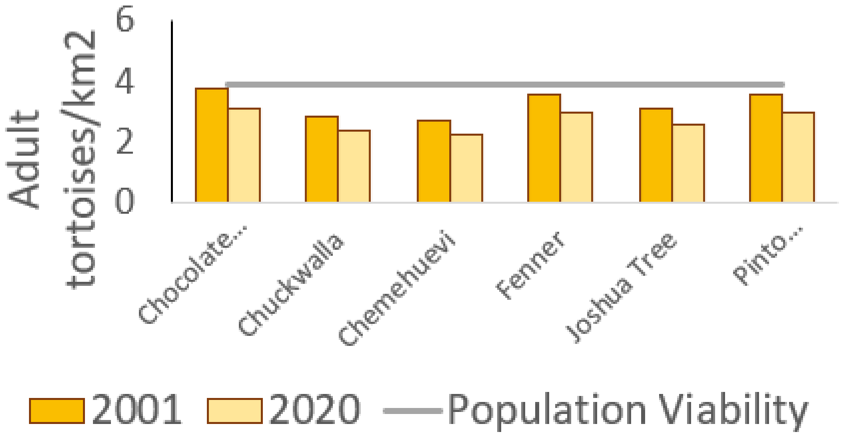
April 18, 2024 | Anne Hilborn, PhD

Wildlife Branch

Presentation Overview

- Life History/Range
- Population trends
- Threats
- Department's Recommendation





Listing History Mojave Desert Tortoise

Listed as Threatened under CESA in 1989

Listed as Threatened under the ESA in 1990

Petition sent to Commission March 2020

Designated as a candidate species October 2020

Life History

Species Biology

Long-lived desert reptile

Slow Reproduction: Sexual maturity at 12-20 years, 6-12 eggs/year

Diet: Wildflowers and herbaceous perennials

Adaptations to desert:

Use burrows to avoid desert heat and winter cold

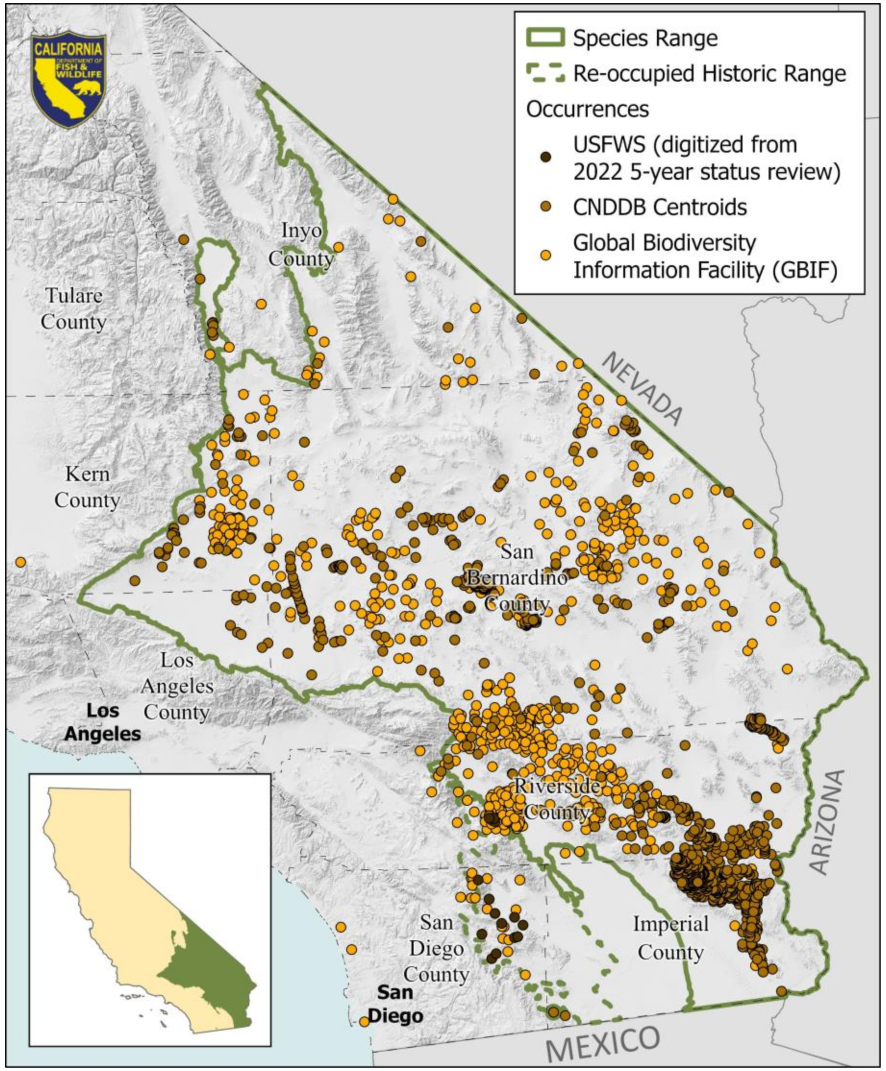
Up to 90% of the time underground

Other physiological adaptations to extreme desert conditions

Range and Distribution

- Mojave Desert
- Colorado Desert

- Distribution is uneven



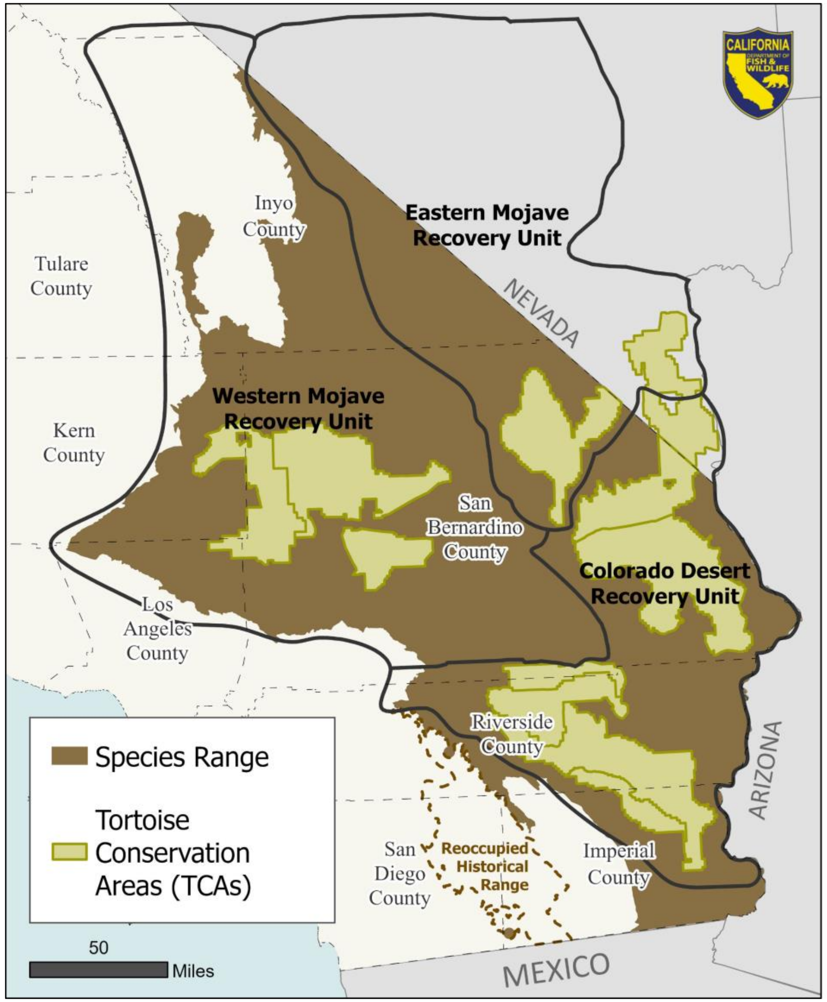
Recovery Units and Tortoise Conservation Areas

3 Recovery Units

- Western Mojave
- Eastern Mojave
- Colorado Desert

Tortoise Conservation Areas (TCAs)

- Best habitat in range
- Yearly surveys since 2001



Population Trends: Density

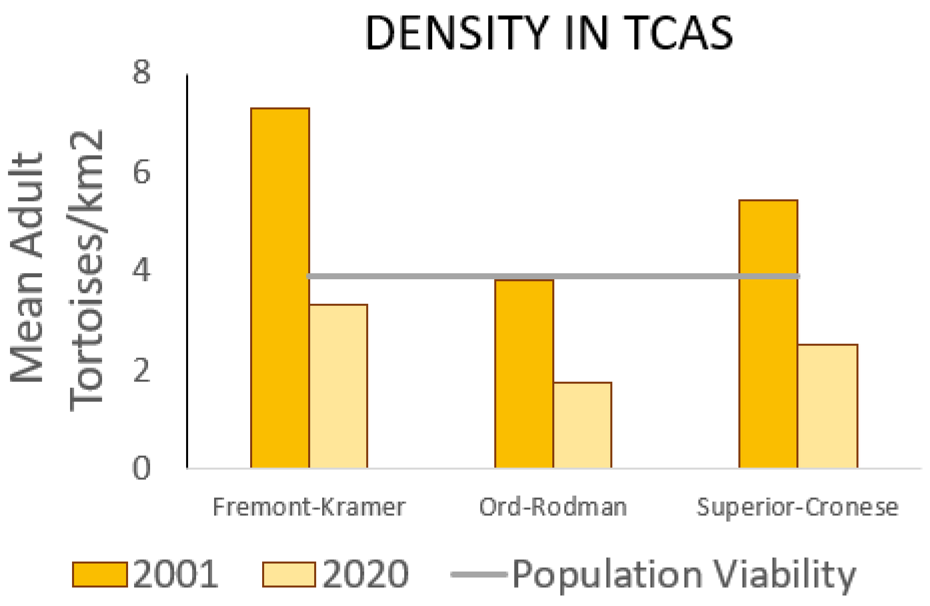
Robust estimates of density in the TCAs 2001and 2020 *

Important Benchmark:

3.9 adult tortoises/km^2 needed for population viability

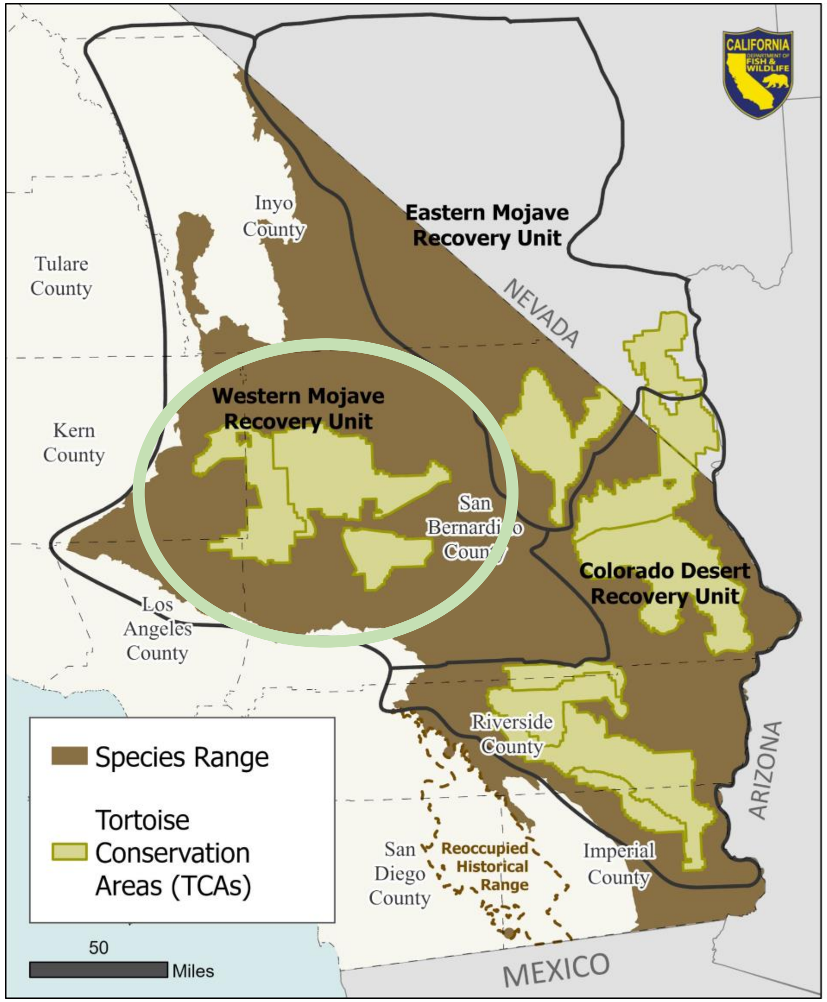
*Zylstra et al. 2023

Population Trends: Western Mojave RU

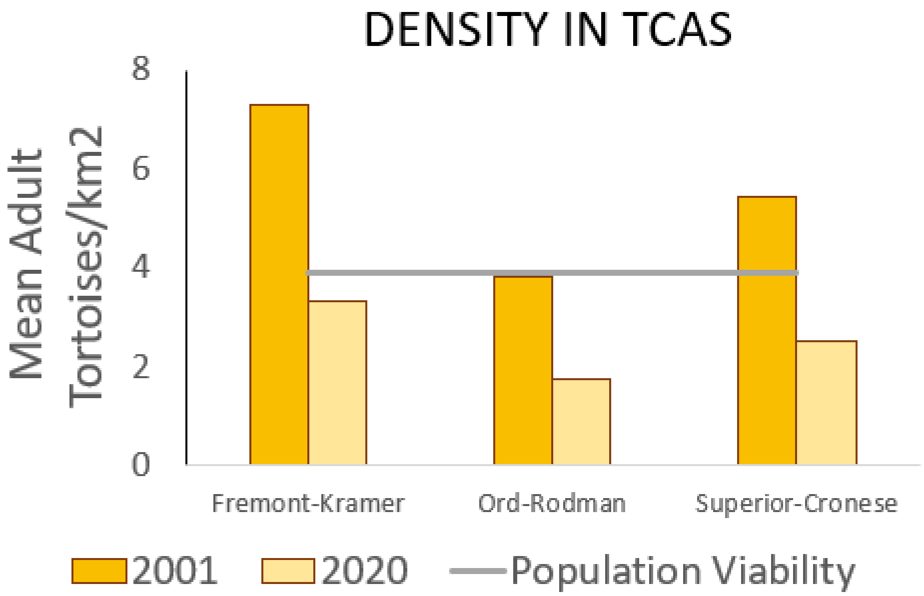


Two TCAs above population viability in 2001

All TCAs below population viability in 2020

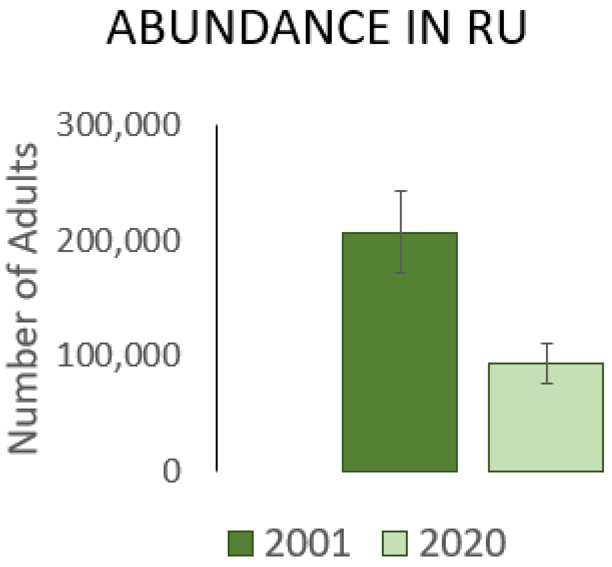


Population Trends: Western Mojave RU

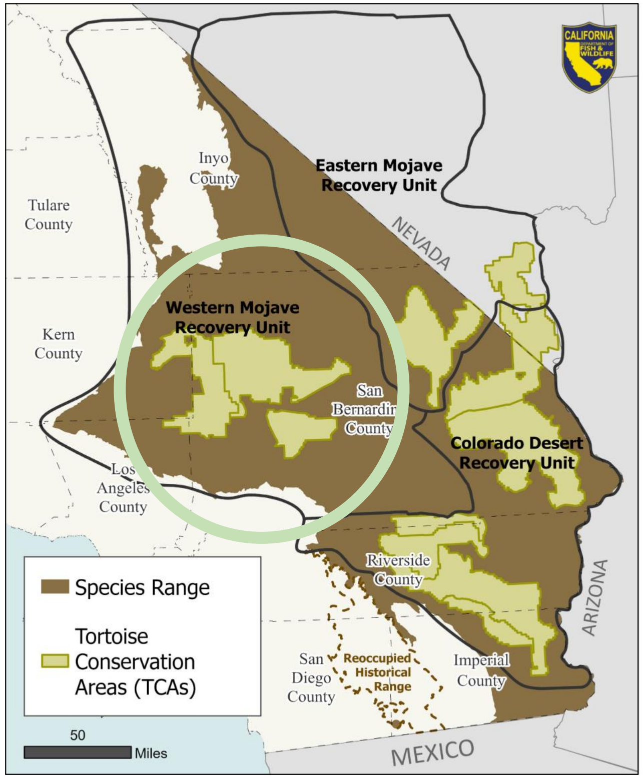


Two TCAs above population viability in 2001

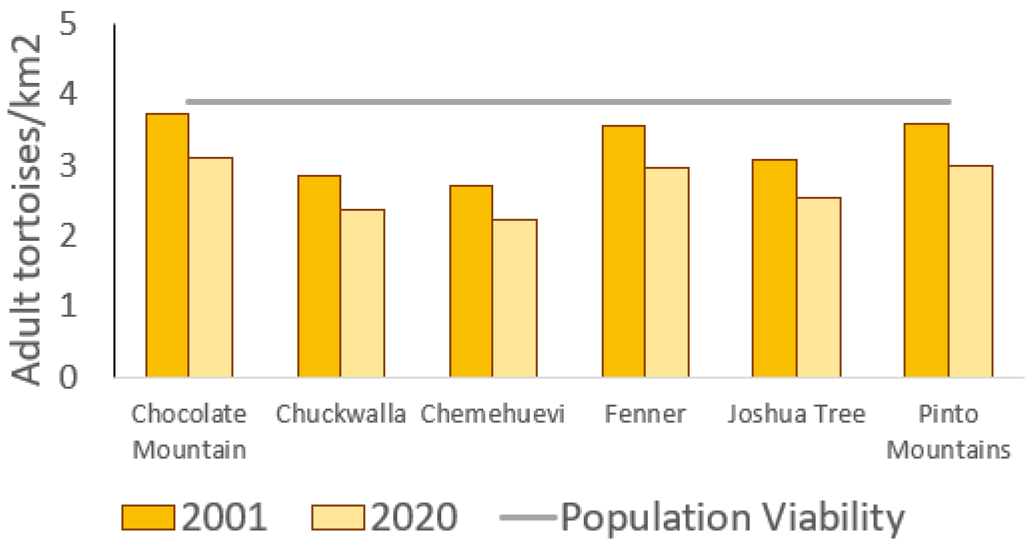
All TCAs below population viability in 2020



Loss of ~112,000 adults (54% decline)

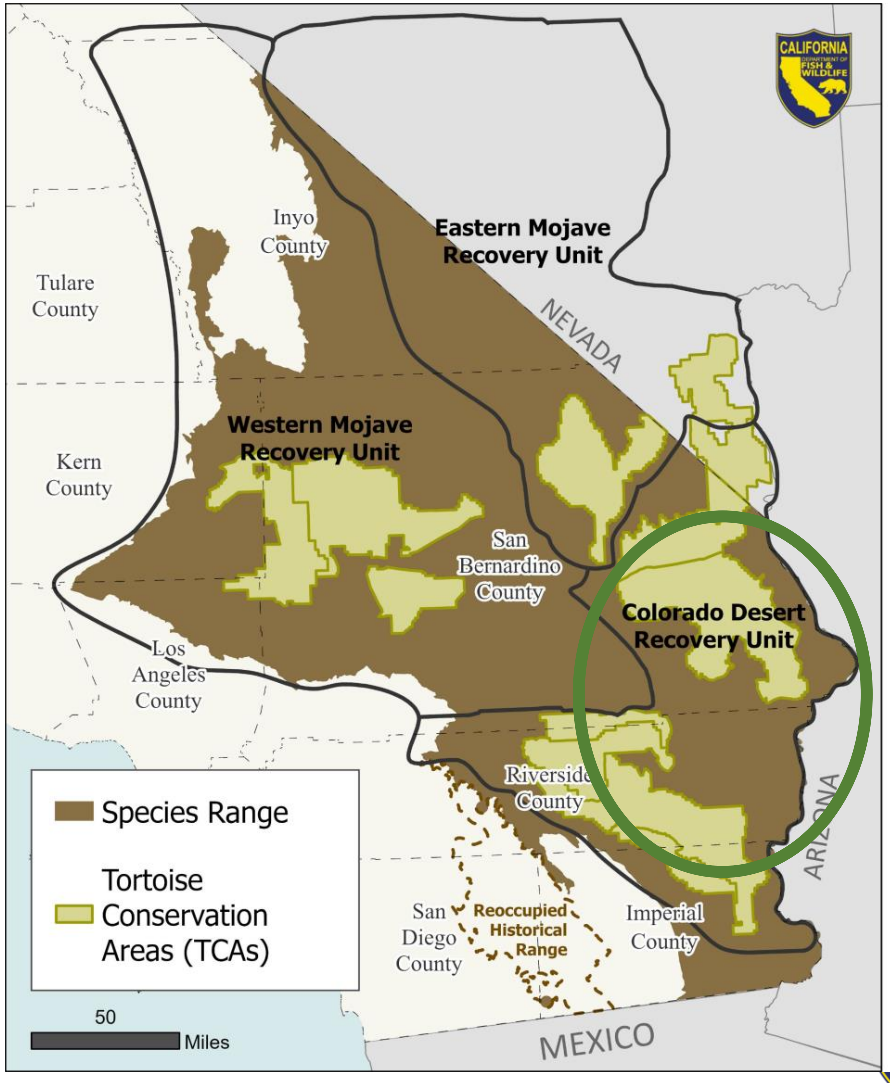


Population Trends: Colorado Desert RU

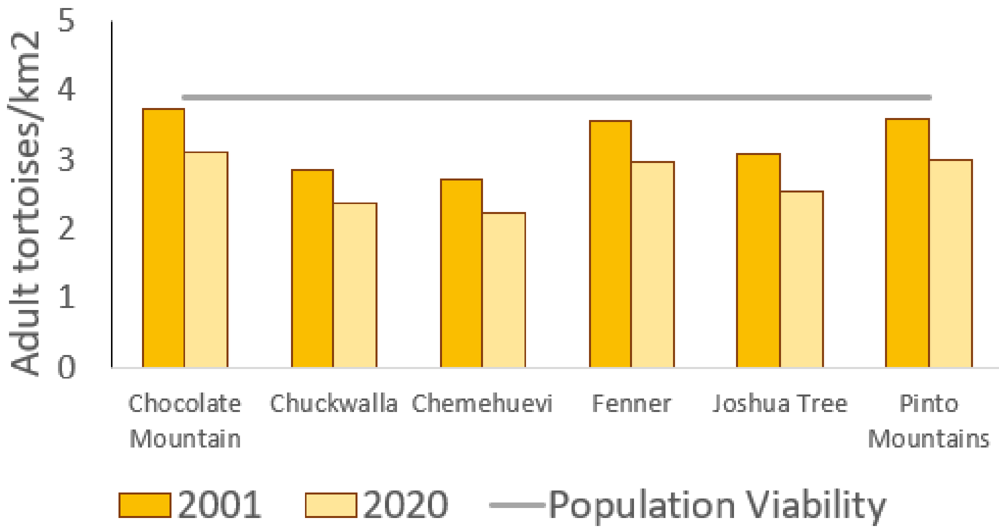


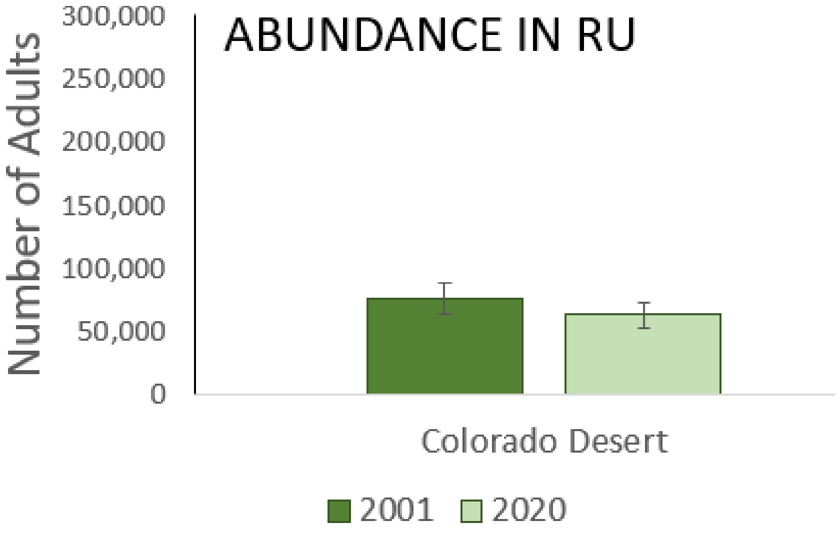
All TCAs in the Colorado Desert were below population viability in 2020

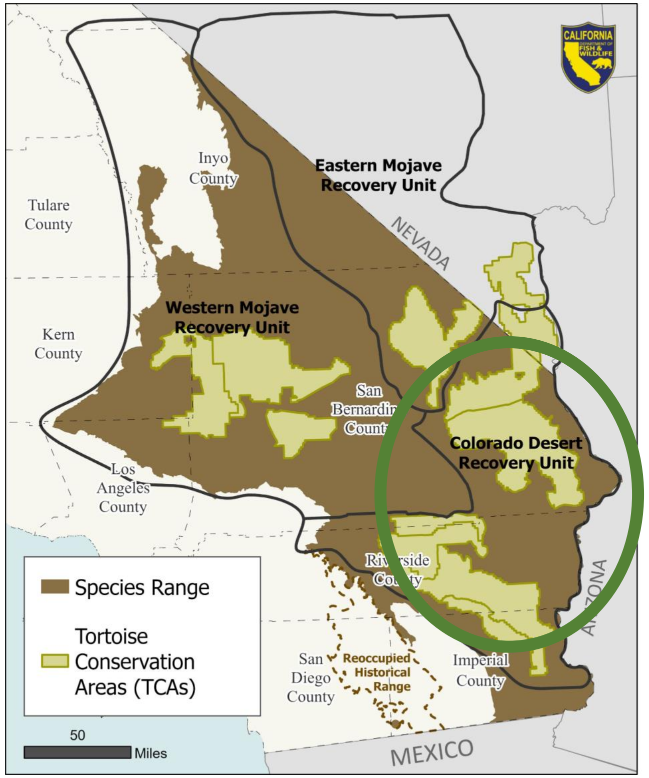
All TCAs declined between 2001 and 2020



Population Trends: Colorado Desert RU





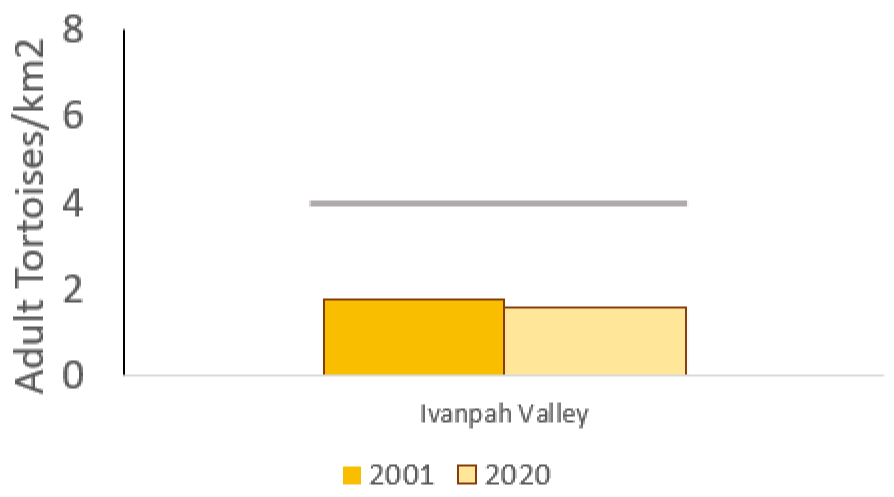


All TCAs in the Colorado Desert were below population viability in 2020

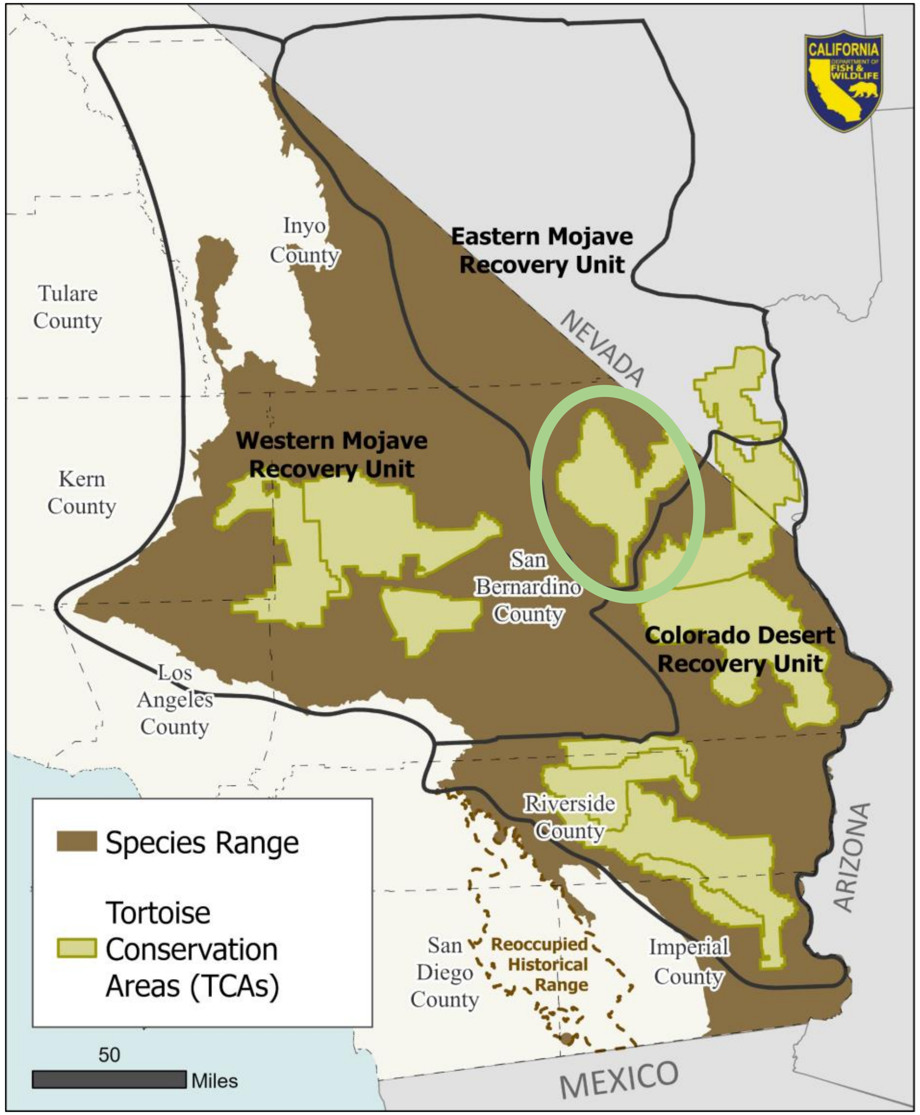
All TCAs declined between 2001 and 2020

Loss of~13,000 adults (~17% decline)

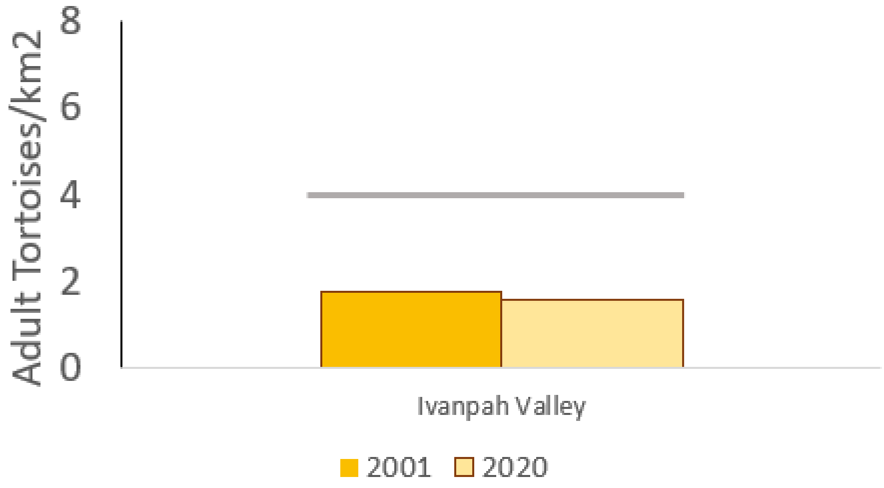
Population Trends: Eastern Mojave RU

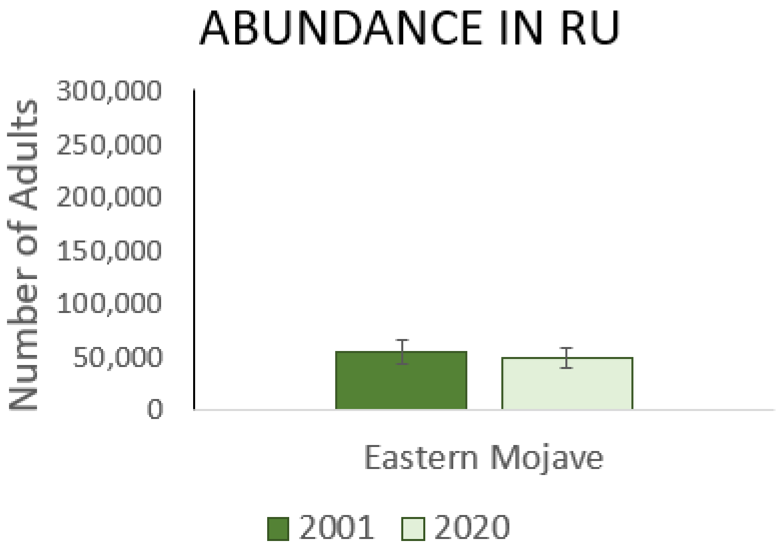


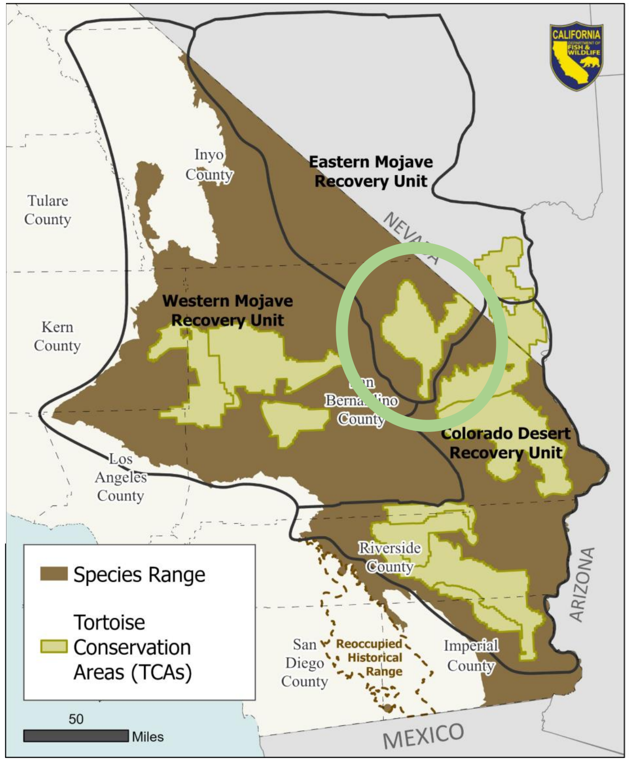
The TCA in the Eastern Mojave was below population viability in 2001 and 2020



Population Trends: Eastern Mojave RU







The TCA in the Eastern Mojave was below population viability in 2001 and 2020

Loss of ~5,000 adults (~10%)

Threats

Direct Mortality

Predation
Roads
Climate Change
Disease
Gunshots

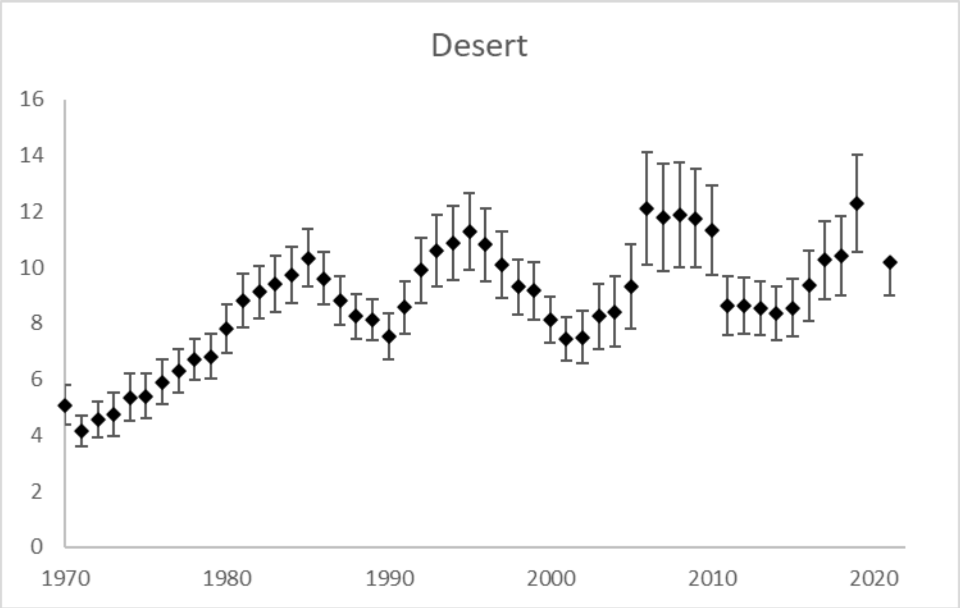
Habitat Loss/Degradation

Roads
Housing Development
Renewable Energy
Military
Climate Change
Fire
Invasive Species
Cannabis
Mining

Threats: Predation

Ravens have increased in the Mojave Desert

Adults Per Route

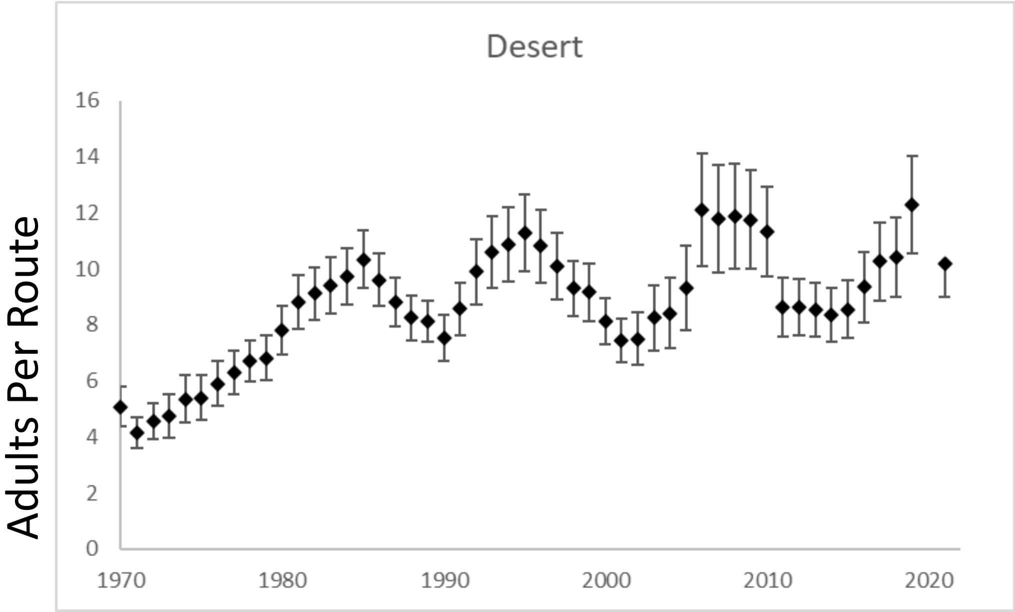


Data from the Breeding Bird Survey

Ravens prey on juvenile tortoises

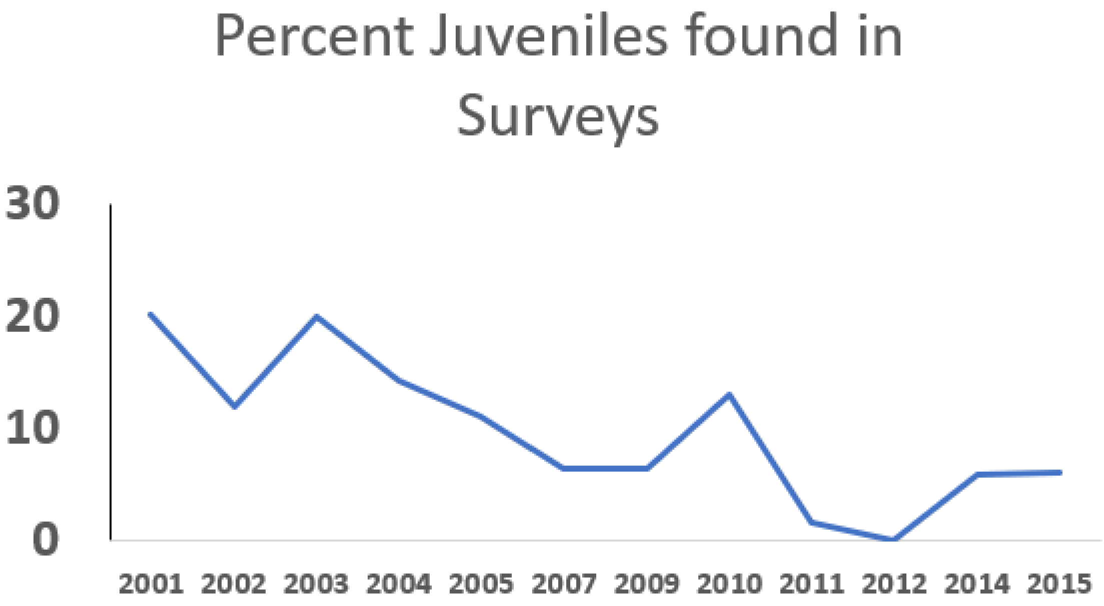
Threats: Predation

Ravens have increased in the Mojave Desert



Data from the Breeding Bird Survey

Ravens prey on juvenile tortoises



USFWS unpublished data, used with permission

Threats: Roads

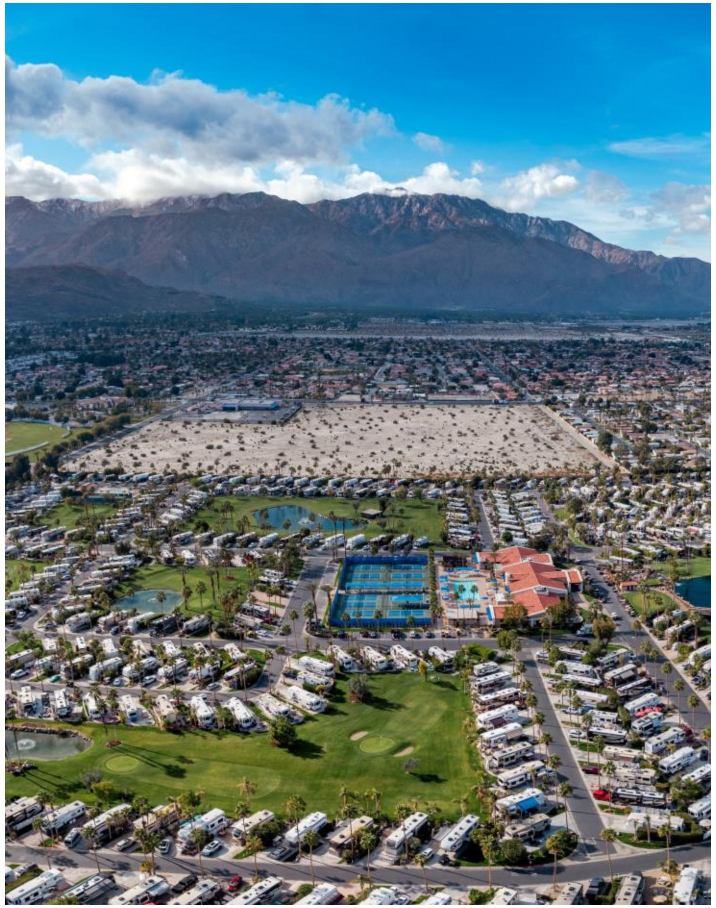
Vehicle Strikes

Off Highway Vehicles

BLM via flickr

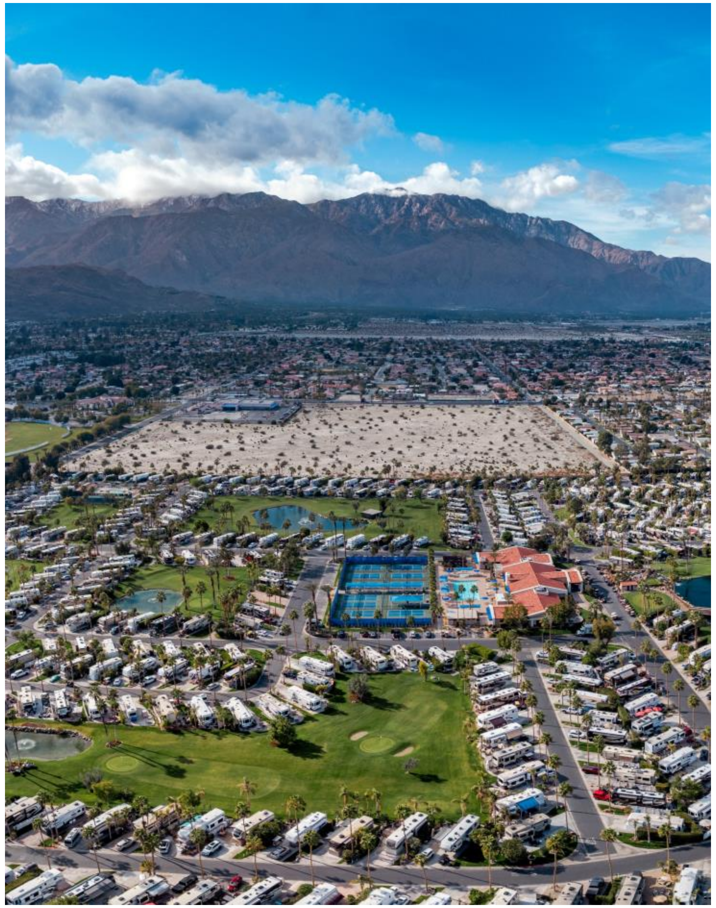
Threats: Habitat Loss and Degradation

Urban Development



Threats: Habitat Loss and Degradation

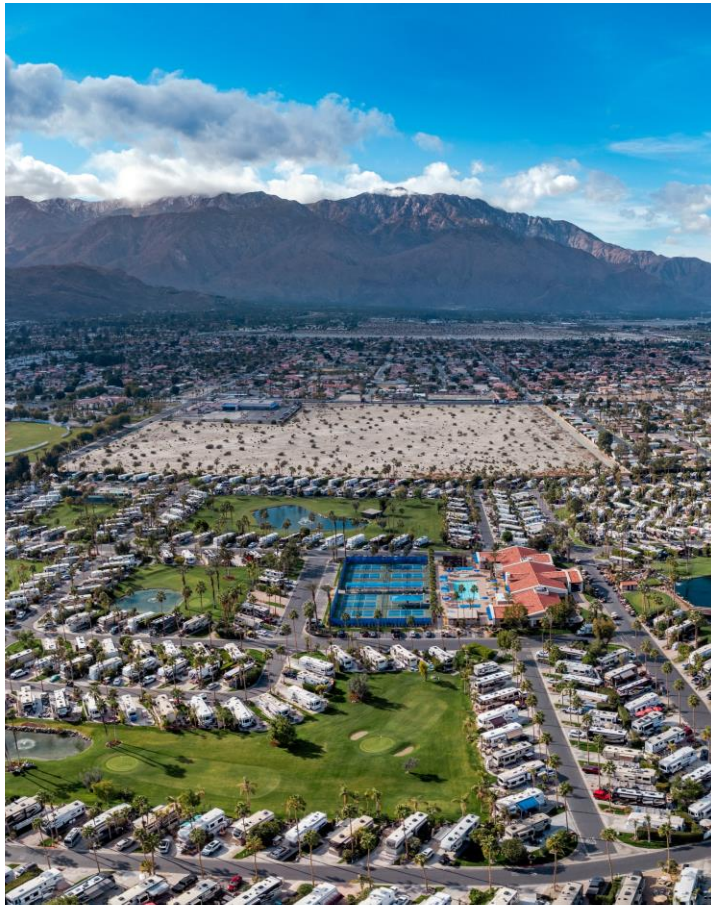
Urban Development



Renewable Energy

Threats: Habitat Loss and Degradation

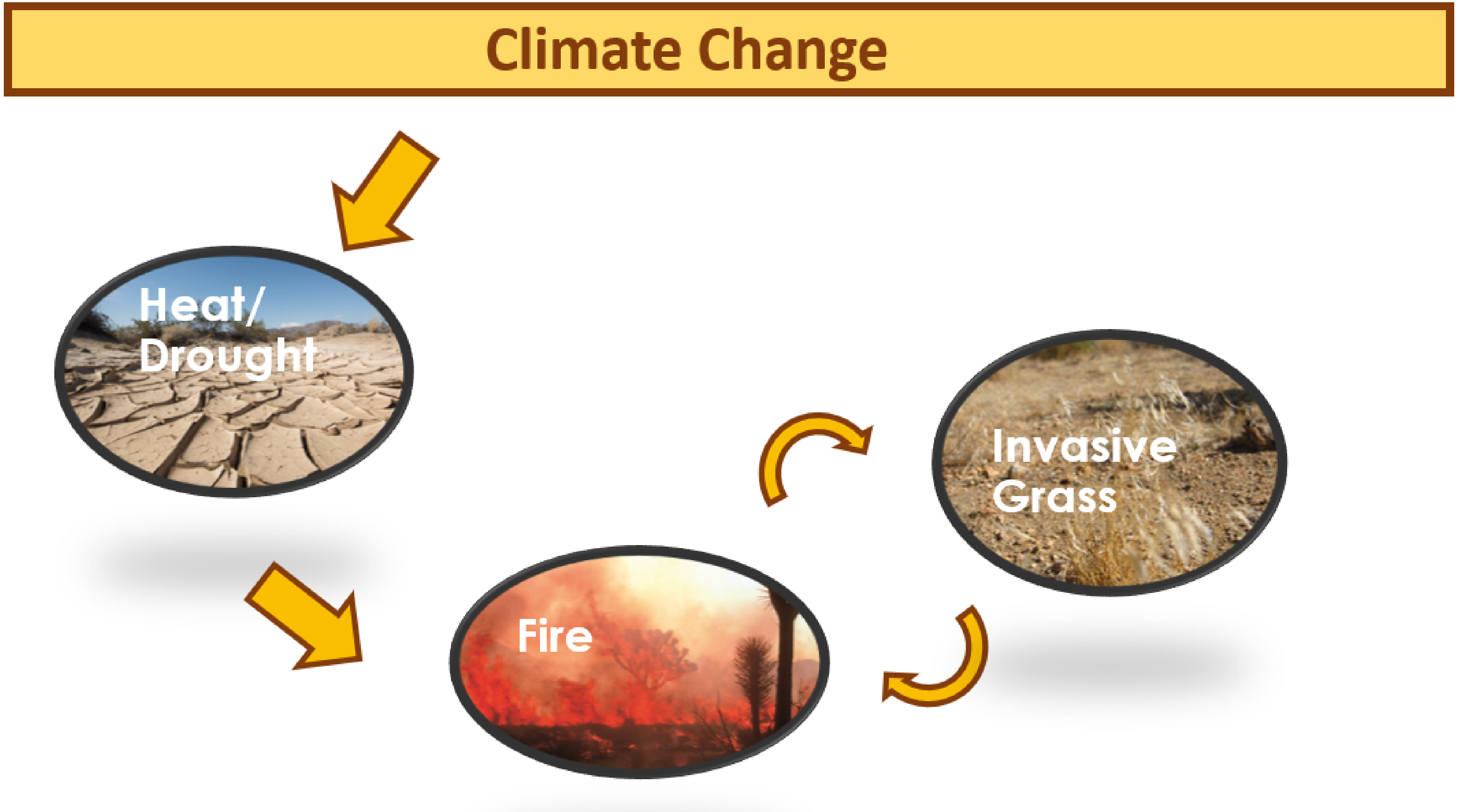
Urban Development



Renewable Energy

Department of Defense

Threats: Climate Change, Fire, Invasive Species



Threats: Climate Change

Deserts are hotter and drier

Decreases area tortoises can thrive and reproduce

Climate change has led to more severe drought

Threats: Fire

Increasing fire in the desert

Native vegetation does not recover easily

Harder to find food post fire

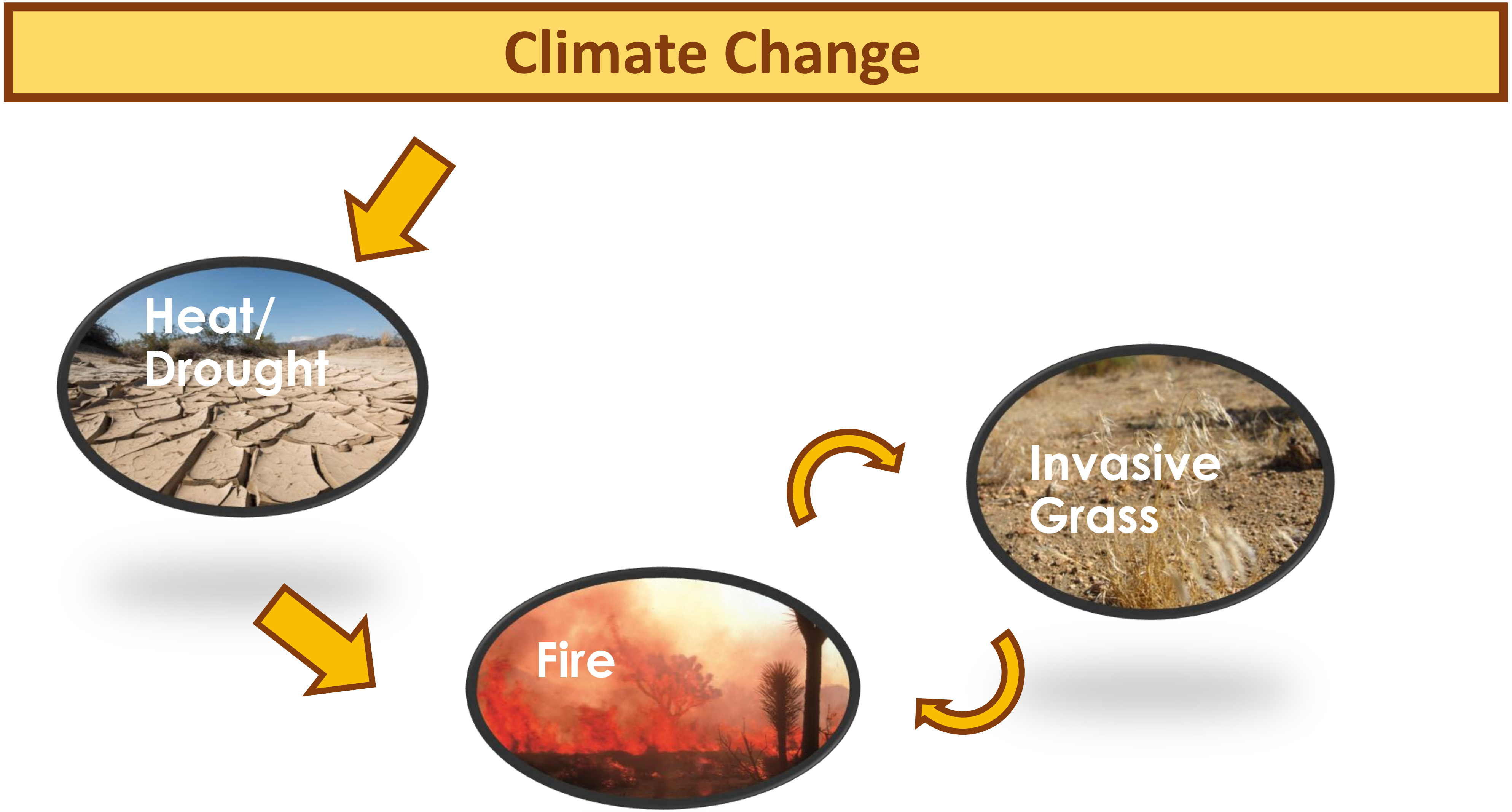
Threats: Invasive Species

Increasing invasive grasses

Create fuel for fires

Poor nutrition

Threats: Climate Change, Fire, Invasive Species



Summary

- Long term declines across the range
- Most TCAs below viability for 20 years, and continued decline
- Low recruitment of juveniles
- Continued, intersecting threats

Recommendation: Uplist to Endangered

- The Department has determined that listing the Mojave Desert Tortoise as endangered under CESA is warranted at this time

Questions | Contact

Anne Hilborn

Senior Environmental Scientist

wildlifemgt@wildlife.ca.gov

March 29, 2024

Eric Sklar, President
Melissa Miller-Henson, Executive Director
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Submitted via Email to: fgc@fgc.ca.gov

Re: Status Review for Mojave Desert Tortoise

Dear President Sklar and Executive Director Miller-Henson:

Defenders of Wildlife (Defenders), the Desert Tortoise Council (Council) and Desert Tortoise Preserve Committee (Committee) have reviewed the *Status Review for Mojave Desert Tortoise* prepared by the California Department of Fish and Wildlife (CDFW). We appreciate CDFW's approach in preparing the status review, including peer review by prominent desert tortoise research biologists.

First, and foremost, CDFW concluded that the *Mojave Desert Tortoise is in serious danger of becoming extinct in California due to one or more causes including present or threatened degradation and loss of habitat, predation, and other natural occurrences and human-related activities*, and that *The Department recommends that the Commission find the petitioned action to change the status of Mojave Desert Tortoise from threatened to endangered to be warranted*. Under the California Endangered Species Act (CESA), an endangered species is one "which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish and Game Code Section 2062).

CDFW's conclusion confirms that the petition submitted by Defenders, the Council and Committee on March 23, 2020 was based on relevant scientific information and accurately described the threats the species continues to face, including climate change and a host of human activities.

The minimum viable density for a desert tortoise population is 3.9 adults/km^2 according to the 1994 Desert Tortoise Recovery Plan (USFWS 1994). According to the most recent (2019-2021) density estimates within Critical Habitat Units (CHUs) in California reported by the U.S. Fish and Wildlife Service (USFWS 2020, 2022a, 2022b), densities were below the minimum in six CHUs, at the minimum in two and above the minimum in three. The six CHUs with densities below the minimum threshold are proof that those populations are not viable, putting the species on a path toward extinction. After 35 years of being listed as a threatened species by the Fish and Game Commission and 34 years by the USFWS, desert tortoise populations show no sign of recovery. Furthermore, past and current regulatory actions such as the prohibition on take, development of land use plans, impact mitigation and translocation have been ineffective in halting population declines.

Severe decline of adults in CHUs is not the only indication the species is headed toward extinction. Since 2007, the number of juveniles has also declined, with the probability of encountering a juvenile lowest in the Western Mojave Recovery Unit (Allison and McLuckie 2018). Berry et al. (2014) confirmed this in a demographic study of desert tortoises in the Western Mojave, where juveniles were observed only within the 40 mi^2 Desert Tortoise Research Natural Area, which has been closed to off-highway vehicle use and domestic sheep grazing since 1976.

The Desert Tortoise Research Natural Area is also the only area in the Western Mojave where the desert tortoise population shows sign of recovery. Berry et al. (2014) reported that the number of adult desert tortoises within the Natural Area was seven times greater than those found within the adjacent Fremont-Kramer CHU in Fremont Valley.

In response to the federal listing of the desert tortoise as threatened in 1990, the BLM eliminated domestic sheep grazing throughout most of the CHUs in the Western Mojave Recovery Unit in 1994, so the primary threats to the species remaining in the area are the widespread and intense off-highway vehicle use, and predation by common ravens and coyotes. The recent expansion of the Twentynine Palms Marine Corps Base required the translocation of approximately 1,600 desert tortoises, and the impending use of the Western Training Area in Fort Irwin by the U.S. Army will require translocating an estimated 1,100 desert tortoises from approximately 60,000 acres within the Superior-Cronese CHU.

Although the legal protection of species listed under CESA as threatened or endangered are the same, listing the desert tortoise as endangered will likely increase allocation of funds for actions that are proven to be effective in conserving the species and its habitat. Listing the species as endangered may also provide a regulatory environment where greater scrutiny of the adverse impacts of proposed land uses will occur and impact avoidance and mitigation requirements will be more effective and enforced. We are also optimistic that changing the listing status to endangered may prompt CDFW to prepare a recovery plan for the species and to identify and implement conservation actions in the Western Mojave Recovery Unit where the declines have been most severe and where federal recovery actions are failing.

We fully agree with all of CDFW's recommended actions it can take as presented in Section 9 of the status review report, including preparing and implementing a recovery plan for the desert tortoise.

In conclusion, we urge the Commission to approve listing of the desert tortoise as endangered throughout its range in California. We thank CDFW staff for their thorough review of the status of the desert tortoise.

Respectfully submitted,

Jeff Aardahl
Senior California Representative
Defenders of Wildlife
jaardahl@defenders.org

Ed LaRue, Chairperson
Ecosystems Advisory Committee
Desert Tortoise Council
eac@deserttortoise.org

Ron Berger
Board Member
Desert Tortoise Preserve Committee
Ron.Berger@tortoise-tracks.org

Cc: Chuck Bonham, Director, CDFW
Dr. Anne Hilborn, Senior Environmental Scientist Specialist, CDFW

Literature Cited

Allison, L., and A. McLuckie. 2018. Population Trends in Mojave Desert Tortoises (*Gopherus agassizii*). Herpetological Conservation and Biology 13(2):433–452. http://www.herpconbio.org/Volume_13/Issue_2/Allison_McLuckie_2018.pdf

Berry, K.H., L.M. Lyren, J.L. Yee and T.Y. Bailey. 2014. Protection Benefits Desert Tortoise (*Gopherus agassizii*) Abundance: The Influence of Three Management Strategies on a Threatened Species. Herpetological Monographs, 28(1):66-92. https://bioone.org/journals/herpetological-monographs/volume-28/issue-1/HERPMONOGRAPHS-D-14-00002/Protection-Benefits-Desert-Tortoise-Gopherus-agassizii-Abundance--The-Influence/10.1655/HERPMONOGRAPHS-D-14-00002.short

[USFWS] U.S. Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) Recovery Plan. U.S. Fish and Wildlife Service, Region 1, Portland, Oregon. 73 pages plus appendices. https://ecos.fws.gov/docs/recovery_plan/940628.pdf

[USFWS] U.S. Fish and Wildlife Service. 2020. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2019 Annual Reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada. 42 pages. https://www.fws.gov/sites/default/files/documents/2019_Rangewide%20Mojave%20Desert%20Tortoise%20Monitoring.pdf

[USFWS] U.S. Fish and Wildlife Service. 2022a. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2020 Annual Reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada. https://www.fws.gov/sites/default/files/documents/USFWS.2022%20report.%20Rangewide%20monitoring%20report%202020.pdf

[USFWS] U.S. Fish and Wildlife Service. 2022b. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2021 Annual Reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada. https://www.fws.gov/sites/default/files/documents/USFWS.2022%20report.%20Rangewide%20monitoring%20report%202021.pdf

Received at California Fish and Game Commission
November 8, 2023

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

BALLONA WETLANDS LAND TRUST, Plaintiff and Petitioner, vs. CALIFORNIA FISH AND GAME COMMISSION, Defendant and Respondent.	Case No.: 20STCP03035 **[~~PROPOSED~~] WRIT OF MANDATE**

Whereas judgment was entered on 11/03/2023, ordering that a peremptory writ of mandate issue:

To CALIFORNIA FISH AND GAME COMMISSION:

YOU ARE HEREBY COMMANDED TO: make a compatibility determination pursuant to Section 630 of Title 14 of the Cal. Code of Regulations as to whether the parking lots in Area A and baseball fields in Area C of the Ballona Wetlands Ecological Reserve are compatible with the purpose of the Reserve.

YOU ARE FURTHER COMMANDED to file and serve an initial return to the writ no later than 180 days after service of the writ. The return shall specify the actions taken to comply with the terms of the peremptory writ of mandate.

The Court shall retain jurisdiction to enter injunctive relief and compel compliance with the Peremptory Writ of Mandate, including as provided in Cal. Code of Civil Procedure Section 1097.

LET THE WRIT ISSUE.

David W. Slayton, Executive Officer / Clerk of Court

DATED: 11/07/2023 K. Encinas

Clerk of the Superior Court

State of California
Department of Fish and Wildlife

Memorandum

Date: April 2, 2024

To: File

From: Region 5

Subject: Ballona Wetlands Ecological Reserve – Parking Lots and Baseball Fields

This memorandum documents the California Department of Fish and Wildlife's ("Department") determination under Title 14, California Code of Regulations, § 630(h)(3) related to parking lots in Area A of the Ballona Wetlands Ecological Reserve ("Reserve") and little league baseball fields in Area C of the Reserve. Specifically, the Department determined that restoration or other uses of the little league baseball fields or parking lots is not more appropriate at this time.

The presence of a parking lot within an ecological reserve is typical, and sharing use of the lot with another public agency is common and often benefits the Department. For example, the Los Angeles County Sheriff's Department uses one of the Area A parking lots and helps supplement the Department's law enforcement division when its resources are unavailable. However, the Department notes that little league baseball, or similar active recreational uses, are typically not allowed within an ecological reserve. In light of the nature of little league baseball occurring at the Reserve, CDFW is documenting its determination to provide context for this unique situation. Importantly, CDFW emphasizes that the circumstances and context in which these uses are allowed to continue is specific to the Reserve and in no way should be considered applicable to any other Department land or ecological reserve.

The Reserve encompasses approximately 577-acres along coastal Los Angeles County approximately five miles north of the Los Angeles International Airport, and is bordered by the communities of Westchester, Marina del Rey, and Playa Vista. The historic wetlands ecosystem in the vicinity of the Reserve once spanned more than 4,000 acres, but today the Reserve has approximately 152 acres of degraded wetlands. The Reserve is divided into three areas: A, B, and C, with areas B and C further subdivided. (See attachment 1). The little league baseball fields are in south Area C adjacent to Culver Boulevard and have operated there since 1956. The two parking lots are located at the west end of Area A adjacent to Fiji Way and were constructed between 1984 and 1985.

In 2003, the Wildlife Conservation Board ("WCB") approved the Department's acquisition of the Reserve. Then in 2005, the California Fish and Game Commission adopted regulations designating the Reserve as an ecological reserve. (Attachment 2 Final Statement of Reasons) Minutes to WCB's 2003 meeting indicate that the Reserve was acquired with the intent to restore it. (Attachment 3 WCB Meeting Minutes) A summary of the long-term restoration planning states that, "the natural resource goals for the long-term restoration planning for the Ballona Wetlands are: restore tidal circulation to the extent feasible; provide the range of freshwater, brackish and saltwater wetland habitat that is typically associated with a coastal estuary; and provide significant new habitat area for a variety of native species of plants and animals, including migratory birds. Additional long-term restoration planning goals include: providing for cost-effective flood management; protecting cultural resources; and providing appropriate public access, public recreation, educational and interpretive opportunities."

Following acquisition of the Reserve, the Department and its project partners, which included the California State Coastal Conservancy and the Bay Foundation, commenced a very deliberate restoration planning process that was informed by scientific analysis from experts in the fields of wetland and estuarine ecology and copious amount of public input. The planning process included:

- Preparing a feasibility assessment, baseline data collection, and creating and refining restoration options
- Convening a Science Advisory Committee ("SAC") composed of experts in the fields of wetland and estuarine ecology that analyzed the science being used during the planning process, assessed the appropriateness of factors being considered, and provided overall technical guidance. The SAC met seven times with all meetings open to the public. The SAC created a 2008 recommendation report for the project team in response to a feasibility study that identified potential restoration options and the rationale for their inclusion in the study. (The feasibility study is Attachment 4 and the SAC recommendation is Attachment 5) As the project team refined the proposed project, the SAC provided input and made additional recommendations.
- Twenty public stakeholder meetings held by the restoration project team
- Four public on-site open house meetings
- More than 60 presentations to groups and the public by the Bay Foundation

The Department, as lead agency under the California Environmental Quality Act ("CEQA"), built upon the prior planning and public input and prepared a draft environmental impact report ("EIR") that analyzed the environmental effects associated with implementing different alternatives for restoring the Reserve. (State Clearinghouse Number: 2012071090) The EIR's restoration alternatives were refinements of two restoration options that the project team developed during the initial planning process and were supported by the SAC for additional analysis. Likewise, the EIR's CEQA project objectives presented similar goals to those that justified the acquisition of the Reserve and included: restore, create, and enhance estuarine environments; establish natural processes and functions; strategically preserve, restore, enhance, and develop multiple habitats (including a variety of wetland habitats and upland habitats); and improve tidal circulation.

The Department released its draft EIR for public comment in 2017 and received over 7,500 pieces of correspondence consisting of nearly 3,000 discrete comments. The Department revised the draft EIR in response to comments, provided responses to the public comments, and released a final EIR in December 2019. The following year, the Department certified the EIR and approved moving forward with restoring the Reserve as analyzed in the EIR.

Four lawsuits were filed against the Department challenging the EIR and the Los Angeles County Superior Court ruled in favor of the four petitioner groups. The Court determined that CDFW is required to disclose and analyze new flood control design parameters and commit to additional environmental review if performance criteria changes, which the court believed could be easily rectified. (Attachment 6 Court Decision) In all other respects CDFW prevailed and other arguments of the lawsuits were denied. CDFW decertified the EIR on September 28, 2023, and as of the date of this document is in process of revising the EIR per the court's order.

Having acquired the property with specific goals, spent approximately two decades developing restoration plans, received scientific input from wetlands scientists, and considered significant public input on the plans, CDFW is not inclined to ignore those efforts and input to now abandon its restoration plan or goals. The current restoration plan that was developed through the above-mentioned restoration planning process continues to be the restoration project in the revised EIR. Importantly, the current plan for restoration is not affected nor in any way hindered by the presence of the baseball fields or Area A parking lots. Nor do the baseball fields or Area A parking lots negatively affect the Department's day-to-day management of the Reserve. Therefore, to ignore or modify the current plans in order to address the baseball fields or Area A parking lots would require the Department to unnecessarily shift its focus and priorities away from the purposes for which it originally acquired the Reserve, specifically a tidal restoration project that benefits native species.

Individuals of the public may prefer the baseball fields and parking lots be removed immediately and the underlying land restored with native habitat. Increasing habitat for native species at the Reserve, and anywhere else in California, is important to the Department. However, as the State's trustee for fish and wildlife resources, the Department focuses its restoration efforts on areas that result in the most benefit relative to those efforts. It will direct its efforts to what the Department determines to be the most effective for species and their habitats.

In contrast to the current restoration plans, restoring the former baseball fields or the Area A parking lots will not result in enhanced estuarine environments, improved tidal circulation, or benefit to multiple habitats including a variety of wetland habitats and upland habitats. The Area A parking lots and baseball fields are on upland areas adjacent to roads. To achieve the restoration goals one must excavate and remove some of the deepest fill material on the Reserve while at the same time avoid impacts to existing infrastructure and maintaining flood protection. As a result, improving tidal circulation in these areas is infeasible. Instead, these areas should be restored with upland vegetation, and the current restoration plans already include restoration of upland habitat in these areas.

It is important to keep in mind that the Reserve is not located in a rural area where the edge of an ecological reserve may be just as undisturbed as the interior of the land. Here, the Reserve is located within one of the most populous communities in the United States. Not only are the Area A parking lots adjacent to a street, but across the street is Fisherman's Village; a harbor front development with restaurants, shopping, and other commercial uses. Similarly, the baseball fields in south Area C are bordered and adjacent to Culver Boulevard to the north, Lincoln Boulevard to the west, State Route 90 a bit further to the east, and the Ballona Creek Bike Path to the south. Human disturbance is high for the west portion of Area A and Area C south compared to other areas of the Reserve. Additionally, Area C south is cut off from the rest of the Reserve by the aforementioned infrastructure which makes wildlife movement to and from Area C south more challenging.

When deciding if a piece of land should be restored, the ability to restore the habitat is important but not the sole factor the Department considers. The long-term maintenance of the restored habitat and ability to sustain the restored habitat values are also important factors. As a result, the Area A parking lots and baseball fields present a lower value opportunity for restoration as compared to other locations of the Reserve. Perhaps more importantly, the current restoration plan was developed with purpose over several years with extensive analysis, input from experts, and copious amount of public input. As such, the Department believes the current restoration project presents a higher value restoration opportunity as compared to focusing on the Area A parking and baseball fields.

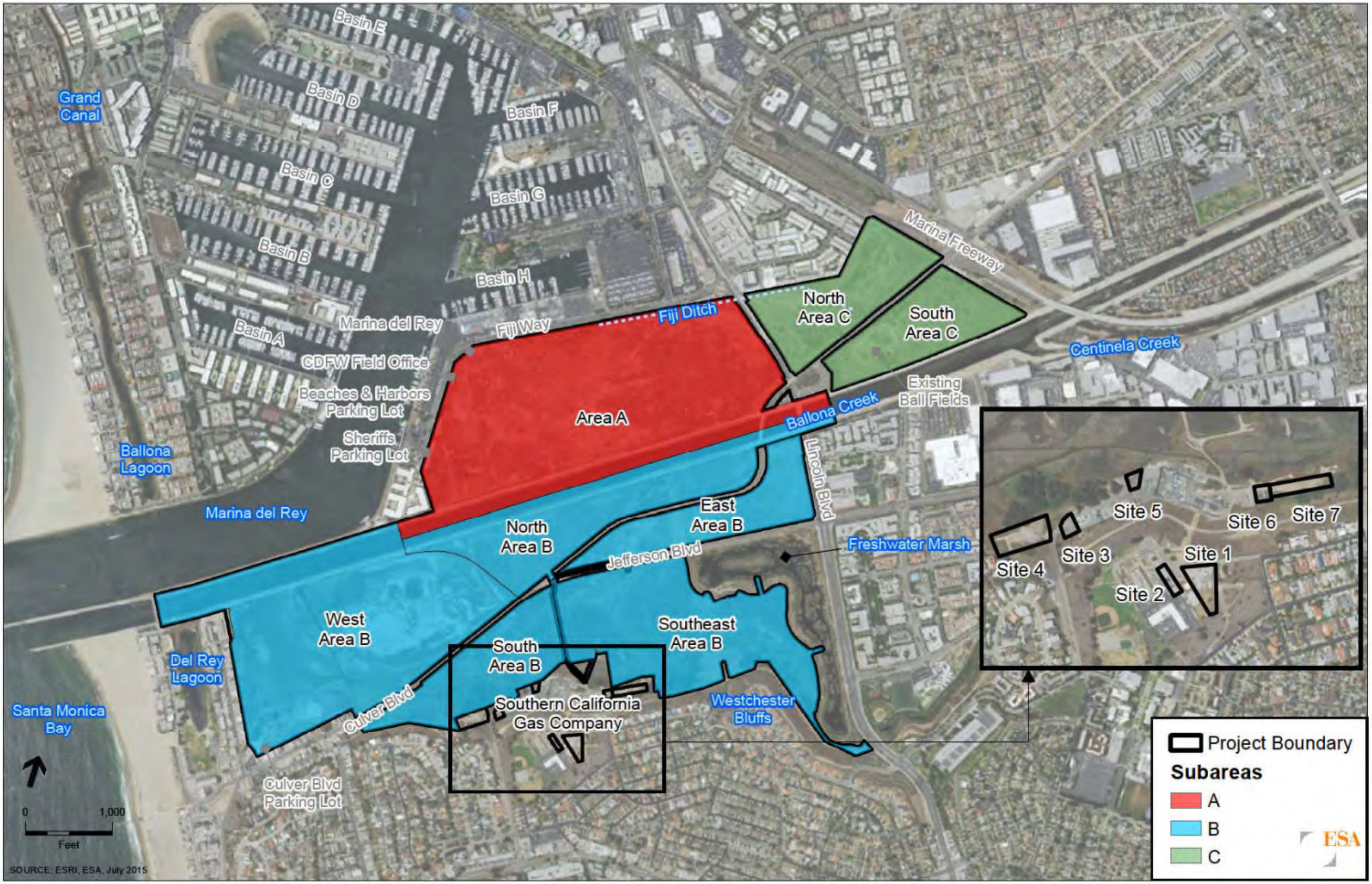
It is worth keeping in mind that this determination does not involve constructing new infrastructure or starting new uses in an otherwise pristine ecological reserve. Rather, the existence of the baseball fields and Area A parking lots predate CDFW's acquisition of the Reserve by decades. With little league baseball ongoing in south

Area C since 1956, and the Area A parking lots in use since at least 1984, coupled with the human interference in those areas as described above, it is unsurprising that those specific areas lack beneficial habitat for native species. In particular, the baseball fields are surrounded by invasive vegetation. Still, with implementation of the restoration project that remains the focus of the EIR currently being revised, habitat around the Area A parking lots and baseball fields would be restored to upland and transitional habitat.

In light of restoration being the purpose for acquisition, and the Department's focus on restoration for the Reserve, the Department is not aware of nor has it allocated resources to identifying or developing non-restoration uses in place of the baseball fields or Area A parking lots. And because the continued presence of the Area A parking lots and baseball fields do not hinder or impede the planned restoration or the Department's day-to-day management of the Reserve, the Department is not, at this time, aware of other uses that would be more appropriate in place of the Area A parking lots or baseball fields. Accordingly, the Department is not inclined to shift its focus and limited resources towards an interim, or different, use of the areas which could be a distraction and impediment to furthering the planned for restoration.

Although the following factor did not inform the Department's determination, the Department believes it is worth mentioning in anticipation of furthering the restoration and implementing its mission within a highly urbanized environment in the 21st century. According to the Little League, it serves low-income residents, including those at the Mar Vista Housing Projects nearby the Reserve. (Attachment 7) Approximately 60%-75% of the participants in this particular little league receive some sort of assistance. Although baseball fields are not normally allowed within an ecological reserve, the little league that has operated here for decades introduces children and their guardians to an ecological reserve and to a lesser extent the Department. The Department recognizes that participants are there for baseball and softball, but once restoration is complete and the Department can expand its focus from restoration, this could be an opportunity for the Department to more actively interact with the little league's participants. It is a Department priority to increase investment in programs and resources to benefit underrepresented communities, especially to improve biodiversity and access to the outdoors. The Department needs each Californian and their diverse perspectives to be part of the conversation on how best to protect and conserve California's biodiversity as we tackle the challenges over the coming decades. Creative problem solving is needed and embracing this demographic could potentially best serve the purposes of this particular ecological reserve and the Department's mission. Until then, the Department will continue focusing on restoring the Reserve.

Attachments



Ballona Wetlands Restoration Project

Figure ES-2
Project Site

STATE OF CALIFORNIA
FISH AND GAME COMMISSION
FINAL STATEMENT OF REASONS FOR REGULATORY ACTION

Amend Section 630, Ecological Reserves
Title 14, California Code of Regulations
Re: Designation and Special Regulations

I. Date of Initial Statement of Reasons: March 24, 2005

II. Date of Pre-adoption Statement of Reasons: July 18, 2005

III. Date of Final Statement of Reasons: November 29, 2005

IV. Dates and Locations of Scheduled Hearings:

(a) Notice Hearing: Date: May 5, 2005
Location: Sacramento

(b) Discussion/Adoption Hearing: Date: August 19, 2005
Location: San Luis Obispo

V. Update:

No modifications were made to the originally proposed language of the Initial Statement of Reasons.

Section III. Description of Regulatory Action, Subsection (d) Identification of Reports or Documents Supporting Regulation Change is revised to read:

> See attached Management Plan Summary<u>, revised July 2005</u> for the proposed new addition<u>. Also see State Lands Commission Calendar Item C36 and Voting Record dated June 20, 2005 approving a Department of Fish and Game application to lease a 24 acre Expanded Wetlands Parcel for management and authorizing its inclusion within the proposed Ballona Wetlands Ecological Reserve.</u>

The revised Management Plan Summary is attached.

The Fish and Game Commission adopted the proposed regulatory amendments at its August 19, 2005 meeting in San Luis Obispo.

Reasons for Modification of Originally Proposed Language of Initial Statement of Reasons:

No changes have been made to the originally proposed regulatory language.

The attached revised Management Plan Summary describes the June 20, 2005 approval by the State Lands Commission (SLC) of a Department of Fish and Game (DFG) application to lease 24 acres known as the "Expanded Wetlands Parcel" for management, and authorization of its inclusion within the proposed Ballona Wetlands Ecological Reserve. SLC and DFG are in the process of finalizing this lease, and propose the inclusion of this parcel in the proposed Ballona Wetlands Ecological Reserve with this rulemaking. The management plan summary is also revised to include protection of uplands among the management objectives for the property, and includes existing gas and energy easements in the list of agreements affecting the property.

VI. Summary of Primary Considerations Raised in Support of or Opposition to the Proposed Actions and Reasons for Rejecting those considerations:

Responses to public comments received by July 18, 2005 were included in the Pre-adoption Statement of Reasons (attached).

The following is a summary of public comments received since July 18, 2005:

1. The following individuals wrote letters in support of the proposed regulatory amendments, and with the exception of Daniel S. Cooper, requested that an area known as the Freshwater Marsh not be included within the proposed Ballona Wetlands Ecological Reserve.

- Mira Tweti dated August 5, 2005
- Barbara Elliot dated August 5, 2005
- Bob and Sue Krauch dated August 7, 2005
- Jean Pickus dated August 8, 2005
- Edith Read, Ph.D. Center for Natural Lands Management dated August 9, 2005
- Ruth Lansford, Friends of Ballona Wetlands dated August 10, 2005
- Lisa Fimiani dated August 12, 2005
- Lance Williams dated August 15, 2005
- Daniel S. Cooper, Cooper Ecological Monitoring dated August 15, 2005
- Thomas and Catherine Tyrell dated August 18, 2005

The following individuals testified at the August 19, 2005 Fish and Game Commission Hearing in support of the proposed regulatory amendments and requested that the area known as the Freshwater Marsh not be included within the proposed Ballona Wetlands Ecological Reserve:

- Otella Wruck, Friends of Ballona Wetlands
- Andi Culberterson, City of Los Angeles
- Edith Read, Center for Natural Lands Management
- Lisa Fimiani, Audobon Society, Friends of Ballona Wetlands
- Kathleen Truman, Latham & Watkins representing Playa Capital

Department Response: The proposed regulatory amendments do not include the area known as the Freshwater Marsh within the proposed Ballona Wetlands Ecological Reserve

2. Stan Wisniewski, Los Angeles County Beaches and Harbors wrote a letter dated August 17, 2005 supporting the proposed regulatory amendments contingent on recognition of existing Local Coastal Permits and associated regulations and development standards. He also expressed concern regarding designation of the proposed Ballona Wetlands Ecological Reserve and any related development restrictions.

   Andi Culbertson, Los Angeles County Beaches and Harbors testified at the August 19, 2005 Fish and Game Commission hearing in support of the proposed regulatory amendments. He also expressed concerns regarding designation of the proposed Ballona Wetlands Ecological Reserve and any related development restrictions.

Department Response: The proposed regulatory action will not result in development restrictions.

3. The following individuals wrote letters requesting that the area known as the Freshwater Marsh be included within the proposed Ballona Wetlands Ecological Reserve:

- Paul Herzog, Ballona Wetlands Land Trust; Joe Geever, Surfrider Foundation; Marcia Hanscom, Sierra Club Angeles Chapter; Patricia McPherson, Grassroots Coalition; Don May, California Earth Corps; Roy Van de Hoek, Wetlands Action Network dated August 13, 2005
- Bill Rosendahl, Los Angeles City Council dated August 16, 2005
- Tracy Egoscue and Dana Palmer, Santa Monica Baykeeper dated August 16, 2005

The following individuals testified at the August 19, 2005 Fish and Game Commission Hearing requesting inclusion of the Freshwater Marsh within the proposed Ballona Wetlands Ecological Reserve:

- Marcia Hanscom, Wetlands Action Network
- Peggy Forster, Grass Roots
- Andrew Christie
- Robert VandeHoek
- Sabrina Venskus, Ballona Wetlands Land Trust

Department Response: The Freshwater Marsh is a mitigation parcel owned by the State Lands Commission and managed by the Center for Natural Lands Management under agreement with Playa Vista Development. There is no need to include the Freshwater Marsh within the proposed Ballona Wetlands Ecological Reserve, because its restoration, funding, management and uses are governed by multiple regulatory agencies and funded by Playa Vista Development.

4. Paul Weakland testified at the August 19, 2005 Fish and Game Commission hearing that Ecological Reserves should not be named after individuals.

Department Response: It is the policy of the Fish and Game Commission that no facility of the Department of Fish and Game shall be named for persons living or dead.

VII. Location and Index of Rulemaking File:

A rulemaking file with attached file index is maintained at:
California Fish and Game Commission
1416 Ninth Street
Sacramento, CA 95814

VIII. Location of Department Files:

Department of Fish and Game
1812 Ninth Street
Sacramento, CA 95814

IX. Description of Reasonable Alternatives to Regulatory Action:

(a) Alternatives to Regulatory Action:

Designation of the properties as wildlife areas in Section 550, Title 14, CCR. This alternative is inappropriate because of the purposes for which these properties were acquired. The sensitive habitats and species require additional protection not provided under Section 550.

(b) No Change Alternative:

By not adding these properties and providing special regulations, the appropriate level of protection for the properties is not provided. Also, appropriate public use activities will not be enforceable unless the amendments are made.

(c) Consideration of Alternatives:

In view of information currently possessed, no reasonable alternative considered would be more effective in carrying out the purposes for which the regulations are proposed or would be as effective, and less burdensome to the affected private persons than the proposed regulations.

X. Impact of Regulatory Action:

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States:

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states.

The proposed regulatory action adds one ecological reserve to Title 14 with special regulations. The proposed regulatory action is proposed to provide maximum protection of wildlife and habitat and to manage appropriate public use. It is not expected to negatively affect businesses, because the regulations are enforced only on the specific properties named.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California:

None

(c) Cost Impacts on a Representative Private Person or Business:

The agency is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State:

None

(e) Nondiscretionary Costs/Savings to Local Agencies:

None

(f) Programs mandated on Local Agencies or School Districts:

None

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4:

None

(h) Effect on Housing Costs:

None

Updated Informative Digest/Policy Statement Overview

Currently, there are 132 ecological reserves designated in Section 630, Title 14, CCR, for the purpose of protecting sensitive habitats and species. The department is requesting that this section be amended to add one new ecological reserve, Ballona Wetlands, to this listing.

Ballona Wetlands consisting of 553 acres in Los Angeles County is proposed for designation as an ecological reserve for the protection and enhancement of coastal salt marsh, freshwater marsh, transitional uplands, and associated species, including the state listed endangered Belding's savannah sparrow. The area is also an important wildlife movement corridor to other public lands in the vicinity of the wetlands.

The reasons for listing this property in Title 14 are to regulate public use and provide the best available protection for the species and habitats the property was acquired to protect. Since the property contains sensitive species, including a state listed endangered species, sensitive vegetation communities and acts as a linkage for other important protected lands, it is necessary and appropriate to provide this level of regulatory protection to prevent improper use and degradation of wildlife resources. In order to do this efficiently, the department has a set of general regulations which apply to all ecological reserves.

The department may also write special regulations for individual properties, as it thinks appropriate, to give an additional level of protection, or to permit specific public uses not governed by the general regulations. The department is requesting special regulations for this reserve based on management information gathered which shows these amendments are necessary to protect the habitat or species the property supports.

Three special regulations will protect sensitive species and habitats of Ballona Wetlands by allowing pedestrian use only on designated trails; bicycle use only on a designated bike path on the north side of the Ballona Creek flood channel; and boating only within the Ballona Creek flood channel. One special regulation will allow fishing only with barbless hooks from shore in designated areas along the Ballona Creek flood channel or from a boat within the Ballona Creek flood channel for the protection of sensitive species and habitats and to minimize mortality of fish and aquatic species caught by anglers and returned to Ballona Creek. Two additional special regulations will allow licensed recreational use of a portion of an area of the proposed reserve known as Area C, and leased parking use under existing agreements, unless it is determined that other uses are more appropriate for these areas. Because these licensed recreational and parking uses are not normally allowed on ecological reserves, these two special regulations are necessary when the department has determined these activities are appropriate and will cause no impacts to protected species and habitats.

No changes have been made to the originally proposed regulatory language. The attached Management Plan Summary is revised from the version included with the

Initial Statement of reasons to include protection of uplands among the management objectives of the property, and to include existing gas and energy easements in the list of agreements affecting the property. The Management Plan Summary is also revised to reflect recent developments in the Department's efforts to include an additional 24 acre parcel, known as the "Expanded Wetlands Parcel" within the proposed Ballona Wetlands Ecological Reserve. On June 20, 2005 the State Lands Commission (SLC) approved a Department of Fish and Game (DFG) application to lease the Expanded Wetlands Parcel for management, and authorized its inclusion within the proposed Ballona Wetlands Ecological Reserve. SLC and DFG are in the process of finalizing this lease, and propose the inclusion of this parcel in the proposed Ballona Wetlands Ecological Reserve with this rulemaking.

The Fish and Game Commission adopted the proposed regulatory amendments to designate Ballona Wetlands Ecological Reserve at its August 19, 2005 meeting in San Luis Obispo.

§630. Ecological Reserves is amended to read:

The areas specified in this chapter have been declared by the Fish and Game Commission to be ecological reserves. A legal description of the boundaries of each ecological reserve is on file at the department's headquarters, 1416 Ninth Street, Sacramento. Ecological reserves are established to provide protection for rare, threatened or endangered native plants, wildlife, aquatic organism and specialized terrestrial or aquatic habitat types. Public entry and use of ecological reserves shall be compatible with the primary purposes of such reserves, and subject to the following applicable general rules and regulations, except as otherwise provided for in the special area regulations:

(a) General Rules and Regulations:

(1) Protection of Resources. No person shall mine or disturb geological formations or archeological artifacts or take or disturb any bird or nest, or eggs thereof, or any plant, mammal, fish, mollusk, crustacean, amphibian, reptile, or any other form of plant or animal life in an ecological reserve except as provided in subsections 630(a)(2) and (a)(8). The department may implement enhancement and protective measures to assure proper utilization and maintenance of ecological reserves.

(2) Fishing. Fishing shall be allowed in accordance with the general fishing regulations of the commission except that the method of taking fish shall be limited to angling from shore. No person shall take fish for commercial purposes in any ecological reserve except by permit from the commission.

(3) Collecting. No collecting shall be done in an ecological reserve except by permit issued pursuant to section 650 of these regulations. Any person applying for a permit must have a valid scientific collecting permit issued pursuant to part 3 of this title.

(4) Motor Vehicles. No person shall drive, operate, leave, or stop any motor vehicle, bicycle, tractor, or other type of vehicle in an ecological reserve except on designated access roads and parking areas.

(5) Swimming. No person shall swim, wade, dive, or use any diving equipment within an ecological reserve except as authorized under the terms of a permit issued pursuant to subsection (3).

(6) Boating. No person shall launch or operate a boat or other floating device within an ecological reserve except by permit from the commission.

(7) Trails. The department may designate areas within an ecological reserve where added protection of plant or animal life is desirable, and may establish equestrian or walking trails or paths within such designated areas. No person shall walk or ride horseback in such areas except upon the established trails or paths.

(8) Firearms. No person shall fire or discharge any firearm, bow and arrow, air or gas gun, spear gun, or any other weapon of any kind within or into an ecological reserve or possess such weapons within an ecological reserve, except law enforcement personnel and as provided for in individual area regulations that allow for hunting.

(9) Ejection. Employees of the department may eject any person from an ecological reserve for violation of any of these rules or regulations or for any reason when it appears that the general safety or welfare of the ecological reserve or persons thereon is endangered.

(10) Public Entry. Public entry may be restricted on any area at the discretion of the department to protect the wildlife, aquatic life, or habitat. No person, except state and local law enforcement officers, fire suppression agencies and employees of the department in the performance of their official duties or persons possessing written permission from the department, may enter any ecological reserve, or portion thereof, which is closed to public entry. No person may enter any Ecological Reserve between sunset and sunrise except with written permission from the Department, which may be granted for purposes including night fishing in accordance with subsection (a)(2) from designated shore areas only.

A $2.00 day use pass or a valid $10.00 annual wildlife pass is required of all users of Elkhorn Slough and Upper Newport Bay ecological reserves except for users that possess a valid California sport fishing license hunting license or trapping license, or users that are under 16 years of age or users that are part of an organized youth or school group and having free permits issued by the appropriate regional office. Refer to subsection 550(b)(16)(B), Title 14, CCR, for regulations for fee requirements for wildlife areas.

(11) Introduction of Species. Unless authorized by the commission, the release of any fish or wildlife species, including domestic or domesticated species, or the introduction of any plant species, is

prohibited. The department may reintroduce endemic species on ecological reserves for management purposes.

(12) Feeding of Wildlife. The feeding of wildlife is prohibited.

(13) Pesticides. The use of pesticides is prohibited on any ecological reserve unless authorized by the commission with the exception that the department may use pesticides for management purposes and for public safety.

(14) Litter. No person shall deposit, drop, or scatter any debris on any ecological reserve except in a receptacle or area designated for that purpose. Where no designated receptacles are provided, any refuse resulting from a person's use of an area must be removed from that area by such person.

(15) Grazing. The grazing of livestock is prohibited on any ecological reserve.

(16) Falconry. Falconry is prohibited.

(17) Aircraft. No person shall operate any aircraft or hovercraft within a reserve, except as authorized by a permit from the commission.

(18) Pets. Pets, including dogs and cats, are prohibited from entering reserves unless they are retained on a leash of less than ten feet or are inside a motor vehicle, except as provided for in individual area regulations that allow for hunting or training activities.

(19) Fires. No person shall light fireworks or other explosive or incendiary devices, or start or maintain any fire on or in any reserve, except for management purposes as provided in subsection (a)(1).

(20) Camping. No person shall camp on/in any ecological reserve.

(21) Vandalism. No person shall tamper with, damage or remove any property not his own when such property is located within an ecological reserve.

(b) Areas and Special Regulations for Use:

(1) Abalone Cove Ecological Reserve, Los Angeles County.

(A) Fishing is permitted for fin fish (those having vertebrae) only, from boats as well as from shore. Spear guns may be used for the taking of fin fish.

(B) Swimming, surfing, boating, skin and SCUBA diving are permitted.

(2) Agua Hedionda Lagoon Ecological Reserve, San Diego County.

(A) The department, and the County of San Diego, after consultation with the department, may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(B) All fishing is prohibited.

(3) Albany Mudflats Ecological Reserve, Alameda County.

(4) Alkali Sink Ecological Reserve, Fresno County.

(A) Grazing is permitted under a permit from the department.

(5) Allensworth Ecological Reserve, Tulare County.

(A) Grazing shall be allowed under permit from the department.

(B) Hunting shall be permitted in accordance with general hunting regulations, but only at such times and in specific areas as designated by the department.

(6) Apricum Hill Ecological Reserve, Amador County.

(A) No person, except as provided in subsection (a)(10), shall enter the reserve.

(7) Atascadero Creek Marsh Ecological Reserve, Sonoma County.

(8) Bair Island Ecological Reserve, San Mateo County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve during the period February 15 through May 20.

(B) Waterfowl shall be taken in accordance with the general waterfowl regulations.

(9) Baldwin Lake Ecological Reserve, San Bernardino County.

(A) All fishing is prohibited.

(B) Waterfowl and upland game hunting shall be allowed in accordance with the general hunting regulations. Waterfowl hunting shall be permitted from boats only, and in accordance with general waterfowl hunting regulations and pursuant to the provisions of Section 551, Title 14, CCR.

(C) Boating is permitted for the purpose of waterfowl hunting only. Boats may be launched and retrieved in designated areas only.

<u>(10) Ballona Wetlands Ecological Reserve, Los Angeles County.</u>

<u>(A) Pedestrian use is allowed on designated trails only.</u>

(B) Bicycle use is allowed only on the designated bike path on the north side of the Ballona Creek flood control channel.

(C) Fishing from shore is allowed only in designated areas along Ballona Creek flood control channel. Fishing from boats is allowed only within the Ballona Creek flood control channel. Only barbless hooks may be used.

(D) Boating shall be allowed only within the Ballona Creek flood control channel.

(E) Existing recreational uses may be allowed under license agreement with Playa Vista Little League in that portion of Area C identified in the license agreement unless it is determined by the department that restoration or other uses in this area are more appropriate.

(F) Existing parking areas under leases to the County of Los Angeles may be allowed unless it is determined by the department that restoration or other uses in those areas are more appropriate.

(~~10~~11) Batiquitos Lagoon Ecological Reserve, San Diego County.

(A) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological research projects within the reserve. Such projects shall be compatible with the primary purpose of the reserve.

(B) San Diego County, after consultation with the department, may carry out management activities necessary for fish and wildlife management, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and associated use of equipment.

(~~11~~12) Blue Ridge Ecological Reserve, Tulare County.

(A) Grazing shall be allowed under permit from the department.

(B) Hunting and trapping shall be permitted in accordance with the general hunting and trapping regulations, but only at such times and in specific areas as designated by the department. Trapping may only be done under permit from the department.

(~~12~~13) Blue Sky Ecological Reserve, San Diego County.

(A) Bicycles prohibited.

(~~13~~14) Bobelaine Ecological Reserve, Sutter County.

(A) No person, except as provided in subsection (a)(10), employees of the National Audubon Society or employees of the Department of Water Resources, in the performance of their official duties or those persons possessing written permission from the area manager, may enter the reserve for any purpose.

(B) All fishing is prohibited.

(C) The area manager may issue permits to conduct biological research projects and may restrict the use of boats, vehicles and other motorized equipment within the reserve. Such projects and use shall be compatible with the primary purposes of the reserve.

(D) The Audubon Society may carry out operation and management activities necessary for fish and wildlife management, flood control, vector control and public access. Authorized operation and maintenance activities shall include, but not be limited to, use of chemicals, vegetation control, water control and associated use of equipment.

(~~14~~15) Boden Canyon Ecological Reserve, San Diego County.

(A) Upland game hunting shall be permitted in accordance with the general hunting regulations, but only at such times and in specific areas as designated by the department.

(~~15~~16) Boggs Lake Ecological Reserve, Lake County.

(~~16~~17) Bolsa Chica Ecological Reserve, Orange County.

(A) No person, except as provided in subsection (a)(10), or employees of Signal Corporation and its invitees, for the purposes of carrying out oil and gas operations, shall enter this reserve and remain therein except on established trails, paths or other designated areas.

(B) Fishing shall be permitted at designated areas around outer Bolsa Bay only.

(C) Horses are prohibited from entering the reserve.

(D) Pets are prohibited from entering the reserve except when they remain inside a motor vehicle.

(E) No person shall enter this reserve between 8:00 p.m. and 6:00 a.m.

(F) Motor vehicles are prohibited between 8:00 p.m. and 6:00 a.m.

(G) Vehicle parking is for reserve visitors' use only.

(H) The County of Orange, after consultation with the department, may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(~~17~~18) Bonny Doon Ecological Reserve, Santa Cruz County.

(~~18~~19) Boulder Creek/Rutherford Ranch Ecological Reserve, San Diego County.

(~~19~~20) Buena Vista Lagoon Ecological Reserve, San Diego County.

(A) The County of San Diego, after consultation with the department, may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(B) Fishing is allowed at designated fishing areas only.

(~~20~~21) Burton Mesa Ecological Reserve, Santa Barbara County

(A) Motor vehicles use is prohibited, except by department personnel or department authorized contractors for management or research, or by law enforcement/public safety officers in response to public safety or health hazards.

(B) Upland game hunting may be permitted only at such times and in specific areas as designated by the department.

(~~21~~22) Butler Slough Ecological Reserve, Tehama County.

(A) Livestock grazing may be allowed under permit from the department.

(B) The department may carry out management activities necessary for habitat preservation and management. Authorized operations and maintenance activities shall include, but not be limited to, controlled livestock grazing, controlled burning, and chemical and mechanical treatment with the use of associated equipment.

(~~22~~23) Butte Creek Canyon Ecological Reserve, Butte County.

(A) Motor vehicle use in the Reserve is prohibited except by Department personnel, law enforcement officers or firefighters in response to public safety or health hazards.

(B) Horses are prohibited.

(C) Fishing by boat or other flotation device within the Reserve and in the main channel of Butte Creek is permitted only from February 1 through April 30. Only hand-carried boats or flotation devices may be launched and operated.

(D) The use, application or deposition in any form of toxic substances is prohibited unless authorized by the Commission.

(~~23~~24) Butte Creek House Ecological Reserve, Butte County.

(A) Motor vehicle use is prohibited except by Department personnel, law enforcement officers, or firefighters in response to public safety or health hazards.

(B) The use, application or deposition in any form of toxic substances is prohibited unless authorized by the Commission.

(~~24~~25) Buttonwillow Ecological Reserve, Kern County.

(A) Grazing may be allowed under permit from the department.

(B) Hunting may be permitted in accordance with general hunting regulations, but only at such times and in specific areas as designated by the department.

(~~25~~26) By-Day Creek Ecological Reserve, Mono County.

(A) All fishing is prohibited.

(B) Hunting shall be permitted in accordance with general hunting regulations.

(~~26~~27) Calhoun Cut Ecological Reserve, Solano County.

(A) No person, except as provided below and in subsection (a)(10), shall enter this reserve.

(B) Hunting for waterfowl is allowed only from a boat on waters of the main channel of Calhoun Cut and its tributaries, accessible only from Lindsey Slough and subject to the general hunting regulations and the provisions of subsection (a)(10), related to the protection of wildlife, aquatic life and habitat.

(C) Fishing is allowed only from a boat on waters of the main channel of Calhoun Cut and its tributaries, accessible only from Lindsey Slough and subject to the general sport fishing regulations and the provisions of subsection (a)(10), related to the protection of wildlife, aquatic life and habitat.

(D) Grazing may be allowed under permit from the Department.

(~~27~~28) Canada de los Osos Ecological Reserve, Santa Clara County.

(A) No person, may enter the reserve except with written permission from the department, or unless part of an organized group that has received written permission.

(B) Fishing may be allowed only with written permission from the department. Fishing may be permitted from boats, as well as from shore; only lightweight hand-carried boats or floatation devices may be launched and operated. No gasoline-powered boats shall be permitted.

(C) Swimming, diving and wading may be allowed in designated areas with permission from the department.

(D) Hunting may be allowed, but only in participation with department sponsored hunts at such times, areas, and species as designated by the department.

(E) Target and skeet shooting, other discharge of firearms, and use of bow and arrow may be allowed, but only at such times and in specific areas as designated by the department.

(F) Except as otherwise permitted by the department, all public access trails are open to foot access only.

(G) Notwithstanding the provisions of subsections (a)(1), (2), (3), (5), (6), (8), (12) and (17), the department may issue permits to conduct biological research within the reserve, and may allow collection of plants and animals for educational purposes. Such activities must be compatible with the primary purpose of the reserve.

(H) Camping and campfires may be allowed in specified areas with written permission from the department.

(I) The department may restrict any activities on the reserve to persons under 16 and adults supervising those persons.

(J) Dogs may be allowed in the reserve with written permission from the department.

(K) Livestock grazing may be allowed for habitat management purposes under permit from the department.

(~~28~~29) Canebrake Ecological Reserve, Kern County.

(A) Notwithstanding the provision of subsection (a)(15), grazing may be allowed under permit from the department.

(B) Firearms, archery equipment, and hunting dogs, either on leash or in a vehicle, may be possessed only by licensed hunters only at such times and in specific areas as designated by the department.

(C) Fishing may be allowed only in those specific areas designated by the department.

(D) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6), and (12), the department may issue permits to conduct biological or archaeological research. Such research shall be compatible with the primary purpose of the reserve.

(E) Notwithstanding the provisions of subsection (a)(18), only those animals assisting visually impaired or disabled persons are permitted.

(F) Notwithstanding the provisions of subsection (a)(7), equestrian use may be allowed, but only in specific areas designated by the department.

(~~29~~30) Carlsbad Highlands Ecological Reserve, San Diego County.

(~~30~~31) Carmel Bay Ecological Reserve, Monterey County.

(A) Sport fishing with hook and line, spear gun or hand-held implements shall be permitted from boats as well as from shore. No invertebrates may be taken, possessed or destroyed.

(B) Swimming, boating, surfing, skin and SCUBA diving are permitted.

(C) Within Stillwater Cove kelp may be removed at any time to allow the passage and mooring of boats between Pescadero Rocks and Arrowhead Point.

(D) If, at any time, the director of the department finds that the harvesting of kelp will tend to destroy or impair any kelp bed or beds, or parts thereof, or tend to impair or destroy the supply of any food for fish or wildlife, the director shall serve on every person licensed to harvest kelp a 48-hour advance, written notice that the kelp bed, or a part thereof, will be closed to the harvesting of kelp for a period not to exceed one year. After service of such a notice the person upon whom notice is served may appeal to the commission for a hearing to reopen the kelp bed or part thereof.

(E) Not more than five percent (5%) of the total weight of kelp harvested in any one day shall consist of Nereocystis (bull kelp).

(F) Any licensed person or company intending to harvest kelp within the ecological reserve shall give the department's regional manager of the Marine Resources Region, or his designee, at least 48-hours oral notice of the intention to harvest. At the option of the department, an observer selected by the department may accompany the harvester during such a harvesting.

(G) Not more than 50 percent of the kelp within Bed 219 shall be harvested in any four-month period.

(~~31~~32) Carrizo Canyon Ecological Reserve, Riverside County.

(A) No person, except as provided in subsection (a)(10), and employees of the Bureau of Land Management in the performance of their official duties shall enter this reserve during the period June 15 to September 30.

(B) The County of Riverside may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(C) Pets are prohibited from entering the reserve except when they remain inside a motor vehicle.

(~~32~~33) Carrizo Plains Ecological Reserve, San Luis Obispo County, including the American, Panorama, Elkhorn Plain and Chimineas Units.

(A) Hunting shall be allowed in accordance with the general hunting regulations and only at such times and in such places as designated by the Department.

(B) Target shooting is permitted in designated areas.

(C) Notwithstanding the provisions of subsection (a)(15), grazing may be allowed under permit from the department.

(D) Notwithstanding the provisions on subsections (a)(1), (3), (5), (6), (10), (12) and (20), the department may issue permits to conduct biological research or monitoring compatible with the purposes of the reserve.

(~~33~~34) China Point Ecological Reserve, Siskiyou County.

(A) No person, except as provided in subsection (a)(10) and employees of the U.S. Forest Service in the performance of their official duties, shall enter this reserve during the period February 15 through July 31.

(B) Fishing shall be permitted from boats as well as from shore; boats may be launched and operated in the Klamath River.

(C) Hunting shall be allowed in accordance with the general hunting regulations and subject to subsection (~~33~~34)(A) above.

(~~34~~35) Chorro Creek Ecological Reserve, San Luis Obispo County.

(A) Except as otherwise designated by the department, all public access trails are open to foot access only.

(B) Notwithstanding the provisions of subsections (a)(1), (2), (3), (5), (6), (8), (12) and (17), the department may issue permits to conduct biological research within the reserve, and may allow collection of plants and animals for educational purposes. Such activities must be compatible with the primary purpose of the reserve.

(C) Livestock grazing may be allowed for habitat management purposes under permit from the department.

(~~35~~36) Clover Creek Ecological Reserve, Shasta County.

(A) Livestock grazing may be allowed under permit from the department.

(B) The department may carry out management activities necessary for habitat preservation and management. Authorized operations and maintenance activities shall include, but not be limited to, controlled livestock grazing, controlled burning, and chemical and mechanical treatment with the use of associated equipment.

(~~36~~37) Coachella Valley Ecological Reserve, Riverside County.

(A) The Bureau of Land Management, the Fish and Wildlife Service and The Nature Conservancy may carry out management activities necessary for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but not be limited to, use of chemicals, vegetation control, water control and associated use of equipment.

(~~37~~38) Coal Canyon Ecological Reserve, Orange County.

(A) Hunting shall be permitted in accordance with the general hunting regulations, but only at such times and in specific areas as designated by the department.

(B) Method of take restrictions: Shotguns and archery equipment only.

(~~38~~39) Coldwater Canyon Ecological Reserve, Ventura County.

(A) The existing travel corridor through the area is open to foot traffic only. All other areas are closed to public entry.

(~~39~~40) Corral Hollow Ecological Reserve, San Joaquin County.

(A) No person, except as provided in subsection (a)(10), shall enter the reserve.

(~~40~~41) Corte Madera Marsh Ecological Reserve, Marin County.

(A) Boating is permitted, except only lightweight hand-carried boats may be launched within the reserve.

(~~41~~42) Cosumnes River Ecological Reserve, Sacramento County.

(A) Walking is allowed only on established trails, paths or other designated areas.

(B) Horses, except by written permission of the department for grazing management, are prohibited.

(C) Boating is permitted subject to the limitation that only lightweight, hand carried, non-gasoline powered floating devices may be launched and operated from designated launching sites. The department or its designee may further restrict the use and operation of boats to protect resources or provide for the orderly operation of recreational programs. Boating restrictions may include, but are not limited to, seasonal closures.

(D) Fishing is allowed only from a boat on the waters of the main channel of the Cosumnes River and sloughs accessible from the Mokelumne River in accordance with the general fishing regulations and the provisions of subsection (a)(10), related to the protection of wildlife, aquatic life and habitat.

(E) Hunting may be permitted in accordance with general hunting regulations, but only at such times and in specific locations as designated by the department.

(F) Picnicking shall occur only at such times and in those areas designated by the department.

(G) Pets are prohibited from entering the reserve, except when they remain inside a motor vehicle.

(H) The department, the State Lands Commission, the Bureau of Land Management, The Nature Conservancy, Ducks Unlimited, Inc. and the County of Sacramento may carry out management activities necessary for fish and wildlife management, flood control, vector control and public access. Authorized operation and maintenance activities shall include, but not be limited to, use of chemicals, vegetation control, animal control, water control and associated use of equipment.

(I) Grazing may be allowed under permit from the department.

(J) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological or archaeological research. Such research shall be compatible with the primary purpose of the reserve.

(K) Farming may be allowed under permit from the department when such farming is compatible with the primary purpose of the reserve.

(~~42~~43) Crestridge Ecological Reserve, San Diego County.

(A) Non-motorized mountain biking may be allowed on designated roads during designated seasons as determined by the department. Closures may be implemented at the discretion of the department.

(~~43~~44) Dairy Mart Ponds Ecological Reserve, San Diego County.

(A) San Diego County, after consultation with the department, may carry out management activities for vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and associated use of equipment.

(~~44~~45) Dales Lake Ecological Reserve, Tehama County.

(A) Waterfowl hunting shall be permitted in accordance with the general waterfowl regulations per Section 502, Title 14, CCR.

(B) Livestock grazing may be allowed under permit from the department.

(C) The department may carry out management activities necessary for habitat preservation and management. Authorized operations and maintenance activities shall include, but not be limited to, controlled livestock grazing, controlled burning, and chemical and mechanical treatment with the use of associated equipment.

(~~45~~46) Del Mar Landing Ecological Reserve, Sonoma County.

(A) Fishing is permitted for fin fish (those having vertebrae) only. Spear guns may be used for the taking of fin fish.

(B) Swimming, boating, skin and SCUBA diving are permitted.

(~~46~~47) Del Mar Mesa/Lopez Ridge Ecological Reserve, San Diego County.

(~~47~~48) Del Monte Dunes Ecological Reserve, Monterey County.

(~~48~~49) Eden Landing Ecological Reserve, Alameda County.

(A) No person shall enter this reserve except on designated trails without written permission or by posted notice of the regional manager.

(B) No person shall walk, ride horses or bicycles, except on designated trails.

(C) Dogs are restricted to designated trails and designated hunting areas during the waterfowl season. In designated hunting areas, dogs may be off leash only for hunting during waterfowl season and must be under voice control at all times.

(D)Waterfowl hunting shall be permitted, but only at such times and in specific areas as designated by the department. Waterfowl shall be taken in accordance with the general waterfowl regulations.

(E) Fishing shall be permitted from boats and from shore, but only at such times and in specific areas as designated by the department.

(F) Notwithstanding the provisions of section (a)(2), commercial bait fishing for brine shrimp may occur only at such times and in specific areas as designated by the department.

(G) Notwithstanding the provisions of subsections (a)(1), (2), (3), (5), (6), (8), (10), (12) and (20), the department may issue permits to conduct biological research or monitoring compatible with the primary purposes of the reserve.

(~~49~~50) Elkhorn Slough Ecological Reserve (National Estuarine Research Reserve), Monterey County.

(A) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological research projects within the reserve. Such projects shall be compatible with the primary purposes of the reserve.

(B) Fishing shall be conducted from only those specific areas of the reserve designated by the department.

(C) Hunting shall be permitted in accordance with general hunting regulations, but only at such times and in specific areas as designated by the department.

(D) Grazing shall be allowed under permit from the department. The department may restrict the use of horses by grazing permittees.

(E) All designated public access trails are opened to foot access only.

(F) The causing of excessive noise especially that amplified electronically is prohibited.

(G) Picnicking shall be conducted in only those areas designated by the Department.

(~~50~~51) Estelle Mountain Ecological Reserve, Riverside County.

(A) Upland game hunting shall be permitted in accordance with the general hunting regulations.

(~~51~~52) Fagan Marsh Ecological Reserve, Napa County.

(A) Fishing shall be permitted from boats, as well as from shore; only lightweight hand-carried boats may be launched and operated.

(B) Swimming and diving are permitted.

(~~52~~53) Fall River Mills Ecological Reserve, Shasta County.

(~~53~~54) Farallon Islands Ecological Reserve, San Francisco County

(A) Subsections (a)(1) through (a)(21) do not apply.

(B) Except as specifically prohibited under this section, boating, sport and commercial fishing, swimming, and skin and SCUBA diving are permitted within the ecological reserve, which extends one nautical mile from the coastline of Southeast Farallon and North Farallon Islands.

(C) All vessels shall observe a five (5) nautical mile per hour speed limit within 1,000 feet of any shoreline in the reserve.

(D) All commercial abalone and sea urchin diving vessels operating in the reserve shall terminate their vessel engine exhaust system either through a muffler for dry exhaust systems, or below the vessel waterline for wet exhaust systems.

(E) All commercial abalone and sea urchin diving vessels equipped with an open, deck-mounted air compressor system, while operating in the reserve, shall have the air compressor's engine exhaust system terminate below the vessel waterline.

(F) From March 15 through August 15 of each year no vessel shall be operated or anchored less than 300 feet from the shoreline of any of the four islets comprising the North Farallons, including North Farallon, the Island of St. James and the two unnamed islets located between them, all as shown at about 370 46' N, 1230 06' W on the 21st edition of NOAA chart 18645, dated August 11, 1990 and herein incorporated by reference, except in the area beginning at a line extending due west magnetic from the northernmost point of land on North Farallon and continuing clockwise to a line drawn due west magnetic from the southernmost point of land on North Farallon and in the area beginning at a line drawn due west magnetic from the northernmost point of land on the northernmost of the two unnamed islets extending clockwise to a line drawn due south magnetic from the southernmost point of land on that islet.

(G) From March 15 through August 15 of each year no vessel shall be operated or anchored less than 300 feet from the shoreline in the area beginning at the south end of Jordan Channel, westward around Indian Head, then generally northward past Great Arch Rock, then generally following the shoreline to a line extending due west from the northernmost point of land on Sugarloaf Island or in the area from the east end of Mussel Flat, generally southward to the northeasternmost point of land on Saddle Rock (Seal Rock) then generally southwest along the northerly shoreline of Saddle Rock to the southwesternmost point of land on Saddle Rock and continuing generally northward to the west end of Mussel Flat, both areas at Southeast Farallon Island.

(H) Nothing in this section shall prohibit emergency anchorage or vessel operation necessary to protect property or human life.

(~~54~~55) Farnsworth Bank Ecological Reserve, Los Angeles County.

(A) No purple coral (Allopora californica) or geological specimens may be taken.

(B) Subsections (a)(1) through (a)(21) do not apply.

(~~55~~56) Fish Slough Ecological Reserve, Inyo and Mono counties.

(A) Fishing is prohibited within the 20-acre fenced and posted plot of land encompassing two spring areas and an artificial impoundment of 5.6 acres located in the northwest corner of that area known as "Fish Slough," northern Inyo and southern Mono counties.

(B) Hunting shall be allowed in accordance with the general hunting regulations.

(~~56~~57) Fremont Valley Ecological Reserve, Kern County.

(~~57~~58) Goleta Slough Ecological Reserve, Santa Barbara County.

(A) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological research projects within the reserve. Such projects shall be compatible with the primary purposes of the reserve.

(B) No person, except as provided in subsection (a)(10) or designated employees of Santa Barbara Airport, City of Santa Barbara and Goleta Valley Mosquito Abatement District for the purposes of carrying out official duties shall enter this reserve and remain therein except on established trails, paths or other designated areas.

(C) No fishing shall be allowed except at designated areas.

(D) Horses are prohibited.

(E) The department, City of Santa Barbara and the Goleta Valley Mosquito Abatement District may carry out management activities necessary for fish and wildlife management and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control, minor ditching for mosquito abatement when approved by department and use of associated equipment.

(~~58~~59) Harrison Grade Ecological Reserve, Sonoma County.

(~~59~~60) Headwaters Forest Ecological Reserve, Humboldt County.

(A) Horses are prohibited from entering the reserve.

(B) Bicycles are allowed only on the northern 3.5-mile designated corridor.

(C) Dogs on leash are allowed only on the northern 3.5-mile designated corridor.

(D) Camping may be authorized with written permission from the department or the Bureau of Land Management for research and monitoring.

(E) Swimming may be authorized with written permission from the department or the Bureau of Land Management for research and monitoring.

(F) Aircraft operations and motorized vehicle use may be authorized with written permission from the department or the Bureau of Land Management for emergency operations, monitoring, research and other management activities.

(G) The Bureau of Land Management may carry out operation and maintenance activities necessary for fish and wildlife management and public access. Authorized operation and maintenance activities shall include, but not be limited to use of chemicals, vegetation control, forestry management, controlled burning and use of associated equipment.

(~~60~~61) Heisler Park Ecological Reserve, Orange County.

(A) All fishing is prohibited.

(B) Swimming, boating and other aquatic sports are permitted. Boats may be launched and retrieved only in designated areas and may be anchored within the reserve only during daylight hours.

(~~61~~62) Hidden Palms Ecological Reserve, Riverside County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve.

(~~62~~63) Indian Joe Springs Ecological Reserve, Inyo County.

(A) Upland game hunting shall be permitted in accordance with the general hunting regulations.

(~~63~~64) Joshua Creek Canyon Ecological Reserve, Monterey County.

(~~64~~65) Kaweah Ecological Reserve, Tulare County.

(A) Grazing may be allowed only under permit from the department.

(B) Hunting shall be allowed in accordance with the general hunting regulations, but only at such times and in specific areas as designated by the department.

(~~65~~66) Kerman Ecological Reserve, Fresno County.

(A) Grazing may be allowed under permit from the Department.

(B) Hunting shall be permitted in accordance with general hunting regulations from July 1 through January 31. Only licensed hunters will be permitted to possess firearms. Shotguns only, discharging not larger than number 2 lead or size T steel shot, will be allowed on the area. Possession of firearms for other than law enforcement purposes will not be permitted on the area, except as provided herein.

(C) No plinking, firearms practice, or target shooting is allowed within the area.

(~~66~~67) King Clone Ecological Reserve, San Bernardino County.

(~~67~~68) Laguna Laurel Ecological Reserve, Orange County.

(~~68~~69) Lake Hodges Ecological Reserve, San Diego County.

(~~69~~70) Lake Mathews Ecological Reserve, Riverside County.

(A) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological research projects within the reserve. Such projects shall be compatible with the primary purposes of the reserve.

(B) No person except as provided in subsection (a)(10) and employees and consultants of Metropolitan Water District and member public agencies of the District, in the performance of customary reservoir maintenance activities or other official duties, may enter or utilize boats, aircraft or motor vehicles within this reserve.

(C) All fishing is prohibited.

(D) Collections may be made by the department for the purposes of fish and wildlife management, or by Metropolitan Water District for the purpose of water quality testing.

(E) The department and Metropolitan Water District may carry out management activities necessary to ensure water quality and the proper operation and maintenance of Lake Mathews as a water supply facility and natural area. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control, rodent control and use of associated equipment.

(~~70~~71) Leek Springs Ecological Reserve, El Dorado County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve without written permission from the regional manager.

(B) All fishing is prohibited.

(C) Pets are prohibited from entering the reserve.

(D) Vehicles are prohibited, except for use by adjacent landowners and their invitees, United States Forest Service personnel, fire personnel or other authorized persons who may only use the road easement which bisects the property.

(E) Horses and bicycles are prohibited.

(~~71~~72) Limestone Salamander Ecological Reserve, Mariposa County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve.

(~~72~~73) Little Butte Ecological Reserve, Mendocino County.

(~~73~~74) Little Red Mountain Ecological Reserve, Mendocino County.

(~~74~~75) Loch Lomond Vernal Pool Ecological Reserve, Lake County.

(~~75~~76) Lokern Ecological Reserve, Kern County.

(A) Notwithstanding the provision of subsection (a)(15), grazing may be allowed under permit from the department.

(B) Hunting may be permitted in accordance with general hunting regulations only at such times and in specific areas as designated by the department.

(~~76~~77) Macklin Creek Ecological Reserve, Nevada County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve without written permission from the regional manager.

(B) All fishing in prohibited.

(~~77~~78) Magnesia Spring Ecological Reserve, Riverside County.

(A) No person, except as provided in subsection (a)(10), and employees of the City of Rancho Mirage in the performance of their official duties shall enter this reserve during the period June 15 to September 30.

(B) The County of Riverside may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(C) Pets are prohibited from entering the reserve except when they remain inside a motor vehicle.

(~~78~~79) Marin Islands Ecological Reserve, Marin County.

(~~79~~80) Mattole River Ecological Reserve, Mendocino County.

(~~80~~81) McGinty Mountain Ecological Reserve, San Diego County.

(~~81~~82) Meadowbrook Ecological Reserve, San Diego County.

(~~82~~83) Moro Cojo Ecological Reserve, Monterey County.

(~~83~~84) Morro Dunes Ecological Reserve, including the Bayview Unit, San Luis Obispo County.

(~~84~~85) Morro Rock Ecological Reserve, San Luis Obispo County.

(A) No person shall enter into or upon this reserve for any purpose except as follows:

1. For the purpose of fishing and sightseeing, persons may enter upon that portion of Morro Rock between the low tide mark and a point ten (10) feet in elevation above the mean high tide mark.

2. Those persons provided for in subsection (a)(10), and employees of the Department of Parks and Recreation may enter the reserve in the performance of their official duties.

(~~85~~86) Napa River Ecological Reserve, Napa County.

(A) Grazing is permitted under a permit from the department.

(B) No person, except as provided in subsection (a)(10), shall enter this reserve between sunset and sunrise.

(C) Swimming is permitted.

(D) The possession and/or consumption of alcoholic beverages is prohibited.

(~~86~~87) North Table Mountain Ecological Reserve, Butte County.

(A) Horses and bicycles are prohibited from entering the reserve.

(B) Livestock grazing for habitat management is permitted under permit from the department.

(C) Hunting is permitted for deer and upland game in accordance with the general hunting regulations through November 15. Hunting is prohibited after November 15 and through the spring turkey season.

(~~87~~88) Oasis Springs Ecological Reserve, Riverside County.

(A) All fishing is prohibited.

(B) Hunting shall be permitted in accordance with general hunting regulations.

(~~88~~89) Offshore Rocks and Pinnacles, coastal counties.

(~~89~~90) Otay Mountain Ecological Reserve, San Diego County.

(A) Hunting shall be allowed in accordance with the general hunting regulations and the Bureau of Land Management's Wilderness Area Restrictions.

(~~90~~91) Owl Creek Ecological Reserve, Humboldt County.

(~~91~~92) Panoche Hills Ecological Reserve, Fresno County.

(A) Grazing may be allowed under permit from the department.

(B) Hunting shall be permitted in accordance with general hunting regulations from July 1 through January 31. Only licensed hunters will be permitted to possess firearms.

(C) No plinking, firearms practice, or target shooting is allowed within the area.

(~~92~~93) Peytonia Slough Ecological Reserve, Solano County.

(A) Fishing shall be permitted from boats as well as from shore.

(B) Swimming, wading and diving shall be permitted within the reserve.

(C) Boats may be operated within the reserve; however, only lightweight, hand-carried boats may be launched within the reserve.

(~~93~~94) Pilgrim Creek Ecological Reserve, San Diego County.

(~~94~~95) Phoenix Field Ecological Reserve, Sacramento County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve.
(~~95~~96) Pine Hill Ecological Reserve, El Dorado County including the Salmon Falls Unit.
(A) No person, except as provided in subsection (a)(10), shall enter this reserve.
(B) No horses are permitted within the boundaries of the reserve.
(~~96~~97) Pismo Lake Ecological Reserve, San Luis Obispo County.
(A) All fishing is prohibited.
(~~97~~98) Piute Creek Ecological Reserve, San Bernardino County.
(A) Hunting shall be allowed in accordance with the general hunting regulations.
(~~98~~99) Plaisted Creek Ecological Reserve, San Diego County.
(~~99~~100) Pleasant Valley Ecological Reserve, Fresno County.
(A) Grazing may be allowed under permit from the department.
(B) Hunting may be permitted in accordance with the general hunting regulations, but only at such times and in specific areas as designated by the department.
(~~100~~101) Point Lobos Ecological Reserve, Monterey County.
(A) All fishing is prohibited.
(B) Swimming, boating, and other aquatic sports are permitted. Boats may be launched and retrieved only in designated areas and may be anchored within the reserve only during daylight hours.
(~~101~~102) Quail Hollow Ecological Reserve, Santa Cruz County.
(~~102~~103) Quail Ridge Ecological Reserve, Napa County.
(A) No person, except as provided in subsection (a)(10) shall enter this reserve without permission from the department.
(B) Hunting will be permitted only as specially authorized hunts determined by the department.
(~~103~~104) Rancho Jamul Ecological Reserve, including the Headquarters Unit, San Diego County.
(A) Controlled retriever training may be permitted within a designated area. This area shall be clearly posted.
(B) Hunting shall be allowed in accordance with the general hunting regulations, but only at such times and in specific areas as designated by the department.
(C) Within the 50.51 acre Headquarters Unit, the Department may develop facilities and conduct activities consistent with training programs, meeting and storage needs, fire suppression and control, and educational programs under guidelines established by the regional manager.
(D) Uses associated with occupied state housing shall be allowed within the 50.51 acre Headquarters Unit.
(~~104~~105) Redwood Shores Ecological Reserve, San Mateo County.
(A) Fishing shall be permitted from boats as well as from shore; only lightweight, hand-carried boats may be launched and operated.
(B) Swimming, wading and diving shall be allowed within the ecological reserve.
(C) Bicycles are allowed along levee-top road system.
(~~105~~106) River Springs Lakes Ecological Reserve, Mono County.
(A) Hunting shall be permitted in accordance with the general hunting regulations.
(~~106~~107) Saline Valley Ecological Reserve, Inyo County.
(A) Hunting shall be allowed in accordance with the general hunting regulations.
(~~107~~108) San Bruno Mountain Ecological Reserve, San Mateo County.
(~~108~~109) San Diego-La Jolla Ecological Reserve, San Diego County.
(A) Commercial bait fishing for squid, only by use of hand-held scoop net, is authorized offshore west of a line drawn due north from Goldfish Point. All other forms of fishing are prohibited.
(B) Swimming, boating, and other aquatic sports are permitted. Boats may be launched and retrieved only in designated areas and may be anchored within the reserve only during daylight hours.
(~~109~~110) San Diego River Ecological Reserve, San Diego County.
(~~110~~111) San Dieguito Lagoon Ecological Reserve, San Diego County.
(A) Fishing shall be permitted from shore and from the Grand Avenue bridge.
(B) No person, except as provided in subsection 630(a)(10), shall be permitted on the California least tern nesting island.
(C) No person, except as provided in subsection 630(a)(10), shall enter this reserve between 8:00 p.m. and 5:00 a.m.
(D) The County of San Diego, after consultation with the department, may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance

activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(E) Collections of fish, wildlife, water and soil may be made by the Department for the purposes of fish and wildlife management or by San Diego County for the purposes of water quality testing and vector control.

(~~111~~112) San Elijo Lagoon Ecological Reserve, San Diego County.

(A) Notwithstanding the provisions of subsections (a)(1), (3), (5), (6) and (12), the department may issue permits to conduct biological research projects within the reserve. Such projects shall be compatible with the primary purposes of the reserve.

(B) San Diego County, after consultation with the department, may carry out management activities for fish and wildlife management, flood control, vector control and regional park recreational activities. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control, minor ditching and use of associated equipment.

(C) Collections may be made by the department for purposes of fish and wildlife management or by San Diego County for the purpose of water quality testing and vector control.

(~~112~~113) San Felipe Creek Ecological Reserve, Imperial County.

(A) Hunting shall be permitted in accordance with the general hunting regulations.

(~~113~~114) San Joaquin River Ecological Reserve, Fresno and Madera Counties.

(A) No person shall enter into any unit of this reserve except as provided in subsection a(10), or as provided by written permission or by posted notice of the regional manager who will designate appropriate times and/or areas open to public use.

(B) The Department may carry out or cause to be carried out management activities for fish and wildlife, flood control, and vector control. Authorized operation and maintenance activities shall include, but not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(C) Boating is permitted, subject to the limitations of subsection (A) above. Except in the execution of law enforcement, emergency services, or official duties of department employees or contractors, only lightweight, hand carried, non-gasoline powered floating devices may be launched and operated from designated launching sites. The Regional Manager or his designee may further restrict the use and operation of boats to protect the resource or provide for the orderly operation of recreational programs maintained on the area. Boating restrictions may include, but are not limited to, seasonal closures.

(D) Angling shall be permitted from boats as well as from shore, subject to the limitations in subsections (A) and (C), above.

(E) Subsection (a)(20) notwithstanding, late night or over-night use for camping and other purposes may be allowed subject to limitations in subsection (A) above.

(F) Subsection (a)(11) notwithstanding, the Department may, for management purposes, introduce or cause to be introduced nonendemic fish species which are naturalized in the San Joaquin River system, primarily to establish and maintain urban sport-fishing opportunities.

(G) Subsection (a)(17) shall not be construed to prohibit aircraft from operating within a normal flight pattern when taking off from or landing at the Sierra Skypark airport located approximately one-quarter mile south of the reserve.

(H) Grazing for vegetation management may be allowed under permit from the department.

(~~114~~115) San Luis Rey River Ecological Reserve, San Diego County.

(~~115~~116) Santa Cruz Long-toed Salamander Ecological Reserve, Santa Cruz County.

(A) No person shall enter the reserve for any purpose except as follows:

1. Those persons provided for in subsection (a)(10), and employees of the departments of Parks and Recreation and Transportation in the performance of their official duties.

(~~116~~117) Santa Rosa Plain Vernal Pool Ecological Reserve, Sonoma County, including the Hall Road, Todd Road, Wikiup and Yuba Drive Units.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve without written permission of the department. Public use of a trail to be constructed on the Hall Road Unit will be allowed under conditions established by the regional manager.

(B) Ecological research and environment education may be conducted with written permission of the department.

(C) Nothwithstanding the provision of subsection (a)(15), livestock grazing may be allowed for habitat management purposes under permit from the department.

(~~117~~118) Santa Rosa Plateau Ecological Reserve, Riverside County.

(A) Notwithstanding the provisions of subsection (a)(18), only those animals assisting visually impaired or disabled persons are permitted.

(~~118~~119) Springville Ecological Reserve, Tulare County.

(A) No person, except as provided in subsection (a)(10), shall enter between sunset and sunrise.

(~~119~~120) Stone Corral Ecological Reserve, Tulare County.

(A) Notwithstanding the provision of subsection (a)(15), grazing may be allowed under permit from the department.

(B) Hunting may be permitted in accordance with general hunting regulations only at such times and in specific areas as designated by the department.

(~~120~~121) Sycamore Canyon Ecological Reserve, Riverside County.

(~~121~~122) Sycuan Peak Ecological Reserve, San Diego County.

(~~122~~123) Table Bluff Ecological Reserve, Humboldt County.

(A) Livestock grazing may be allowed under permit from the department.

(B) The department may carry out management activities for the preservation and expansion of the endangered western lily (Lilium occidentale). Authorized management activities may include, but not be limited to, controlled livestock grazing, controlled burning, chemical treatment and mechanical treatment.

(C) Except as provided in subsection (a)(10) no persons shall enter the fenced western lily area.

(~~123~~124) Theiller Sebastopol Meadowfoam Ecological Reserve, Sonoma County.

(~~124~~125) Thomes Creek Ecological Reserve, Tehama County.

(A) Livestock grazing may be allowed under permit from the department.

(B) The department may carry out management activities necessary for habitat preservation and management. Authorized operations and maintenance activities shall include, but not be limited to, controlled livestock grazing, controlled burning, and chemical and mechanical treatment with the use of associated equipment.

(~~125~~126) Tomales Bay Ecological Reserve, Marin County.

(A) Waterfowl may be taken in accordance with the general waterfowl regulations.

(B) Fishing shall be permitted from boats as well as from shore; only lightweight, hand-carried boats may be launched and operated.

(C) Swimming, wading, and diving shall be allowed within the reserve.

(D) The land area only of the reserve shall be closed to all entry from March 1 through June 30.

(~~126~~127) Upper Newport Bay Ecological Reserve, Orange County.

(A) Fishing shall be permitted from boats. Fishing is also permitted from shore in designated areas. Clamming or wading is not permitted.

(B) Swimming is permitted only in that area bayward from North Star Beach to mid-channel.

(C) Boating is limited to non-motorized craft, with the exception of law enforcement, emergency, and department vessels and authorized operators under permit from the regional manager. Boating shall occur in designated areas only and is limited to five miles per hour.

(D) No person shall walk, or ride horseback except on established trails, paths, or other designated areas.

(E) The County of Orange may carry out management activities for fish and wildlife, flood control and vector control. Authorized operation and maintenance activities shall include, but shall not be limited to, use of chemicals, vegetation control, water control and use of associated equipment.

(~~127~~128) Walker Canyon Ecological Reserve, San Diego County.

(A) Hunting shall be allowed in accordance with the general hunting regulations.

(~~128~~129) Watsonville Slough Ecological Reserve, Santa Cruz County.

(~~129~~130) West Mojave Desert Ecological Reserve, San Bernardino County.

(A) Hunting shall be permitted in accordance with the general hunting regulations from July 1 to January 31. Only licensed hunters shall be permitted to possess firearms.

(B) No plinking, firearms practice or target shooting is allowed within the ecological reserve.

(~~130~~131) Woodbridge Ecological Reserve, San Joaquin County.

(A) No person, except as provided in subsection (a)(10), shall enter this reserve.

(~~131~~132) Yaudanchi Ecological Reserve, Tulare County.

(A) Grazing is permitted under a permit from the department.

(B) No person, except as provided in subsection (a)(10), shall enter this reserve between sunset and sunrise.

(C) No person shall walk except on established trails, paths, or other designated areas.

(D) Horses, except by written permission of the Department for the purpose of grazing, are prohibited.

(~~132~~133) Yorkville Ecological Reserve, Mendocino County.

NOTE

Authority cited: Sections 1580, 1581, 1583 and 1907, Fish and Game Code. Reference: Sections 1526, 1528, 1530, 1580-1585, 1590 and 1591, Fish and Game Code.

DEPARTMENT OF FISH AND GAME
WILDLIFE CONSERVATION BOARD
1807 13TH STREET, SUITE 103
SACRAMENTO, CALIFORNIA 95814
(916) 445-8448
FAX (916) 323-0280
www.dfg.ca.gov/wcb

State of California
The Resources Agency
Department of Fish and Game

WILDLIFE CONSERVATION BOARD

Minutes
September 30, 2003

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State of California
The Resources Agency
Department of Fish and Game
WILDLIFE CONSERVATION BOARD
Minutes
September 30, 2003

The Wildlife Conservation Board met on Wednesday, September 30, 2003, in Room 4203 of the State Capitol in Sacramento, California. The meeting was called to order at 10:00 A.M. by Chairman Michael Flores. Mr. Flores introduced the Board Members and then turned over the meeting to Mr. Al Wright, Executive Director of the Board.

6. Roll Call

WILDLIFE CONSERVATION BOARD MEMBERS

Michael Flores, Chairperson
President, Fish and Game Commission
Fred Klass, Program Budget Manager
Vice, Steve Peace, Member
Director, Department of Finance
Robert C. Hight, Member
Director, Department of Fish and Game

JOINT LEGISLATIVE INTERIM ADVISORY COMMITTEE

Assembly Member Patty Berg
Kristin Stauffacher,
Vice, Senator Michael J. Machado
Jeff Arthur,
Vice, Assembly Member Hannah-Beth Jackson
Debra Gravert,
Vice, Assembly Member Fran Pavley

EXECUTIVE DIRECTOR

Al Wright

Staff Present: Al Wright, Executive Director
John Donnelly, Assistant Executive Director
Marilyn Cundiff, Public Land Management Specialist
Jenny Smith, Staff Services Analyst
Peter Perrine, Public Land Management Specialist
Bonnie Turner, Public Land Management Specialist
Scott Clemons, Public Land Management Specialist
Tony Chappelle, Public Land Management Specialist
Ajit Bindra, Associate Budget Analyst
Gary Cantrell, Research Analyst
Dave Means, Senior Land Agent
William Gallup, Senior Land Agent
Steven Christensen, Senior Land Agent
Ken Morefield, Research Analyst
Elena Salas, Secretary
Mary Grande, Secretary
Jan Beeding, Office Technician
Maureen Rivera, Executive Assistant

Others Present: Susannah Churchill, Environment California
Melanie Choy, Robinson and Associates
Dottie Jensen, WAMU
Jan Owen, WAMU
Victoria Rome, Natural Resources Defense Council
Joe Caves, Conservation Strategy Group
Paul Martin
Tom Francis, Ballona Wetlands Land Trust
Steve Soboroff, Playa Vista
David Vena, Latham and Watkins
Rorie Skei, Santa Monica Mountains Conservancy
Patti Sinclair, Playa Capital Company LLC
Ruth Lansford, Friends of Ballona Wetlands
Jim Landry, Ballona Wetlands Foundation
and Loyola Marymount University
Rex Frankel, Sierra Club
Mathew Hayden, City of Calabasas
Jared Carter, Pacific Lumber Company
Susan McCabe, McCabe and Company
David Nelson, Playa Capital
Liza Riddle, Trust for Public Land
Catherine Tyrrell, Playa Capital
Marcia Hanscom, Wetlands Action Network
Laurie Collins, Santa Monica Mountains Conservancy
Cara Horowitz, Santa Monica Mountains Conservancy
Leslie Purcell
Debra Gravert, Office of Assembly Member Fran Pavley
Nick Smith, Governor's Office
Others Present: Tami Miller, Platinum Advisors

(Continued) John Stevens, State Assembly
Brian Miller, Resources Agency
Linda Parks, County of Ventura
Rick Rayburn, Department of Parks and Recreation
Jim Metropulos, Sierra Club

2. Ballona Wetlands, Los Angeles County $140,000,000.00

Mr. Wright reported that this proposal was to consider a cooperative project with the State Coastal Conservancy (SCC), the Trust for Public Land (TPL), the Department of Fish and Game (DFG) and the Wildlife Conservation Board (WCB) to acquire approximately 483± acres of private land and property interests in Los Angeles County in order to preserve critical habitat and key open space, including a large portion of what remains of the Ballona Wetlands. The property is located on the western edge of the Los Angeles metropolitan area, in Los Angeles County, just north of Los Angeles International Airport. The subject property is the largest remaining undeveloped and restorable coastal wetland in Los Angeles and consists of three distinct areas identified as Area A (138± acres), B Residential (54± acres) and the Ballona Wetlands Parcel, including the Ballona Creek Channel (291± acres). The total to be conveyed to the State is 483± acres. Mr. John Donnelly described the project and its location.

As part of the transaction, Playa Capital Company, LLC (Playa), the present owner of the property, would also release its right of first refusal to purchase adjacent property identified as Area C. Playa will release its rights to an easement across Area C if relieved of its obligation to construct a road and bridge to connect Culver Boulevard with Playa Vista Drive. A trust currently holds title to Area C for the benefit of the State and legislation has passed to formally transfer title to the State acting by and through the DFG, WCB.

Mr. Donnelly reported that prior to this meeting, a summary paper which discussed several key points of the project, the State's Purchase Agreement and Environmental Site Assessment for this project, were available at the following locations on September 19, 2003:

1. The California Resources Agency, 1416 Ninth Street, Suite 1311, Sacramento, CA 95814 (916) 653-5656
2. Wildlife Conservation Board, 1807 13th Street, Suite 103, Sacramento, CA 95814 (916) 445-8448
3. Los Angeles River Center and Gardens, 570 West Avenue Twenty-six (at San Fernando Road), Los Angeles, CA 90065 (323) 221-9959 Ext. 0
4. Franklin Canyon Park, 2600 Franklin Canyon Drive, Beverly Hills, CA 90210 (310) 858-7272 Ext. 0

Mr. Donnelly explained that the documents and summaries were also available for review on the Internet by accessing the Wildlife Conservation Board's website or the California Resources Agency website.

The subject property is a composition of upland scrub, open salt/mud flat, riparian, coastal dune and grasslands providing habitat for a number of special animal species. A few of the species found on site include Lange's El Segundo dune weevil, Dorothy's El Segundo dune weevil, wandering skipper (federal species of concern), silvery legless lizard, Stevens' California vole (federal and State species of concern), California brown pelican (federally and State-listed endangered), California least tern (federally and State-listed endangered) and Belding's Savannah sparrow (a federal species of concern and State-listed endangered).

Several of the species listed above rely on wetland habitat, which is quickly disappearing. The Ballona Wetlands once consisting of approximately 1,500 acres, has been reduced over time to less than 150 acres. However, several narrow corridors, such as the Ballona Creek Channel connect the subject property with other open areas nearby, including Baldwin Hills to the northeast and a restored dune system at the western end of the Los Angeles International Airport located to the south.

The property will be acquired on behalf of the State and will be under the interim jurisdiction of the DFG. TPL has agreed to pay and provide for management of the property during this interim period (estimated to be approximately five years) which will provide the DFG, SCC and others involved in the transaction, the time needed to complete the planning processes and identify the appropriate entity to manage the property and implement long-term restoration. It is envisioned that restoration will incorporate, as appropriate, Area C, once that property is conveyed to the DFG, and an adjacent fresh water marsh recently restored by Playa as a condition of its present development.

Area A and Area B Residential have been appraised and the value has been reviewed and approved by the Department of General Services (DGS) at $140,000,000.00, with concurrence from the WCB. Playa Capital Company, LLC has agreed to sell these areas at $139,000,000.00, thereby providing a donation to the State. In addition, Playa has agreed to transfer the Ballona Wetlands Parcel and release its rights as described above in Area C to the State at no cost. It is estimated that an additional $1,000,000.00 will be needed for project expenses, including title and escrow company costs, appraisal and the DGS' review charges, bringing the total allocation needed to complete this project to $140,000,000.00.

The proposed acquisition project is exempt from the California Environmental Quality Act (CEQA) pursuant to Class 13 and 25 categorical exemptions. (California Code of Regulations, Title 14, §15313 and 15325) Class 13 of categorical exemptions consists of acquisitions of land for wildlife conservation purposes. Class 25 of categorical exemptions consists of transfers of land in order to preserve open space, habitat or historical resources. Subject to approval by the Board, the appropriate Notice of Exemption will be filed with the State Clearinghouse. CEQA analysis for restoration will be a component of the restoration planning process.

Mr. Wright reported that the Board received numerous letters of support for this project including letters from Senator John Burton; Zev Yaraslovsky, Third District

Supervisor of Los Angeles County; Larry Myers of the Native American Heritage Commission; the Ballona Valley Preservation League, representing 24 individuals and organizations; and Kathy Knight from the Spirit of the Sage Council. Mr. Wright stated that the Board received a rather lengthy email from Tom Francis raising a number of concerns regarding the acquisition.

Ms. Ruth Lansford, President of Friends of Ballona Wetlands, addressed the Board in support of this project. She stated that Friends of Ballona Wetlands is the longest running organization that has been fighting for over twenty-five years to preserve the wetlands. Ms. Lansford went on to read a prepared statement. (See Attachment A)

Mr. John Tommy Rosas, Vice Chair of the Gabrielino/Tongva Indians of California Tribal Council addressed the Board. He stated that the land of this project is theirs, basically and traditionally, which is all documented. Mr. Rosas stated that he has talked with Mr. Wright who provided Mr. Rosas with requested documents.
Mr. Rosas expressed concern that the Native Americans have lost a lot of land, that a lot of land needs to be saved and expressed support for the preservation of the property. He stated that their main objection and concern to this transaction is the way it was proposed and lack of communication with the Tribal Council. Mr. Rosas stated that the Native Americans are protected under CEQA and the Public Resources Code and that those don't seem to work, adding that another burial site was dug up last week at Playa Vista. Mr. Rosas stated that someone cited the letter from Mr. Larry Myers, but in the second sentence of the letter, referring to both the Playa Vista area and Ahmanson Ranch property, both areas contain extremely sensitive Native American cultural sites. He added that in his review of documents faxed to him, there were only two references to historic or cultural resources, yet there was great detail about other aspects of the project and feels they have been left out of the process. He stated that several archeological sites in the Playa Vista area are eligible for listing on the national register for historic places, which usually triggers a 106 consultation, which has not happened. He stated that the area also contains the Ballona Lagoon archeological district, and that district has been determined to be eligible for the national register and is listed on the State register. He stressed the importance of protecting their burial sites and cultural resources and requested they be more involved in the project and their concerns acknowledged ahead of time, and under those conditions they would then lift their opposition to the project. Mr. Rosas provided written comments for the record. (See Attachment B).

At this time Mr. Flores welcomed Assembly member Patty Berg.

Mr. Wright stated that he and Mr. Rosas talked recently and that the Board received a letter from the Native American Heritage Commission in strong support of the acquisition and identifying the area of Playa Vista in total as having cultural resources on it. Mr. Wright stated he is not personally aware of any specific sites on the property that are part of this acquisition, that the State is aware of three

scattered shell sites, and that there may be other information the State is not aware of but is certainly interested in obtaining. Mr. Wright stated that because this project is an acquisition, it does not cause any physical change to the land or the environment does not trigger the 106 consultation requirements that Mr. Rosas has talked about. He added that as Mr. Donnelly discussed in the presentation, one of the primary goals of the restoration that will be led by the State Coastal Conservancy is to protect cultural resource values that may exist on the property. Mr. Wright agreed with Mr. Rosas before the Board meeting that he would convene a meeting in the near future if it was possible to get all of the parties together with the State Coastal Conservancy and the Department of Fish and Game, who would be managing the property, to meet with Mr. Rosas and hear his concerns more specifically so that when the State Coastal Conservancy begins the restoration planning we have made certain that we have incorporated in the public process the concerns of the Native Americans. Mr. Rosas stated that when there are test digs on the property, the soil is going to be disturbed and that is when there are usually archeological finds. He stated there are archeological sites recorded on this property and a number of others that are not recorded and that is why, when they are consulted, the Council can advise the State of those sites, otherwise the sites are confidential. He again stated that is their issue - it is required that they be consulted.

Mr. Hight agreed with Mr. Wright's statements that the Department of Fish and Game will be happy to work with them in resolving their issues. Mr. Rosas expressed appreciation for the opportunity to further discuss their concerns.

Ms. Leslie Purcell addressed the Board and expressed appreciation to the State, the Trust for Public Land and the many people that have worked on saving the Ballona Wetlands. Ms. Purcell stated she is a member of the Sierra Club and that she has worked with many of the local groups in Los Angeles to try to save the wetlands. She expressed support for the State acquiring the land and considering parts of Area D that are not yet entitled. She stated that she is concerned about the amount of money being spent on this proposal comparing it to the amount of money being spent on the Ahmanson Ranch proposal. Ms. Purcell reported that there are toxic issues that have been skimmed over, old oil field gases and residues in that area, and most of the land west of Lincoln Boulevard is a wetlands area that is not very developable. She commented that she understood the State has an appraisal process but when she looked at the Ahmanson and Grizzly Creek properties, the developer was willing to take a substantially less figure and get a tax benefit, $20 million for Ahmanson and $6,300,000.00 for Grizzly Creek, whereas Playa Vista is only taking $1 million off and still trying to get a tax benefit. Ms. Purcell stated that Playa Vista is also released from a traffic mitigation they were supposed to do which was a bridge and road project that would have cost about $10 million. She stated they were also supposed to do the wetland restoration at the west end of the wetlands, maybe $13 million, at the end of the development process they were required to do that restoration. She stated she has been working with several people to save the Ballona west bluff, located above the freshwater marsh. She reported the bluff is being graded at this time and burials are being uprooted and being taken off the site. Ms. Purcell again expressed concern to please consider the bluff area for acquisition.

Mr. Tom Francis, Executive Director of the Ballona Wetlands Land Trust, stated that since 1994, the sole mission of the organization has been to facilitate the acquisition and preservation of the entire Ballona wetlands ecosystem. He reported that the Trust has several concerns about the way the State is approaching this acquisition, but also has suggestions on how, in the future, the State can do a better job on acquisitions, get more land for the taxpayer and therefore do better for the environment. Mr. Francis stated that the Trust supports acquisition of the Ballona Wetlands in concept, but feels the State should be acquiring the entire ecosystem, not just part of it, adding that there are still 350 acres on the other side of the street that are threatened by development and not part of this proposal. He stated that the Trust urges the Board to postpone this acquisition so that the State has an opportunity to renegotiate it so that the taxpayers get a fair deal and the State do something that truly protects the environment from the threat of development. Mr. Francis commented that this acquisition will likely generate significant interest in reevaluating the State's acquisition policy so that the State can stop competing with itself by overpaying for a small part of land that needs protection while leaving other ecosystems to be paved over due to lack of acquisition funds. He stressed the environmental community and the State need to face the fact that we have a small amount of money relative to the amount of land that needs to be purchased and there is a need to reevaluate how we approach purchases.

Mr. Jim Metropulos, representing the Sierra Club California, addressed the Board and read a prepared statement in support of this proposal. (See Attachment C)

Mr. Rex Frankel, President of the Ballona Ecosystem Education Project, addressed the Board in support of the proposed preservation of this area and expressed concern regarding the purchase price of the property. He stated that the Ballona Ecosystem Education Project is the second oldest group that has been working on the Ballona Wetlands issue and that he has been working since 1985 to save the Ballona Wetlands, uplands and open space around it. Mr. Frankel stated he is also a member of the Executive Committee of the Sierra Club of Los Angeles. He praised Governor Davis for his support of this proposal. Mr. Frankel expressed concern regarding the amount of money the State was paying for this acquisition thereby possibly hindering the State's ability to acquire other properties, including Ballona Bluffs, Palos Verdes Peninsula and Santa Clarita Valley in the Newhall area. Mr. Frankel stated that Ballona Bluffs and the Newhall Ranch area face imminent threat of development while the Ballona properties being considered today face enormous regulatory hurdles to build anything, have no permits and may take many years of litigation. He stated that it will take years for permits to be issued and therefore they are concerned that the purchase price may be excessive for the amount of property being acquired in comparison to the Ahmanson Ranch proposal. Mr. Frankel commented that he felt Playa Vista and their supporters are using the panic of the recall to press Governor Gray Davis into making a bad deal for the taxpayers even if it is good for the environment. Mr. Frankel stated that the Board should reconsider the transaction and urge Playa Vista to accept a fair price and save more land.

Ms. Marsha Hanscom, Executive Director of the Wetlands Action Network, addressed the Board in support of this project. She reported that she also serves on the National Board of Directors of the Sierra Club and wanted to clarify that Mr. Jim Metropulos was the official spokesperson from the Sierra Club regarding this proposal. She reported that their National Board of Directors passed a resolution in support of this acquisition last week at its annual meeting. She stated that Wetlands Action Network is one of the cofounders of the Citizens United coalition to save all of Ballona Wetlands, with 110 groups participating in that coalition. She stated that over the past 30 years, thousands of people have been involved in various ways to protect the Ballona Wetlands. Ms. Hanscom addressed Mr. Frankel's and Mr. Francis' comments regarding issues about entitlements and that the developers could never get permits on this land. She stated that those comments were not entirely accurate and that there are some entitlements on the property from a settlement several years ago and that there is an underlying land use plan where the Coastal Commission would have been required to permit hundreds of houses, a marina and residential units to be built on this land. She added that while there have been some changes in the law or clarifications in the law, there is no question in her mind that after attending many Coastal Commission hearings, the developers would get permits to build something on this land. She stated that development on this land is not acceptable and that it should be protected for the public. She again expressed their support for this proposal and that the management of the property will improve under the Department of Fish and Game and the Trust for Public Land and not stay the same as was mentioned earlier. She stated that they wanted to make sure, before closing escrow, that all of the agreements that are detailed in the purchase agreement are made available to the public; all of the agreements about the parking lots that were originally built for the 1984 Olympics are still there. She commented that today's proposal regarding Grizzly Creek is related to Ballona Wetlands because the Marbled Murrelet, the endangered bird that nests at the top of the redwoods, has actually been seen on several occasions at Marina Del Rey adjacent to the Ballona Wetlands, and that if we restore these wetlands and give the birds more space, we are helping endangered species that travel up and down the Pacific Flyway. She commented that these two acquisitions will be a legacy to Governor Davis and his administration.

Mr. Hight thanked Ms. Hanscom for seeing the connection between the two parcels and that the Department of Fish and Game is very excited about the combination of the two acquisitions.

Ms. Victoria Rome, Policy Analyst with the Natural Resources Defense Council (NRDC), addressed the Board in support of this proposal. On behalf of California's 110,000 members, she asked the Board to approve this proposal. She submitted for the record a copy of a Commentary by Mark Gold and Joel R. Reynolds, Southern California colleagues, which appeared in the Los Angeles Times on July 21, 2003, and provides further detail on all of the reasons why the NRDC supports acquisition of this property and Ahmanson Ranch. (See Attachment D)

Mr. Reed Holderman, Vice President and Regional Director for The Trust for Public Land (TPL), addressed the Board in support of this proposal. Mr. Holderman stated that the TPL is the only national nonprofit land conservation organization dedicated to conserving land for people, no matter where they live. Mr. Holderman stated that

The Trust for Public Land has been in existence for over 30 years and saved over 1.5 million acres in the United States and over 250,000 acres here in California. Mr. Holderman stated that over the past two years his organization has had the pleasure of working with the Board staff, the Department of General Services, Playa Capital and the environmental community to create an opportunity for public purchase of the Ballona Wetlands. This opportunity has been over 20 years in the making, involving studies, land use and public hearings, appraisals and lawsuits. Mr. Holderman stated that the Ballona Wetlands is probably the most analyzed and thought over property in the State and believes that the proposal offers the best chance of saving the portion of Playa Capital's ownership that can be reclaimed and restored as a fully functioning wetland. He added that most groups and elected officials at all levels of government support the Board's acquisition of this property. He stated that the overwhelming support stems from the fact that the Los Angeles area has experienced incredible growth and urbanization without providing the necessary open space and outdoor recreational opportunities to meet the social, recreational and spiritual needs of the community. Mr. Holderman reported that in 1950, the population of New York City was eight million people and Los Angeles County had four million people, and in 2000, New York City still had eight million people, but Los Angeles County had grown to ten million people, an increase of 150 percent. He stated Los Angeles is now known as one of the most "park poor" cities in the United States and the natural areas in Los Angeles are disappearing at an alarming rate. He explained that Southern California has lost all but 10 percent of its historic wetlands and Los Angeles County has been even harder hit with only two to three percent of Los Angeles County's wetlands remaining. He commented that this acquisition is so important to the fragile chain of wetlands dotting California's coast because it will more than double the current wetland supply in Los Angeles by making approximately 500 acres available for wetland restoration. Mr. Holderman stated that the purchase of Ballona Wetlands is arguably the most significant wetland acquisition on the south coast during the last twenty years. He stated this acquisition will also reaffirm a commitment made by Governor Davis to create and expand open space. He reported that the land use plan for the subject properties was approved twice by the City and County of Los Angeles and the California Coastal Commission calls for intensive residential, commercial and visitor serving development on these graded and historic wetlands. The California Coastal Commission signed an agreement a few years ago to expedite project permits and has already approved several infrastructure projects that reference the larger unbuilt development on the subject properties. Mr. Holderman stated that if the Board did not approve today's proposal, Playa Capital will proceed with efforts toward development. He added that The Trust for Public Land enthusiastically supports the recommendation to approve this proposal.

Ms. Susannah Churchill, Preservation Advocate with Environment California, addressed the Board in support of this proposal. She stated that they have been involved in the effort to save Ballona Wetlands since 1996. On behalf of Environment California, she expressed appreciation to the Davis administration, Senator Bowen and Assembly member Nakano for taking action to preserve Ballona Wetlands. She commented that they believe these lands will be valuable as wildlife habitat and as open space in a part of the State where over 95 percent of the wetlands have been destroyed by development. She added that they also believe $140 million is a lot of money, that protecting the land is priceless and urged the Board to approve this proposal. She presented for the record a Position Statement representing over 40 groups and individuals in support of this acquisition. (See Attachment E) Ms. Churchill also submitted for the record a response to the Ballona Land Trust Position Paper outlining why the State is justified in moving forward on this proposal. (See Attachment F)

Dr. James Landry, representing Ballona Wetlands Foundation, expressed support for this proposal and their desire to assist the State, especially through the expertise of their science advisory board in the planning and eventual restoration of the salt marsh. He stated that he also represented Loyola Marymount University and expressed the University's support of the acquisition of this land, both as a neighbor and community member. Dr. Landry stated that for many years they have been involved in a variety of activities in the wetlands, from workshops to research, and will be happy to provide assistance to the State in the restoration of the wetlands. He stated that they viewed the wetlands as a great site and opportunity to help education and train their scientists as well as all of their students about the importance of the wetlands and environment in their lives.

Mr. Flores asked if there were any further comments or questions.

Mr. Hight stated that in 1985 Governor Davis, at that time State Controller, became involved in this project and has been heavily involved ever since with the goal in mind of trying to figure out how to preserve and restore as much of the wetlands as possible. Mr. Hight stated that this area has been appraised and reappraised and that he is exceedingly comfortable with the appraised value and that it is fair, just and equitable. He thanked the local activists who have worked through the years and spent many hours to get to this point.

Mr. Flores requested Mr. Wright address some of the issues regarding toxics, Area D, full disclosure of documents, etc. Mr. Wright discussed the property value and stated that no one wants to pay more for the property than they have to, including the Wildlife Conservation Board. He reported that the State must adhere to strict processes in order to make value determinations. He stated that the Trust for Public Land contracted for an appraisal and once that appraisal was done, the Wildlife Conservation Board contracted with another private contractor, also licensed by the State to review the appraisal. Once the review was done, both documents were given to the Department of General Services, who has authority and the mandate to approve all appraisals for the State before we approve the acquisitions. After consultation with others, Mr. Wright felt it would be appropriate for the State to contract with yet another contractor for another appraisal. Another appraisal was done, the fair market value was determined by that appraiser, which came in $10 million less than the first appraisal that was contracted by The Trust for Public Land. Mr. Wright addressed issues regarding toxics that may or may not exist on the property. He stated that The Trust for Public Land paid for an extensive environmental site assessment done by a contractor, URS, and that report has been made available for public review. Mr. Wright has asked the contractor to update the site assessment for better interpretation of the data contained in the report and may ask URS to do additional sampling. He stated that, from what is known at this time, there is nothing on the property that would cause the Board concern, that we would ask Playa Capital to pay for remediation since everything we know about the property relative to toxics occurred on the property long before their ownership. He stated there are hydrocarbons in the soils because of the approximate 22 old oil wells, most are currently operated by Southern California Gas Company, either as monitoring or as wells, to inject and withdrawn natural gas from the property and they will have continuing responsibilities in that area. Mr. Wright stated there is an issue about an old agricultural dump and sampling in that area. He stated that from what we know about it today, they have not detected any pesticides even though apparently a pesticide was used on the celery grown in the area and fuel oil might have been used as the celery was discarded to reduce the amount of odor. He stated that none of those contaminants were found in the testing and URS is continuing to evaluate whether or not they need to go in and resample those sites. He added that there were also some heavy metals found, and it is believed some of that is a result of dredge spoils on the property. Mr. Wright stated there is also the issue of soil gases, the methane gas, which some believe would preclude Playa Capital from developing the property and ultimately reducing the value of the property. Mr. Wright passed around a map showing soil gases from a survey of the property and he stated most of the soil gases are in Area D, where Playa Capital is presently developing and very little is found or known to exist on the areas that are the subject of this acquisition. Mr. Wright stated that he has spoken to Southern California Gas Company staff because there have been allegations over the years from people that the gas reservoir that exists 6,000 feet under the ground is leaking and there are gases coming to the surface. In addition to the gas company and Playa Capital investigating that, the City of Los Angeles has also investigated the issue and everybody has come to the conclusion that there is no connection between the underground gas reservoir and the soil gases which is natural occurring methane that appears in several areas in Southern California. Mr. Wright pointed out that the worst gas occurrences are in Area D, and both the city and the county have building codes that provide for construction in those areas by the use of mitigation measures such as venting and impervious soil membranes so that they protect people that live in those areas. He stated that both the Board and the appraiser feel that would have no impact on the value. Mr. Wright addressed zoning and planning. He referred to previous testimony by one of the speakers where they stated there are no entitlements on the property and other speakers have said there are.

Mr. Wright reported that one of the issues in the first appraisals was whether or not there was adequate investigation with the permitting authorities about entitlements and the risk that Playa Capital or the landowner was taking in proceeding with building. Mr. Wright stated that the appraiser discovered in his review regarding entitlements, and by speaking with city and county staff, also talking with the Executive Director, Chair and voting members of the Coastal Commission, that in 1984 there was a land use plan that was approved and it has been resubmitted to the Coastal Commission and accepted by the City of Los Angeles and the County of Los Angeles. He stated that everybody recognizes this will be a difficult place to develop. In addition to that, because of legal challenges, there was a settlement agreement in 1994, Friends of Ballona Wetlands vs. the California Coastal Commission, in which there were specific agreements reached about building density, building heights and several other things. Mr. Wright stated that these were all taken into consideration by the appraiser in developing the highest and best use scenario of the properties. Mr. Wright stated the appraiser made certain that the proposed development scenario was also compliant with the Bolsa Chica decision.

Mr. Wright stated that discussions with and correspondence from the City and County indicate that they believe that once the applications are perfected, that permits would be issued within a period of about 18 months. Mr. Wright stated that he talked with the appraiser this morning on the issue of litigation because in a conversation with one of the speakers a couple of days ago they raised the issue of how could one assume the litigation would be resolved in a year to a year and a half, and therefore asked what he took into consideration to come to that conclusion. The appraiser advised him that he recognized this is a difficult property to develop, but no more difficult than Area D, where special construction techniques are being used now by Playa Capital to construct. There was a boat basin proposed in one development scenario and this appraiser took that out. He stated that there was a cluster of wetlands, the appraiser drew a line around those wetlands and put a 100 foot buffer on it and assumed that most of the rest of the property could be developed. The wetlands delineations that have been approved previously totaled approximately 25 acres on Area B residential and on Area A this appraiser set aside a total of about 65 acres, so the appraiser believes he has created plenty of room to protect wetlands, provide buffers and open space that are necessary, and if there is mitigation required as a result of the proposed development scenario that he assessed, it could be done on site. Mr. Wright stated that in the end, the appraiser said that in the event litigation went beyond the estimated period, the profit margin that he built into the appraisal would still take care of the additional litigation time. Mr. Wright explained that, in other words, if someone were to go to Playa Capital today and offer them what the State is proposing to pay and they develop this out to where they have a lot ready to sell on the open market to build, there is a huge profit margin built into the appraisal. Mr. Wright went on to say that the appraiser believes that even though this property is appraised at $140 million, we are dealing with the Los Angeles market and he believes it is a very reasonable value which was approved by the Department of General Services. Mr. Wright acknowledged that when this large amount of money is taken out of a source to purchase and do restoration work, it will have an impact on our ability to purchase other properties in Los Angeles. He stated the funds are coming out of Prop 50 money designated specifically for Los Angeles and Ventura Counties. He stated that another issue that was raised is why we don’t buy other lands that Playa Capital may be proposing to develop or other lands that may be held by other parties. Proposition 50 specifically states that we will only purchase land from willing sellers and buyers. Mr. Wright stated that, as far as he knows, this Board has never tried to force a landowner to sell something they don’t want to sell and that we are in the business to work with willing sellers and we try to negotiate fair deals for the State and the public, and for the landowners as well. Addressing Ms. Hanscom’s question regarding whether or not all of the agreements will be available for the public to view before we close escrow, Mr. Wright stated that once we complete those licenses, which the Department of Fish and Game will be working with Playa Capital and the WCB on, he did not see any reason why we could not make those available to the public.

Mr. Wright stated that it will be important that we have a strong partnership with the Department of Fish and Game, they are going to need a lot of local support and we hope they will continue to be there after we acquire the property. He added that this acquisition presents a tremendous opportunity to save a large open space in Los Angeles and that the planning and management is done so that there is consensus about how we move forward.

Mr. Flores requested clarification regarding full public access. Mr. Wright stated public access would be decided by the planning process. The Department of Fish and Game will have many discussions regarding that aspect and he assured everything possible would be done to make the property available for public access. Mr. Hight stated there are issues regarding safety and the adjacent Ballona canal, but he assured they would work on providing as much public access as possible. Mr. Wright reported that during his site visits to the wetlands, he observed many students in the area, that there is already a lot of environmental education going on in the community and he expects to continue to see that in the future.

Staff recommended that the Board approve the acquisition of Area A, B Residential and Ballona Wetlands Parcel as proposed; allocate $140,000,000.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 (Prop. 50), Section 79572(b) to cover acquisition and project expenses; authorize acceptance of any and all interests in Area C, the freshwater marsh, and the expanded wetland parcel, as appropriate; authorize transfer of the property to the appropriate managing entity as identified at the end of the restoration planning process; authorize staff to enter into appropriate agreements as necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

It was moved by Mr. Robert Hight that the Board approve the acquisition of Area A, B Residential and Ballona Wetlands Parcel as proposed; allocate $140,000,000.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 (Prop. 50), Section 79572(b) to cover acquisition and project expenses; authorize acceptance of any and all interests in Area C, the freshwater marsh, and the expanded wetland parcel, as appropriate; authorize transfer of the property to the appropriate managing entity as identified at the end of the restoration planning process; authorize staff to enter into appropriate agreements as necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

Motion carried.

Mr. Wright expressed appreciation to the many people who worked on this project.

3. Ahmanson Ranch, Ventura County $135,000,000.00

Mr. Wright reported that this was a proposal to consider the allocation of a grant to the Santa Monica Mountains Conservancy (SMMC) to assist in the cooperatively funded acquisition of 2,958.76± acres of land for the protection of wildlife habitat and corridors to promote the recovery of rare and sensitive species. Other partners in this project include the State Coastal Conservancy (SCC) and the Mountains Recreation and Conservation Authority (MRCA), a Joint Powers Authority. The property is located on the southern facing slopes of the Simi Hills, at the easternmost edge of Ventura County, just north of Calabasas. Mr. Dave Means described the project and its location.

The SMMC is seeking to acquire the property to expand protection of critical habitat within the Simi Hills and maintain habitat corridors with other adjoining mountain ranges and ecosystems. This includes the protection and restoration of sensitive and declining plant communities, protection of the Malibu Creek watershed (a coastal stream) and to provide accessible open space parkland opportunities for the greater Los Angeles metropolitan area.

The Simi Hills run 16± miles east to west, bounded by the 23 Freeway and Thousand Oaks on the west, the San Fernando Valley on the east, the 101 Freeway to the south and the 118 Freeway to the north. The hills are situated in the middle of a series of mountain ranges running east to west in southern California, containing Mediterranean type ecosystems. To the north are the Santa Susana and Big Mountains. These two ranges essentially merge together to form one range of mountains that extends east to west, 20± miles between Moorpark on the west and Santa Clarita on the east. North of this range are larger national forest areas, including the Los Padres National Forest and the Angeles National Forest, located within the San Gabriel Mountains. Running parallel and south of the Simi Hills are the Santa Monica Mountains, coastal mountains that extend east to west, 40± miles between the Oxnard plain on the east and Hollywood on the west, with southerly slopes extending down to the Pacific Ocean coastline.

The location of the Simi Hills provides critical habitat linkage that allows migration of species back and forth between the coastal ranges, up into the larger national forest areas to the north and east. In 1989 the National Park Service commissioned a study that concluded the existing sub-populations of many of the larger mammals in these coastal ranges were too small to be self-sustaining. The linkages provided by the Simi Hills allow for the migration and replenishment of mammals between the different ranges. Without these linkages, the species, especially in the Santa Monica Range, could become isolated and suffer detrimental effects in terms of health and numbers. Adding to this potential impact is the fact that most of the areas separating the Simi Hills from the other two ranges are already developed and separated by major roads and freeway improvements.

As part of this acquisition the SMMC will also obtain rights to an open space easement encumbering Crummer Canyon that abuts the southeast corner of Ahmanson Ranch and extends approximately one mile south to the 101 Freeway.

Crummer Canyon is one of the only two existing protected habitat corridors remaining between the Simi Hills and the Santa Monica Mountains. Eventually a habitat underpass (tunnel) will need to be constructed under the 101 Freeway in order to link up with the Las Virgenes View park open space, located on the south side of the freeway. From here the open space connects with the Malibu Creek State Park and the Malibu Creek watershed, a protected wildlife corridor that extends out to the Pacific Ocean.

Other public held open space within the Simi Hills includes the Santa Susana Pass Historical Park; the 625 acre Sage Ranch; the 2,566 acre Las Virgenes Canyon open space abutting the eastern boundary of the Ahmanson Ranch; the 300 acre Liberty Canyon North Open Space, that also provides the only other protected corridor link between the Simi Hills and the Santa Monica Mountains; the 1,792 acre Cheeseboro Canyon located west of the Las Virgenes Canyon; and the 2,308 acre Palo Comado Canyon National Park. Located in the western portions of the Simi Hills are a combination of county and MRCA open space areas managed by the Conejo Open Space Conservation Agency, encompassing approximately 15,000 acres.

In addition to protecting critical linkages, Ahmanson Ranch will also expand core habitat areas within the Simi Hills. By abutting and linking with the Las Virgenes Canyon open space, the majority of the Las Virgenes Creek watershed, a major tributary of Malibu Creek, will be protected.

The topography of Ahmanson Ranch ranges from the relatively flat Laskey Mesa, to gentle slopes and rolling hills, to the rugged rock lands at the northern boundary of the property. East Las Virgenes Creek flows east to west through the center of the property connecting to the main fork of the Las Virgenes Creek that makes up the western border of the property.

For most of its history the property has been used as ranch. As a result, there is still an abundance of native habitat and wildlife found on the property. Habitat types include valley oak savannah, coastal sage scrub, chaparral, riparian woodland, California walnut woodland, southern willow riparian vegetation and native bunch grasses and grasslands. Wildlife includes a high level of both common and rare species. Listed species of note include the red-legged frog, San Fernando spineflower and the southwestern willow flycatcher. The population of red-legged frogs found on the property is thought to be one of the last remaining viable populations of the federally listed red-legged frog in Southern California; the extremely rare San Fernando Valley spineflower, discovered in 1999 by consultants on the ranch was thought to be extinct at one time and was last observed in the area in 1929; and the southwestern willow flycatcher observed on the property, is both a State and federally listed bird.

The Ahmanson Ranch is also part of the historical range of the California condor and the southern steelhead. It is hoped that preservation of the property will lead to reestablishment of these species on site. Other sensitive species and wildlife found on the property include the loggerhead shrike, two-striped garter snake, American Badger, southern California rufous-crowned sparrow and the yellow warbler. Fifteen species of raptors have been observed on the ranch, nine of which are considered sensitive by the State. Bats use the property for foraging, including the three sensitive listed species. Large mammals include the mountain lion, mule deer, bobcat, coyote, long-tailed weasel, raccoon and ringtail cat. The ranch also supports a full compliment of reptile, rodent and bird species.

Approval of the Ahmanson Ranch development was conditioned on the transfer to MRCA of approximately 7,316 acres of land offsite and 2,633 acres of what was once the western portion of the ranch for parkland, for a total of 9,949 acres which has been completed.

The property has been appraised and the value has been approved by the Department of General Services (DGS) at $170,000,000.00. The purchase price as negotiated is $150,000,000.00. The WCB will fund $135,000,000.00 toward the purchase price, with the remaining $15,000,000.00 funded by the SCC and the SMMC. The transaction and transfer of the property will involve two purchase agreements. The first is a purchase agreement between the MRCA and the current owners. Immediately after this transaction has been completed, the MRCA will transfer and sell the property to the SMMC. Because the transaction between the SMMC and MRCA requires the Public Works Board (PWB) approval, disbursement of WCB funds will be conditioned on approval by the PWB, scheduled to occur subsequent to WCB approval.

For management purposes, title to the property will be transferred to SMMC. Management objectives include: 1) protection of core habitat and wildlife corridors; 2) protections and restoration of sensitive and declining plant communities; 3) protection of listed and sensitive species; 4) nature education and interpretation uses, including the possible conversion of a residence on the property to a nature interpretation center; 5) protection of coastal stream watershed; and 6) public use for low impact recreation, including hiking, biking and nature-related studies.

The terms and conditions of the proposed grant require the PWB approval, as mentioned above, and provide that staff review and approve all documents pertaining to the Grantee’s acquisition, including any appraisals, preliminary title reports, entitlements on the property, property and tax assessments, agreements for purchase or sale, escrow instructions and the instruments of conveyance prior to disbursement of funds.

The proposed acquisition is exempt from California Environmental Quality Act requirements under Section 15313, Class 13 as the acquisition of land for wildlife conservation purposes and under Section 15325, Class 25 as the transfer of ownership in land to preserve open space, habitat or historical resources. Subject to approval by the Board, the appropriate Notice of Exemption will be filed with the State Clearinghouse.

Mr. Wright reported that the Board received several letters of support from Senator Sheila Kuehl; Assembly member Fran Pavley; Assembly member Hannah-Beth

Jackson; Zev Yaroslavsky, Los Angeles County Third District Supervisor; Frances Alet, President, Malibu Canyon Community Association; David Brown, Conservation Chair, Santa Monica Mountains Sierra Club; Phillip Rundell, UCLA Professor; Eugene Jones, Cal State Fullerton; Richard Ambros, UCLA; Jim Edmonson, Southern California Steelhead Coalition and approximately thirty letters from citizens, one of those letters contained 20 signatures.

Mr. Means reported that Ms. Linda Parks, Ventura County Second District Supervisor, was in the audience, also staff from the Santa Monica Mountains Conservancy, including Executive Director Joe Edmiston, Deputy Director Rorie Skei and Staff Counsel Laurie Collins should there be any questions.

Supervisor Parks addressed the Board and, as a member of the Santa Monica Mountains Conservancy as well as the Ventura County Transportation Commission and the Ventura County Board of Supervisors, expressed appreciation for this acquisition. She stated that from the point of view of the SMMC, she felt this acquisition was a great deal. As a member of the Ventura County Transportation Commission, she stated that this acquisition is less expensive than having to put extra lanes on the 101 Freeway and it will save the commuters of that region. She pointed out that the acquisition of the Ahmanson Ranch is supported by the major and minor environmental organizations such as the Sierra Club, Save Open Space, Rally to Save Ahmanson Ranch, Heal the Bay and others, the legislators who represent the area, the cities of Thousand Oaks, Agoura Hills, Westlake Village, Malibu, Los Angeles, Calabasas, as well as the County of Los Angeles. She commented that we are very fortunate to save a large expanse of open space in the middle of a major metropolitan area and that the voters intended for Prop 50 funds to be spent in this type of acquisition. She also pointed out that the Board members might look back on this vote with pride and that this is one of the most important votes they could make. She again expressed appreciation for the Board’s support.

Mr. Joe Edmiston, Executive Director of the Santa Monica Mountains Conservancy, expressed appreciation to the Board and Executive Director Wright for their work on this project, and stated that final approval for this acquisition lies with the Public Works Board at its regularly scheduled meeting. He stated that the appraisal and agreements have been reviewed by numerous people. Mr. Edmiston commented that it is appropriate that we deal with Prop 50, because the proposition requires the funds to be used in close proximity to urban areas of high resource value. He stated there is no other property, with the exception of Ballona Wetlands, in Los Angeles and Ventura Counties, which better meets the criteria and there are no other willing sellers of as significant a property in Los Angeles and Ventura counties. Therefore, all the criteria are combined in this one property. He stated that the last acquisition approved by the Public Works Board for the Santa Monica Mountains Conservancy was an area in Glendale for $70,000 per acre and stated that the Ahmanson Ranch area is a much higher value community, the market is red hot and that we’re considering about $50,000 per acre for this acquisition.

Mr. Flores requested clarification regarding public access to the project area.

Mr. Edmiston explained that there are two roads that access the property, there is a trailhead at the end of Los Virgenes that serves the current open space that was dedicated that will also serve as the principal trailhead into the property and all they have to do is cut off the no trespassing sign that Ahmanson has on it and the property is open. Mr. Edmiston stated there will have to be a management plan because of the sensitive and endangered species on site, with public input and a ranger will move onto the property to guide the public and make sure there is public access but also public access that also protects the sensitive resources.
Mr. Edmiston stated they are ready to open it to the public because the SMMC already manages the adjacent property.

Mr. Metropulos, representing Sierra Club California, stated the Sierra Club supports the recommendation of staff to approve the purchase of Ahmanson Ranch, which will complete protection of a unique block of core habitat but it will also be an important step in completing a habitat linkage that will connect wildlife populations and protected lands in the Santa Monica Mountains to the south, to wild lands in the Santa Susanna and the San Gabriel Mountains to the north, in addition to a critical part of the upper watershed of Malibu Creek which is one of the largest protected coastal streams south of Big Sur. He stated that Lower Malibu Creek is within Malibu Creek and supports the southernmost run of the endangered southern steelhead and Malibu Laguna at its mouth is the last remaining laguna in Los Angeles. Protection of Ahmanson Ranch will provide watershed protection to these unique wetland and riparian resources downstream.

Ms. Marsha Hanscom, Executive Director of the Wetlands Action Network, addressed the Board and expressed appreciation for those involved in this project. She stated that the headwaters for the Los Angeles River is located on this property, which created the estuary Ballona Creek and Ballona Wetlands. She wanted to honor those activists who have worked hard in promoting this proposal. She also thanked the Governor for recognizing the importance of the linkages in this area.

Ms. Victoria Rhome, representing the Natural Resources Defense Council, addressed the Board and stated they are very concerned about environmental degradation that could occur in this area if Ahmanson Ranch were to be developed and therefore, were in strong support of the proposal.

Mr. Flores requested clarification from Mr. Edmiston regarding plans for environmental education, particularly for children, on the property. Mr. Edmiston explained that Mr. Howard Ahmanson had a beautiful vacation home on this property and that will be turned into an education center. Mr. Edmiston reported that there are plans in the works for a permanent endowment to make sure there is money for children all over Southern California, particularly from the heavily impacted urban core, to visit this property. He stated they have an existing program called The Recreational Transit Program, that brings children from the inner city to all of the parks within the Santa Monica Mountains Conservancy and that will include this property.

Ms. Debra Gravert, representing Assembly member Fran Pavley, read a statement from the Assembly member strongly supporting this project. (See Attachment G)

Mr. John Tommy Rosas stated that the Native American group feels they should have been consulted regarding this project. He stated he is familiar with this land and that the land is shared by the Chumash and their people and that many of the Native American sites on the property are theirs. He stated they have concerns because there was no consultation and they were not involved with the process. At this time he also addressed that Board in support of agenda item 5 regarding Grizzly Creek.

Mr. Jeff Arthur, representing Assembly member Hannah-Beth Jackson, whose district includes parts of Santa Barbara and Ventura counties, read a statement from the Assembly member strongly supporting this acquisition. (See Attachment H)

Staff recommended that the Board approve this project as proposed; allocate $135,000,000.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 [$580,000.00 from Section 79572(a) and $134,420,000.00 from Section 79572(b)] to fund the grant amount; authorize staff to enter into appropriate agreements as necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

It was moved by Mr. Fred Klass that the Board approve this project as proposed; allocate $135,000,000.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 [$580,000.00 from Section 79572(a) and $134,420,000.00 from Section 79572(b)] to fund the grant amount; authorize staff to enter into appropriate agreements as necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

Motion carried.

4. Salton Sea Habitat Planning and Restoration Project, Imperial and Riverside Counties — $20,000,135.00

Mr. Wright reported that this proposal was to consider a cooperative project with the Department of Water Resources (DWR) to develop feasibility studies and restoration options for the restoration of the Salton Sea. The sea is located in the southeast corner of California in Riverside and Imperial Counties. Mr. Scott Clemons described the project and its location.

The Salton Sea was created by accident nearly 100 years ago when water diversion dikes inadequately built along the Colorado River collapsed during a flood. For about a year and a half the Colorado River, flooding the channel now occupied by the New River, emptied into the ancient Salton Basin before finally being brought under control and redirected into Imperial Valley irrigation canals or down to the Gulf of Mexico. This accidental flood created what is now California's largest lake, based on surface area.

The Salton Sea is a desert lake with no outlet, with agricultural runoff from diversions from the Colorado River as its primary source of inflow. This runoff has been sufficient to maintain the sea's water level over the years. The sea's salinity has been increasing since its creation, due to concentration of salts through evaporation. Although its present salinity is about 25 percent saltier than ocean water, the sea supports a highly productive fishery and more than 400 species of resident and migratory birds. The endangered desert pupfish is the only native fish species in the sea. Introduced fish species, dominantly tilapia, Gulf croaker, orangemouth corvina and sargo, sustain an important sport fishery and provide the food base for millions of birds. The sea supports many species, including the endangered brown pelican, and significant populations of eared grebes and American white pelicans. There are more than 50 birds listed as special status species (i.e., endangered, threatened, fully protected, or species of concern) at the sea and its environs.

Unless actions are soon taken to control its salinity, the sea will, perhaps within a decade, become too saline to support its present fishery and associated avian populations. With conversion of some 98 percent of California's historical wetlands to other land uses, preservation of this remaining Pacific Flyway habitat area is of major importance. In an effort to determine the best way to restore this valuable resource, the Salton Sea Reclamation Act of 1998 was enacted, which directed the U.S. Department of Interior to complete a feasibility study of sea restoration by 2000 and to report the results to Congress. The federal study indicated that preserving the entire Salton Sea as it now exists (current salinity levels and associated fish and wildlife resources) would be infeasible, due to the sheer volumes of water and salt that would have to be managed to save the whole sea.

Since then, State efforts have focused on evaluating alternatives for sea restoration and preservation not covered in the federal effort – alternatives for restoration and preservation at a smaller scale. Complex negotiations are currently underway associated with the Colorado River Quantification Settlement Agreement (QSA). Parties involved in this effort include Imperial Irrigation District, Coachella Valley Water District, Metropolitan Water District and the San Diego County Water Authority, as well as all interested State and federal agencies, including the Department of Fish and Game, and many non-governmental organizations. The QSA is intended to provide a mechanism for California to manage the reduction from its historical deliveries of Colorado River water to the State's basic interstate apportionment. Agricultural to urban water transfers are part of this approach and, in some instances, would result in reduction of agricultural runoff to the Salton Sea. Reductions in water supplied to the sea would result in an increase in the rate of change of the sea's salinity and could accelerate the habitat degradation of the ecosystem. One of the goals of the QSA is to improve habitat values of the sea. Funding authorized by the Board for this project will not be encumbered until the QSA is signed.

To facilitate progress in the QSA negotiations and to ensure timely preservation of the sea's unique resources, this project will provide feasibility studies to guide the restoration and permanent protection of the wildlife habitat of the Salton Sea. Specifically, the studies will evaluate pilot-scale testing of components of proposed alternatives, and would include such components as embankment design, desalination pre-treatment, aeolian erosion control and wildlife habitat design. The study and the resultant programmatic environmental impact report/statement are to be completed by March 31, 2006. The goal of the State study is to identify an approach that provides the greatest diversity and quantity of fish and wildlife resources consistent with financial feasibility. Once these studies are complete, and the preferred restoration alternatives have been identified and approved, funding available pursuant to pending legislation (including the Salton Sea Restoration Act) and other available State and federal funding will be used to begin implementation of the habitat restoration.

The 2003 Budget Act (Item 3640-301-6031) provides $32,500,000.00 under the Colorado River Acquisition, Protection and Restoration Program. Of this, $10,000,000 as identified in the Act, and an additional $10,000,000 from that same source, shall be made available to the DWR for feasibility studies and related expenses to guide the restoration and permanent protection of wildlife habitat of the Salton Sea and for the reduction of impacts on the sea resulting from water transfers related to the QSA; the treatment, desalination and reuse of a portion of agricultural wastewater and runoff flowing into the sea; the maintenance of stable shorelines for recreational access; and the preparation of an adaptive management process for the long-term conservation of the fish and wildlife species of the sea.

In addition to the costs listed above, an additional $135.00 will be required for Department of General Services' review costs, bringing the allocation necessary for the Board's portion of the project to $20,000,135.00. The Department of Fish Game has reviewed this proposal and recommends it for funding by the Board. These studies will provide the basis for environmental documents that will be prepared for the resultant restoration activities in the sea. The DWR will acquire any necessary permits.

Mr. Hight reported that yesterday the Governor signed three bills authorizing the quantification settlement agreement to go forward and the Salton Sea restoration process to go forward. He stated that the entire process involves transferring water from the Imperial Irrigation District to San Diego and that transfer process will leave the Salton Sea with less water. Through this process, we will have the ability to figure out options to restore the Salton Sea into an exceedingly valuable wildlife area, which was one of the key elements the Governor was concerned about in the entire Colorado River negotiations, that the Salton Sea be dealt with and restored to its greatest capacity. Mr. Hight stated that the agreement also provides $300 million for that restoration and this money will go to the development of alternative plans.

Ms. Marsha Hanscom, representing the Wetlands Action Network, addressed the

Board in support of this project and explained why developing feasibility studies and restoration options are very important and should be considered. Mr. Hight stated that during the planning process the Department of Fish and Game will look at every conceivable option and welcomes their comments.

Mr. Jim Metropulos, representing the Sierra Club, addressed the Board in support of this project. He clarified information in the staff report regarding the creation of the Salton Sea. He pointed out that prior to the event where the dikes collapsed during a flood, which is where the current Salton Sea is now, the Colorado River was not contained by a dam, and water flowed freely through the area and collected in that basin. He also commented that he hoped the feasibility study done by the Bureau of Reclamation would not be a starting point for the feasibility study that the Department of Fish and Game will be doing with the DWR and believes they should start out new and look at various restoration options for the sea. He expressed appreciation to Governor Davis, Director Hight, Secretary Nichols, Richard Katz, Director Hannigan and Deputy Director Michael Spear, Acting Director for the Department of Water Resources, for their efforts in working on the QSA, having the environmental groups involved and getting the legislation signed and passed. He also expressed appreciation to Joe Caves for his efforts with the legislation and looking at ideas for the Salton Sea.

Mr. Joe Caves addressed the Board and on behalf of the National Audubon Society, expressed support for this project stating that this is a critical first step in looking at the Salton Sea and the Colorado River ecological system in a new way. He stated that the Governor's Office and the Administration has provided incredible leadership in putting together this package and urged the Board's support.

Staff recommended that the Board approve this project as proposed; allocate \$20,000,135.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Prop. 50), Section 79568; authorize staff to enter into appropriate agreements necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

It was moved by Mr. Fred Klass that the Board approve this project as proposed; allocate \$20,000,135.00 from the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Prop. 50), Section 79568; authorize staff to enter into appropriate agreements necessary to accomplish this project; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

Motion carried.

5. Grizzly Creek Forest, Expansion 1, Humboldt County \$18,300,000.00

Mr. Wright reported that this was a proposal to consider the acquisition of 691± acres of land as an expansion of the Grizzly Creek Forest for the protection of old growth redwoods and mixed conifer forest along with portions of the riparian corridors of Grizzly Creek and the Van Duzen River. The property is located within the Van Duzen River drainage, about 20 miles easterly of the City of Fortuna on State Highway 36. The town of Bridgeville is located about 20 miles southeast of the project area. Mr. William Gallup described the project and its location.

Acquisition of the Grizzly Creek Forest began in 1999 pursuant to Assembly Bill 1986 as set forth in Chapter 615 of the Statutes of 1998 of the State of California to purchase designated lands within the Grizzly Creek Marbled Murrelet Conservation Area (MMCA). Consequently, the Wildlife Conservation Board approved the first acquisition in 1999 consisting of approximately 716± acres. The Department of Parks and Recreation (DPR) owns and manages the Grizzly Creek Redwoods State Park located adjacent to the subject property, and if this project is approved, the subject, along with the initial 716± acres, will be transferred to the DPR. The property will be owned and managed by State Parks.

The Department of Fish and Game (DFG) has identified this expansion as being critical to the protection of the old growth coniferous forest which is extremely important for recovery of the marbled murrelet, a federally threatened and State endangered species. The marbled murrelet is a small seabird in the alcid family found along the Pacific Coast from Alaska to California. At sea, it feeds by diving for small fish in near-shore waters, typically within 5 km of the coastline. The marbeled murrelet is unique among seabirds in that it nests up to 40 km inland in old growth coniferous forests. In California, it nests almost exclusively in redwoods greater than 200 years old. The marbeled murrelet is a long-lived slow-reproducing species, laying only one egg per year. Given these demographic characteristics, the vast majority of the population consists of breeding adults, whose survival is critical to sustaining the species.

The marbeled murrelet’s total California population is estimated at 6,450 individuals. The vast majority breed in the coastal redwoods of Del Norte and Humboldt counties. A relatively isolated population of approximately 500 birds breeds in the Santa Cruz Mountains of central California. Acquisition of the subject property will increase the likelihood that this species will survive by maintaining current nesting opportunities that are available within the MMCA.

In addition to providing quality marbled murrelet habitat, the subject property also includes nice stands of riparian habitat along Grizzly Creek and the Van Duzen River and provides habitat for additional listed species including Cooper’s hawk, northern spotted owl, coho salmon, chinook salmon and steelhead trout as well as other animals including deer, black bear, mountain lion and raccoon, just to name a few.

The DFG Office of Spill Prevention and Response (OSPR) and the U.S. Fish and Wildlife Service (USFWS) along with other natural resource trustee agencies have been assessing injuries to natural resources, including those to marbled murrelets as a result of the Kure oil spill in 1997 and the Stuyvesant oil spill in 1999. Pursuant to the federal Oil Pollution Act (OPA), its implementing regulations, and the State Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, the OSPR and the USFWS are authorized to collect damages for the injuries to marbled murrelets and to use that money to develop and implement restoration projects for marbeled murrelets, after public input. One of the preferred marbled murrelet restoration projects under consideration by the OSPR, the USFWS, and the other trustees is the acquisition and protection of the subject property. However, timing is an issue. To date these cases have not been settled, nor is there a judgment to provide the funding for such an acquisition. The DFG has concluded that this parcel has the most significant unprotected habitat available for immediate protection.

Funds earmarked for marbled murrelet habitat acquisition acquired through a settlement or civil judgment can be used to replace and/or supplement funds placed in escrow by the Board to purchase the subject property. The OSPR has advised that any use of such recovered funds would be conditioned upon compliance with the OPA's requirement for "adequate public notice, opportunity for a hearing, and consideration of all public comments," prior to finalizing and implementing a restoration plan.

In addition, any settlement of the trustees' claims for natural resource damages will be set forth in a judicial consent decree, subject to public comment, before the court enters it as a judgment. Furthermore, the National Environmental Policy Act (NEPA) and the California Environmental Policy Act (CEQA) apply to the approval of the Restoration Plan, of which a project(s) to address the MMCA injury would be a component.

This proposed acquisition is exempt from California Environmental Quality Act under Section 15313 Class 13 as the acquisition of land for wildlife conservation purposes and under Section 15325 Class 25 as the transfer of ownership in land to preserve open space, habitat or historical resources. Subject to approval of the Board, the appropriate Notice of Exemption will be filed with the State Clearinghouse.

The Department of General Services (DGS) has reviewed and approved the appraisal of the property at $24,600,000.00. The owner has agreed to sell the property for $18,200,000.00; consequently any value over the approved appraised value will be considered a donation to the State. It is anticipated that an additional $100,000.00 will be needed to cover administrative expenses including appraisal and DGS' review costs, bringing the total proposed allocation for this project to $18,300,000.00. However, as discussed above, the funding the Board may expend on the acquisition may be replaced or supplemented as described above for all or part of its acquisition costs. Any such funds received will be used for future Proposition 40 qualifying projects.

Earlier in the meeting, Mr. John Tommy Rosas expressed his support for this proposal. He stated that the redwoods are getting damaged from logging and that the logging should stop and the land restored.

Mr. Wright reported that he received a note from Assembly member Patty Berg that she regretted she was not able to stay for the remainder of the meeting and that the entire community supports the purchase. Mr. Wright stated that the Board received letters of support from Joe Blum of the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and Kate Anderton of Save the Redwoods League.

Mr. Flores asked if there were any questions or comments. There were none.

Staff recommended that the Board approve this acquisition as proposed; allocate $18,300,000.00 from the California Clean Water, Clean Air, Safe Neighborhood Parks and Coastal Protection Bond Fund (Prop. 40), Section 5096.650, for the acquisition and related expenses; authorize future replacement of funding for this acquisition pursuant to settlement or civil judgment; accept a portion of the approved appraised value as a donation from the landowner; authorize transfer of the Grizzly Creek Forest property to the Department of Parks and Recreation for inclusion into the Grizzly Creek Redwoods State Park; authorize staff to enter into agreements as necessary to carry out this acquisition as described; and authorize staff and the Department of Fish and Game to proceed substantially as planned.

It was moved by Mr. Michael Flores that the Board approve this acquisition of up to 691± acres as proposed; allocate $18,300,000.00 from the California Clean Water, Clean Air, Safe Neighborhood Parks and Coastal Protection Bond Fund (Prop. 40), Section 5096.650, for the acquisition and related expenses; authorize future replacement of funding for this acquisition pursuant to settlement or civil judgment; accept a portion of the approved appraised value as a donation from the landowner; authorize transfer of the Grizzly Creek Forest property to the Department of Parks and Recreation for inclusion into the Grizzly Creek Redwoods State Park; authorize staff to enter into agreements as necessary to carry out this acquisition as described; and authorize staff and the Department of Fish and Game to proceed substantially as planned. Motion carried.

Mr. Wright thanked the many staff who worked very hard to prepare these projects for the Board's consideration. He also thanked Ms. Nancy Templeton, Staff Counsel, Mr. Stanley Young, Communications Director for the Resources Agency and Mr. Paul Mosley, a private attorney that has been counsel to the State and working specifically on the Ballona Wetlands project. Mr. Hight also expressed his appreciation to the staff.

Mr. Flores also thanked the Board staff for their work and to the audience for attending and providing input on the proposed projects.

With no further business to discuss, the meeting adjourned at 12:10 P.M.

Respectfully submitted,

Al Wright

Executive Director

Attachments

PROGRAM STATEMENT

At the close of the meeting on September 30, 2003, the amount allocated to projects since the Wildlife Conservation Board's inception in 1947 totaled $1,537,807,956.30. This total includes funds reimbursed by the Federal Government under the Accelerated Public Works Program completed in 1966, the Land and Water Conservation Fund Program, the Anadromous Fish Act Program, the Sport Fish Restoration Act Program, the Pittman-Robertson Program, and the Estuarine Sanctuary Program.

The statement includes projects completed under the 1964 State Beach, Park, Recreational and Historical Facilities Bond Act, the 1970 Recreation and Fish and Wildlife Enhancement Bond Fund, the Bagley Conservation Fund, the State Beach, Park, Recreational and Historical Facilities Bond Act of 1974, the General Fund, the Energy Resources Fund, the Environmental License Plate Fund, the State, Urban and Coastal Park Bond Act of 1976, the 1984 Parklands Fund, the 1984 Fish and Wildlife Habitat Enhancement Bond Act, the California Wildlife, Coastal and Park Land Conservation Act of 1988, Cigarette and Tobacco Products Surtax Fund of 1988, California Wildlife Protection Act of 1990, the Safe, Clean, Reliable Water Supply Act of 1996, the Natural Resources Infrastructure Fund, the Harbors and Watercraft Revolving Fund, Forest Resources Improvement Fund, the Safe Neighborhood Parks, Clean Water, Clean Air, and Coastal Protection Bond Act of 2000, Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act of 2000, California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Fund, Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 and the Wildlife Restoration Fund. In addition to projects completed with the above funding sources, this statement includes tax credits awarded under the Natural Heritage Preservation Tax Credit Act of 2000. The tax credits are not reflected in the total amount allocated to projects.

A. Fish Hatchery and Stocking Projects		$16,006,219.06
B. Fish Habitat Preservation, Development & Improvement		24,602,180.88
Reservoir Construction or Improvement	$ 5,518,592.00	
Stream Clearance and Improvement	14,788,961.69	
Stream Flow Maintenance Dams	542,719.86	
Marine Habitat	646,619.07	
Fish Screens, Ladders and Weir Projects	3,105,288.26	
C. Fishing Access Projects		45,773,746.87
Coastal and Bay	$ 3,537,906.11	
River and Aqueduct Access	12,834,760.89	
Lake and Reservoir Access	9,015,632.69	
Piers	20,385,447.18	
D. Game Farm Projects		146,894.49

E. Wildlife Habitat Acquisition, Development and Improvement 1,425,829,364.98
    Wildlife Areas (General) $274,178,448.77
    Miscellaneous Wildlife Habitat Development........ 25,597,068.74
    Wildlife Areas/Ecological Reserves, (Threatened,
        Endangered or Unique Habitat) 575,706,802.59
    Land Conservation Area.. 6,981,557.18
    Inland Wetlands Conser. Grants & Easements.... 17,204,341.09
    Riparian Habitat Conser. Grants & Easements.... 20,717,803.59
    Other Wildlife Habitat Grants............................. 505,443,343.02
F. Hunting Access Projects.. 484,898.57
G. Miscellaneous Projects (including leases) 11,945,430.29
H. Special Project Allocations.. 1,389,820.29
I. Miscellaneous Public Access Projects... 11,080,312.80
    State Owned $1,244,851.07
    Grants 9,835,461.73
J. Sales and/or exchanges 549,088.07
K. Natural Heritage Preservation Tax Credit Act (tax credits awarded)...(33,508,511.50)
    Statutory plans..(0.00)
    Corridors, wetlands, wildlife habitat, streams and
        riparian habitat...(6,232,435.50)
    Agricultural lands ....(712,726.00)
    Water and water rights...(269,500.00)
    State and local parks, open space and
        archaeological resources.................................(26,293,850.00)

Total Allocated to Projects $1,537,807,956.30

BALLONA WETLANDS OVERVIEW AND SUMMARIES
LOS ANGELES COUNTY

Introduction

The Ballona Wetlands are the last, undeveloped and restorable wetlands of their kind in Los Angeles County. This is of particular importance since some 98% of coastal wetlands in Southern California have been destroyed or degraded. The Ballona Wetlands serve as a last refuge for several species of birds, animals, and plants and is possibly the last remaining area in the county that has the soil characteristics, hydrology, and seed bank that allow for successful wetland restoration.

The 1,087± acres of the original wetlands, once owned by industrialist Howard Hughes and serving as his private airport and birthplace of the famous “Spruce Goose” airplane, is currently owned by Playa Capital Company, LLC (Playa) or its affiliates. Stretching from the San Diego Freeway to the sea, this land has been a source of contention for well over 20 years between the landowners and those concerned about increased congestion and environmental degradation.

In 2001, the Trust for Public Land (TPL) optioned 192± acres of Playa’s property located west of Lincoln Boulevard (138 acres depicted as "Area A" and 54± acres as "Area B Residential"). The project also includes 291± acres shown on the attached map as Ballona Wetlands Parcel, including 83± acres in the Ballona Creek. The total to be conveyed to the State is 483± acres.

The proposed acquisition provides congested Southern California with open space and important habitat for endangered and threatened species including the California brown pelican and Belding's savannah sparrow. The area is also a local nesting site of the great blue heron and habitat for at least ten species of reptile and amphibian species. Acquisition of the property, which the parties currently anticipate will occur 60 days following approval by the Wildlife Conservation Board, will set the stage for a comprehensive five-year restoration planning process led by the State Coastal Conservancy that will actively include members of the public.

Purchase Agreement Summary

The Purchase Agreement calls for Playa Capital Company, LLC (Playa) to convey properties in the City and County of Los Angeles located along the Ballona Creek for $139 million to the State government. The Purchase Agreement between Playa and the State of California specifies which properties are being acquired and includes terms and conditions of the transaction.

The transaction relates to approximately 483 acres of real property and other real property rights located along the Ballona Creek, as shown on the attached map, including:

> ***Areas A and B Residential -*** *Approximately 192 acres of fee property located west of Lincoln Boulevard. Approximately 138 acres of the fee property is labeled on the attached map as Area A and approximately 54 acres of the fee property is labeled on the map as Area B Residential. The entire 192± acres of fee property will be conveyed to the State for the purchase price.*

Ballona Wetlands - *Approximately 291± acres of fee property labeled on the attached map as the Ballona Wetlands Parcel. Of the 291 acres to be conveyed, approximately 83± acres lie within the Ballona Creek and approximately 208± acres lie outside the creek. The Ballona Wetlands Parcel will be conveyed to the State for no payment beyond that paid for Area A and Area B Residential.*

Release of Purchase Rights on Area C - *A release by Playa of all remaining purchase rights it has in the property labeled Area C on the attached map. A trust currently holds Area C approximately 64 acres for benefit of the people of the State. Legislation will formally transfer title of this property to the State.*

Roadway Rights on Area C - *A future release by Playa of an easement it holds on Area C to build a road across Area C to connect Culver Boulevard with Playa Vista Drive across a bridge to be built over the Ballona Creek. Playa is presently obligated to build the road and accompanying bridge in order to alleviate traffic resulting from its present development. Playa is attempting to obtain special relief from this obligation and will release its easement across Area C if, but only if, it obtains such relief prior to September 30, 2005. If Playa obtains relief prior to September 30, 2005, it will relinquish its easement for the road for no payment beyond that paid by the State for Area A and Area B Residential.*

The property is to be conveyed by Playa to the Department of Fish and Game, Wildlife Conservation Board. Fish and Game will be the initial steward of the land.

The $139 million negotiated purchase price is payable at closing, which is scheduled to occur 60 days following approval of the acquisition by the California Wildlife Conservation Board. The Purchase Agreement provides for possible extensions of the closing to December 31, 2003 if necessary to address specified title or survey issues, or to satisfy specified conditions to the close of escrow.

Appraisal:

The State contracted for, and the California Department of General Services approved, an independent appraisal of the portion of the property to be purchased, Area A and Area B Residential. The appraisal was performed by qualified independent appraisers licensed by the State of California, in conformance with the Uniform Standards of Professional Appraisal Practice. The appraisal is further discussed in the Summary of Appraisal, below.

Tax Benefit Sought:

Playa believes the negotiated purchase price for Area A and Area B Residential is below the value of such portions of the property and intends to seek a tax benefit for this conveyance. Playa also intends to seek a tax benefit for the conveyance of the Ballona Wetlands Parcel for no additional consideration. The amount of any charitable gift will be determined by relevant government authorities. The State will acknowledge Playa's intent to make a charitable contribution and accept such gift of the property to the extent the fair market value of all the property conveyed exceeds the purchase price. The State is making no guarantee regarding the tax treatment of the transaction.

Freshwater Marsh:

Although not a part of this transaction, in connection with its development of adjacent property, Playa has created a freshwater marsh located at the Southwest corner of Lincoln and Jefferson Boulevards. The area within which the freshwater marsh has been created is approximately 38 acres and is labeled on the attached map. Playa continues to own the marsh and approximately 22 acres next to the marsh, which additional property is labeled on the attached map as the Expanded Wetlands Parcel. In connection with its previous option to purchase Area C, Playa agreed to convey both the freshwater marsh and the Expanded Wetlands Parcel (approximately 60 acres in the aggregate) to the State of California. This agreement is still in effect even though the option in favor of Playa has expired. If the State elects not to accept the conveyance, then Playa must offer to convey these properties to the City of Los Angeles. It is anticipated that the State will accept the conveyance and that the conveyance will occur in early 2004. After conveyance, Playa must either maintain or provide for maintenance of the freshwater marsh in perpetuity.

Southern California Gas Parcel:

Playa owns fee title to a small property adjacent to the Ballona Wetlands Parcel labeled on the attached map as the Southern California Gas Company parcel. Southern California Gas Company holds a perpetual right to occupy the parcel for purposes of accessing an underground natural gas storage facility, and presently maintains above ground storage tanks and other facilities used to store and distribute natural gas. The rights held by Southern California Gas Company were originally sold *to its predecessors by the U.S. government after World War II when the federal government divested itself of petroleum reserves condemned for use during the war. Southern California Gas Company also holds other easements for oil and gas wells in the area, including easements for gas wells located on the property to be conveyed by Playa to the State. Gas wells are presently used to monitor the underground natural gas storage facility and, in some instances, to pump natural gas into and out of the storage facility.*

The State may not take ownership of the land occupied by Southern California Gas Company in connection with this transaction.

Playa has informed the State that it intends to transfer its fee interest in the Southern California Gas Company parcel to the Southern California Gas Company concurrently with its conveyance to the State of Area A, Area B Residential and the Ballona Wetlands Parcel, so long as negotiations provide for the State's ability to acquire this property at no cost should the Southern California Gas Company ever offer the property for sale. If unsuccessful, the property may be transferred to the State as part of this transaction.

Parties' Obligations and Conditions:

The parties' obligations to close the transaction are subject to conditions, including:

The State must approve title of the property and be reasonably satisfied with matters disclosed by surveys of the property, including environmental surveys, and be satisfied that existing lawsuits and judgments affecting the property do not impose obligations upon the property for which the State will have responsibility following the conveyance.

The State must receive and approve a commitment from the Trust for Public Land, or a similar organization, to provide initial stewardship of the property for a period of up to five years following the conveyance, during long term restoration planning for the property.

Except as specified in the Purchase Agreement, the State is acquiring the property in its current condition.

No Release of Playa's Liability:

The State is not releasing Playa from any liability for the clean up of hazardous materials, if any, required under applicable law. Southern California Gas Company is liable under existing law for contamination on the property, if any, associated with its wells and operations.

Environmental Surveys:

Various environmental surveys of the property, including an environmental site assessment, have been performed to evaluate the suitability of the property for development. An updated environmental site assessment is being performed in accordance with current professional (ASTM) standards, which updated assessment will be available for review and approval by the State prior to the conveyance. The following environmental conditions are known to exist on the property:

Naturally occurring soil gases, including methane, have been detected on the property. Levels of methane detected on the property are generally lower than levels detected on adjacent property where residential development is underway.

Historic oil and natural gas wells exist on the property, including wells that have been abandoned and wells that are presently used by Southern California Gas Company to monitor and operate its underground natural gas storage facility.

Portions of the property have been used in the past as (i) a repository for sludge dredged from the Marina Del Rey harbor, (ii) a landfill for agricultural waste, and (ii) a gun club.

Testing of both soil and groundwater on the property, including testing intended to address the historical uses of the property, has identified localized areas on the property where minor amounts of contaminants are present. The updated environmental assessment will further evaluate the risk associated with the identified contaminants.

Special Tax (Mello-Roos District) Issues:

The portion of the property referred to as Area B Residential is presently located within the boundaries of a Mello-Roos Community Facilities District known as CFD No. 5, which district is under the jurisdiction of the City of Los Angeles. Property located within the boundaries of CFD No. 5 may be assessed a special tax to pay for the construction of streets, sewers and other infrastructure in the district. Playa has represented that all but approximately one-half of one acre of the property to be conveyed to the State is exempt from taxation by the district. The Purchase Agreement requires that Playa provide evidence of the exemption to the State prior to the conveyance. The district has not yet issued any bonds, and no special tax is currently payable. However, Playa has agreed to pay any special tax levied against the property and to cause the property to be removed from the boundaries of the district within five years. If removal is not accomplished within five years, then Playa has committed to provide to the State cash collateral that may be used to pay all future levies, if any, payable by the State with respect to the property.

Existing Rights and Leases:

Various parties have acquired from Playa, and from Playa's predecessors, rights to occupy small portions of the property. The State will take the property subject to these rights, including:

Leases granted by Playa to the County of Los Angeles for parking for the County Sheriff and for the Department of Beaches and Harbors upon a small portion of Area A. These leases may be terminated by the State.

A lease granted by Playa to the County of Los Angeles Flood Control District to access the Ballona Creek from Area A to remove trash and debris. This lease may also be terminated by the State.

A license granted by Playa to a group known as Friends of Ballona Wetlands who perform work to restore sand dunes located in the Ballona Wetlands Parcel. This license is presently being modified by Playa and the Purchase Agreement allows the State to accept or reject the license in its modified form.

A license to the Ballona Wetlands Foundation allowing the Foundation (in association with Loyola Marymount University) to restore habitat and perform other educational functions within a portion of the Ballona Wetlands Parcel. This license is also being modified by Playa and the Purchase Agreement allows the State to accept or reject the license in its modified form.

Licenses granted to several business owners along Culver Boulevard for minor encroachments upon the Ballona Wetlands Parcel. These licenses are all terminable and are subject to review by the State prior to closing.

Easements running in favor of Southern California Gas Company for gas wells to monitor its natural gas storage facility and to inject and remove natural gas from its storage facility.

Easements running in favor of a majority of homeowners located along the Western boundary of the Ballona Wetlands Parcel for small encroachments.

Easements running in favor of Playa for the widening of Culver and Lincoln Boulevards and for the installation of other infrastructure relating to the Playa Vista Development.

Approval by State:

The Purchase Agreement is subject to approval by the California Wildlife Conservation Board, which will be considered at a public meeting, and by the Director of the California Department of General Services following WCB action.

Appraisal Summary

An independent appraisal analysis was performed on Area A and Area B Residential by Members of the Appraisal Institute (MAIs) who are also Certified General Real Estate Appraisers licensed by the State of California. The appraisers certify that they have no financial interest in the property, nor do they have any bias with respect to the parties involved in the transaction. The valuation report and analysis conform to the Uniform

Standards of Professional Appraisal Practice (USPAP), the supplemental requirements and Code of Professional Ethics of the Appraisal Institute, and generally accepted appraisal practice.

The property appraised contains approximately 192 acres (Area A & Area B Residential) and has prior approvals from the California Coastal Commission and local jurisdictions, but the prior plan requires modification and the property requires further significant approvals from each of the jurisdictions including the Coastal Commission before any development could occur. There are also sensitive environmental resources that would limit the development footprint ultimately approved for the property. After thorough interviews and analysis, the appraisers determined that the highest and best use of the property is future development with primarily residential uses, and on-site preservation and enhancement of wetland and buffer areas. About 65 acres of the property was projected to be set aside as open space. Therefore, if the property were developed to its highest and best use, little or no off-site mitigation would be required. Also reflected in the valuation are 3 ½ - 4 ½ years of entitlement and projected litigation delays prior to development.

In preparing the appraisal, the appraisers performed the following tasks:

> The property and surrounding area were inspected several times by the appraisers, including an inspection with the property owners and representatives of the Wildlife Conservation Board on June 10, 2003;
>
> The physical, legal, and economic characteristics of the property were investigated, including review of numerous public and consultant documents.
>
> Representatives of City, County, and State planning and land use departments and commissions were consulted, as were documents including relevant planning and land use regulations and maps. A partial list of individuals interviewed for this appraisal includes members of neighborhood/preservation groups, staff (planning and scientific) of the California Coastal Commission, the Executive Director of the Coastal Commission, the Chair of the Coastal Commission, the Director of the California Department of Fish and Game, Southern California Gas Company representatives, City and County planning officials, property owner representatives and consultants, and attorneys for both the State and property owner;
>
> The relevant regulations relating to wetlands and other environmentally sensitive areas were investigated, particularly in light of the Coastal Commission jurisdiction and Bolsa Chica appellate decision;
>
> Both the ‘sales comparison’ and ‘subdivision development analysis’ approaches were used in valuing the property. These two approaches are commonly relied upon by market participants for a property such as the land in question. There are no other approaches that would be relevant in this case and the two approaches were reconciled into a final conclusion of fair market value for the

entire property;

The Department of General Services (DGS) reviewed the appraisal and concluded that the content, analysis and conclusions stated in the report are in compliance with the applicable (DGS) standards and requirements of the USPAP. DGS also approved the fair market value opinion stated in the appraisal report.

Interim Management

As part of this transaction, the Trust for Public Land (TPL) has agreed to provide initial stewardship of the property consistent with the stewardship Playa has been providing at the Ballona Wetlands for the last decade. This obligation would begin at the close of escrow and last for not more than five years, while long-term restoration planning is underway. The goal of interim management would be to preserve the property in its existing condition. Stewardship activities would include security, maintenance and repair of existing property fencing, weed abatement and trash removal, and invasive non-native species control.

The California Department of Fish and Game will designate a contact person for the property and act as a liaison between TPL and the public.

The State asked TPL to provide interim property stewardship to bridge the gap between the State taking ownership and the completion of the comprehensive long-term restoration planning (summarized below) which the State Coastal Conservancy has agreed to fund and lead. The Conservancy estimates that this planning (including environmental (CEQA) review and permitting) will take approximately five years, a fact that was central to determining the duration of the interim stewardship period. The plan will be the means by which the State determines the final disposition for ownership and management.

Summary of Long-Term Restoration Planning for Ballona Wetlands

The natural resource goals for the long-term restoration planning for the Ballona Wetlands are:

restore tidal circulation to the extent feasible;

provide the range of freshwater, brackish and saltwater wetland habitat that is typically associated with a coastal estuary; and

provide significant new habitat area for a variety of native species of plants and animals, including migratory birds.

Additional long-term restoration planning goals include:

providing for cost-effective flood management;

protecting cultural resources; and

providing appropriate public access, public recreation, educational and interpretive opportunities.

A collaborative planning process will be organized to develop the technical studies necessary to design long-term restoration plans and meet these goals in a timely and cost-effective manner. A project management team will be organized under the leadership of the Southern California Wetlands Recovery Project (SCWRP) and will be composed of seventeen State and federal agencies including the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the California Coastal Commission. The California Coastal Conservancy will provide the initial funding for this planning initiative.

In order to ensure the development of a scientifically sound and public supported plan, the project team will establish a technical advisory panel and actively engage all stakeholders including regulatory agencies, conservation groups, local governments and regional planning entities such as the Santa Monica Bay Restoration Commission. This substantial new public acquisition will enable all prior planning to be extended and refined, with frequent opportunities for organizations, agencies and individuals to become involved in the planning process. Completion of the initial stage of scientific studies and engineering feasibility analyses is currently anticipated within two to three years.

Information regarding the Ballona Wetlands Restoration project, including meeting notices, technical studies and project updates, will be made available at a future date to the public through the SCRWP website, www.coastalconservancy.ca.gov/scwrp.

Public Availability of Purchase Agreement and Environmental Surveys

Copies of the full Purchase Agreement, and the environmental surveys of the properties proposed to be acquired are available for viewing by the public during regular business hours at the following locations:

1. Wildlife Conservation Board
   1807 13th Street, Suite 103
   Sacramento, California 95814
   (916) 445-8448
   Contact: Mary Grande

2. The California Resources Agency
   1416 Ninth Street, Suite 1311
   Sacramento, California 95814
   (916) 653-5656
   Contact: Amanda Soward

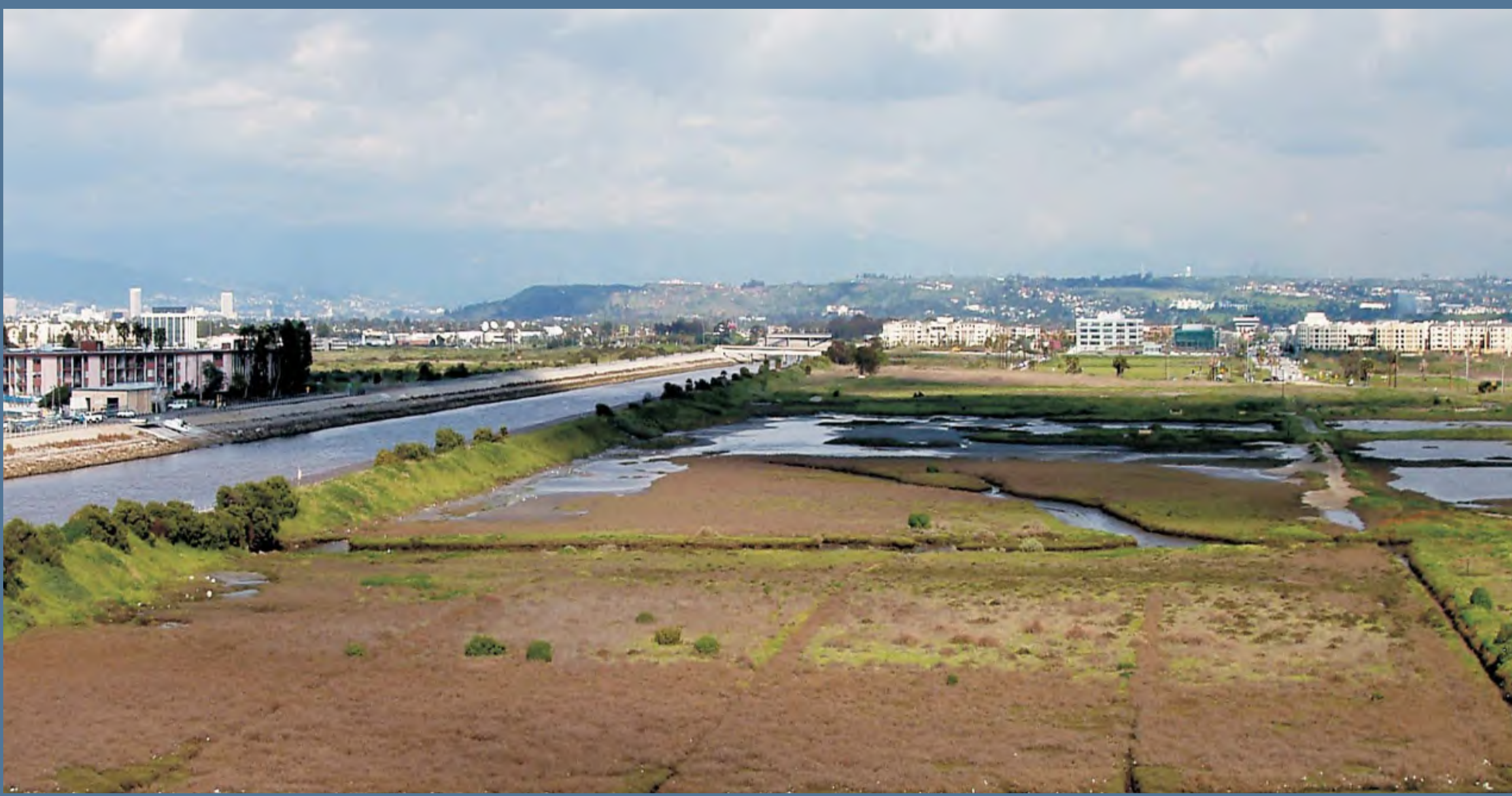
3. Los Angeles River Center and Gardens
570 West Avenue Twenty-six (at San Fernando Road)
Los Angeles, California 90065
(323) 221-9959, Ext. 0
Contact: Receptionist

4. Franklin Canyon Park
2600 Franklin Canyon Drive
Beverly Hills CA 90210
(310) 858-7272, Ext. 0,
Contact: Bree Robb

September 2008

Ballona Wetland Feasibility Report

Prepared For *California State Coastal Conservancy*



Prepared By

Philip Williams & Associates, Ltd.

with

EDAW,
Nordby Biological Consulting,
Tierra Environmental, and
Weston Solutions

PWA
PHILIP WILLIAMS & ASSOCIATES, LTD
ENVIRONMENTAL HYDROLOGY

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Ballona Wetlands Restoration
Feasibility Report

Prepared for

California State Coastal Conservancy

Prepared by

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with

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1. INTRODUCTION

In 2004, the State of California took title to 600-acres of the remaining Ballona Wetlands in Los Angeles (Figure 1-1). The property is owned by two state agencies, the Department of Fish and Game (DFG) and the State Lands Commission. The State Coastal Conservancy (Conservancy) has funding for planning and restoring the property. Together, the three agencies are working with stakeholders, scientists and other agencies to develop a plan to restore this extraordinary resource. The Conservancy is providing funds for the planning effort and manages the work plan, budget, and schedule. DFG would be the applicant for any permits needed for the restoration project and the lead agency for purposes of CEQA. A restoration plan would be developed for all of the lands owned by the state. Planning is being conducted within the landscape and watershed context, incorporating adjacent and ecologically related resources.

This document characterizes the differences between five preliminary alternatives for the Ballona Wetlands Restoration Plan developed and refined by the Project Management Team (PMT), with the advice of the Ballona Wetlands Working Group, Science Advisory Committee, Agency Advisory Committee, and the consultant team. The aim is to provide a consistent set of information for each alternative using measures of change developed from the project's Goals and Objectives (Appendix A). These measures of change provide the ability to objectively determine how each alternative moves towards a specific project objective from the existing baseline conditions. The PMT would use this information to screen out infeasible or undesirable alternatives from advancing to the EIS/EIR process.

While the report is structured around five alternatives, they are discussed for each subarea within the Ballona Wetlands when appropriate, allowing the preferred alternative(s) to be developed from a combination of alternatives from different subareas. Area A refers to the portion of the Ballona Wetlands north of Ballona Creek to the west of Lincoln Boulevard. Area B refers to the portion south of Ballona Creek. Area C refers to the area north of Ballona Creek and east of Lincoln Boulevard.

Chapter 2 of the report provides an overview of the five alternatives, highlighting the changes from the existing conditions of the site, as well as the habitat restoration and public access objectives accomplished by each alternative. The alternatives encompass a reasonable range of options for restoring estuarine habitat within each of the different subareas (see Appendix B for habitat descriptions). These options include:

- Enhance existing habitat with minimal grading
- Muted tidal wetland restoration within existing constraints
- Full tidal wetland restoration, supporting all associated habitat types, and requiring significant site alteration

- Full tidal wetland and subtidal habitat restoration, providing a connection between these habitats with the project site, and requiring significant site alteration.
- Realignment of Ballona Creek, allowing interaction between the creek and wetland, and providing much more habitat and functional connectivity; and, requiring significant site alteration.

For each habitat restoration alternative, a public access alternative has been developed which includes trails, gateway entrances, overlooks and pullouts.

Chapter 3 applies information from existing sources, in particular the Existing Conditions Report and hydrodynamic modeling (Appendix C), to compare the potential effects of the restoration alternatives based on the measures of change. The main themes of the feasibility assessment are:

- Habitat Acreages
- Quality of Habitat
- Habitat Connectivity (Regional and Local)
- Biodiversity
- Hydrology (Tidal Circulation and Flood Protection)
- Sediment and Water Quality
- Sustainability
- Public Access, Recreation and Safety
- Phasing and Relative Costs

These themes are based on the goals and objectives for the project. Each theme is discussed in terms of how different site conditions might improve or effect desired characteristics of the theme. The evaluation is summarized in a Chapter 4 which describes the main characteristics of each alternative. The information provided in this section can then be used as an objective basis to determine how each of the alternatives accomplishes these project objectives. A summary is provided that compares the alternatives to each other based on a list of common, favorable characteristics. This summary also describes some of the trade-offs between the different approaches to restoration. A ranking of each alternative on a scale from 1 to 5 is given. These rankings are based on the best judgment of the Project Management Team, with input from the Science and Agency Advisory Committees.

1.1 SECTION 1 FIGURES

figure 1-1

Ballona Wetlands Restoration

Project Area

Proj. # 1793

PWA

2. DESCRIPTION OF ALTERNATIVES

2.1 ALTERNATIVE 1 - ENHANCE EXISTING HABITAT WITH MINIMAL GRADING

Alternative 1 (Figure 2-1) proposes minimal change relative to the existing conditions of the site. As such, this alternative emphasizes enhancement of existing upland habitats, in particular coastal sage scrub (CSS) and native grassland habitats, over creation or restoration of coastal wetland habitats. Alternative 1 would convert an area of freshwater marsh in the southeast portion of Area B to muted tidal marsh by replacing the existing Freshwater marsh culvert with a daylighted tidal channel that connects to Ballona Creek. This would provide one additional source of tidal influence to the project area. Existing tide gates would be modified to increase the muted tidal waters entering the southwest portion of Area B. Alternative 1 proposes little change to existing infrastructure such that the project area would remain fragmented and isolated by roads, Ballona Creek, berms and levees. Existing dune habitat, the constructed freshwater marsh and recreational facilities in Area C would be retained.

Area A would be managed to include seasonal wetland habitat, tidal low marsh and channel, transition zone and enhanced upland. The existing tidal connection to Berth H in Marina del Rey would not be changed.

Area B would remain similar to existing conditions with the following exceptions:

1. A small triangle of land located south of Culver Boulevard and west of proposed muted mid-marsh habitat that is currently mapped as non-tidal salt marsh/brackish marsh would be converted to CSS and transitional habitats.
2. The closing elevation of the tide gates that allow limited tidal influence in this area would be increased to admit lower high tides into the area. This would expand the area of muted tidal marsh.

Area C includes the highest elevations of the project area. Under Alternative 1, little excavation of this area is proposed. Instead, existing recreational facilities would be retained and enhanced CSS and native grassland habitat, and a small treatment wetland would be constructed.

In terms of Public Access (Figure 2-2), Area A would have a loop trail on the existing Gas Company access road, and a larger loop trail would provide access to the seasonal wetland area via a boardwalk. Gateway entrances, overlooks and a formal parking/staging area would be developed. For Area B, public access would include periphery trails, along Cabora Drive, and pedestrian crossings for a fully integrated trail network. Gateway entrances, overlooks and formal parking would be provided. Linkages between the east and west portions of Area B would be provided by two pedestrian crossings on Culver Boulevard. A pedestrian bridge located near the historic rail crossing would link Area B to Area A. Public access features in Area C would include two loop trails originating from the gateway entrances at La Villa Marina and near the Little League fields. A parking area would continue to be located at the Little League fields.

2.2 ALTERNATIVE 2 - A SMALLER AREA TIDAL WETLAND RESTORATION

Alternative 2 (Figure 2-3) includes a departure from existing conditions through excavation of fill to create fully tidal channels, low marsh, and mid-high salt marsh. Alternative 2 would also convert an area of freshwater marsh in the southeast portion of Area B to muted tidal marsh by replacing the existing Freshwater Marsh culvert with a daylighted tidal channel that connects to Ballona Creek. This would provide one additional source of tidal influence to the project area. Existing connections would be modified by adjusting the setting of the existing tide gates to increase the muted tidal waters entering the southwest portion of Area B. The connection under Dock 52 to Marina del Rey would be enhanced, creating a full tidal marsh in Area A. Alternative 2 proposes little change to existing infrastructure such that the project area would remain fragmented and isolated by roads, Ballona Creek, and berms and levees. Existing dune habitat, constructed freshwater marsh and recreational facilities would be retained.

Area A would be modified to include fully tidal channels, low and mid-high marsh, and associated transition zone habitats. This would be accomplished by increasing the tidal connection under Dock 52 to create an open culvert with a cross-sectional area of 100 ft^2. The remainder of Area A would be converted to enhanced CSS and native grassland habitat.

The southeast portion of Area B (Area B southeast) would be modified to include fully tidal channels, low and mid-high marsh, and associated transition zone habitats. In Area B southwest, the degree of tidal influence would be increased through modification of the existing tide gates. A new culvert with a cross-section of 100 ft^2 would provide a new fully tidal connection to Area B southwest. Like Alternative 1, a small triangle of land located south of Culver Boulevard that is currently mapped as non-tidal salt marsh/brackish marsh would be converted to CSS and transition zone habitats

Alternative 2 would create a small, deeper extension of Fiji Ditch in Area C beneath Lincoln Boulevard resulting in an incremental increase in fully tidal channel, low and mid-high marsh habitats and transition zone habitat beyond that proposed in Alternative 1. The recreational facilities, CSS and native grassland habitat would be retained and small areas of seasonal wetland and treatment wetlands created.

In Area A, a loop trail on the existing Gas Company Road, and a perimeter trail, around the new wetlands, connecting the gateway entrance along Fiji Way to the Ballona Creek Bicycle trail along the north levee would be developed (Figure 2-4). Boardwalk spur trails at the Fiji Way and Fisherman’s Village gateway entrances would provide access to overlooks. Public access features in Area B would be similar to Alternative 1. Public access features in Area C would include two loop trails originating from the gateway entrances at La Villa Marina and near the Little League fields. A parking area would continue to be located at the Little League fields. An overlook would be located near the seasonal wetland area.

2.3 ALTERNATIVE 3 - A LARGER AREA TIDAL WETLAND RESTORATION

Alternative 3 (Figure 2-5) would create additional estuarine habitat relative to Alternative 2 resulting in further increases in fully tidal channel, low marsh and mid-high marsh habitats and associated transition zone habitat. Culver Boulevard, Jefferson Boulevard and the Gas Company road in Area B would be improved by raising the roads on levees or piles; these would provide greater hydraulic connectivity through larger culverts or between piles. Portions of the project area would remain fragmented and isolated by Ballona Creek and Jefferson Boulevard. Existing dune habitat, constructed freshwater marsh and recreational facilities would be retained.

Area A would be modified to include fully tidal channels, low marsh and mid-high marsh and associated transition zone habitats. This would be accomplished by increasing the tidal connection under Dock 52 to create an open culvert with a cross-sectional area of 160 ft^2. The remainder of Area A would be converted to enhanced CSS and native grassland habitat.

In Area B, Alternative 3 would increase the degree of tidal influence in the southwest wetland by replacing the SRT with a 100 foot wide breach. The alternative also includes extension of existing fully tidal channels and raising Culver Boulevard on pilings or levees and removal of the berm south of Culver Boulevard. Most available area would be converted to fully tidal habitats and transition zone habitat. The southeast wetland would be connected as in Alternative 2.

Alternative 3 would create a small, deeper extension of Fiji Ditch in Area C and excavation of a small tidal marsh resulting in an incremental increase in fully tidal channel habitat and an increase in transition zone habitat beyond that proposed in Alternative 2. The recreational facilities, CSS and native grassland habitat would be retained and two small areas of seasonal wetland would be created.

Key provisions for public access (Figure 2-6) in Area A are a looping perimeter trail along the banks of the restored wetland. This trail links gateway entrances along Fiji Way to those along the north levee. Gateway entrances would be located at the existing parking area near Fisherman's Village, along Fiji Way, and two along the Ballona Creek Bicycle Path. Boardwalk spur trails at the Fisherman's Village and Fiji Way gateway entrances would provide access to overlooks. These overlooks would provide both an easily accessible viewing point and a key location for interpretive and educational signage. A formal parking/staging area would be developed at the gateway entrance near Fisherman's Village. In Area B, roadside vehicular pullouts would be provided along Culver and Lincoln Boulevards. A link between the east and west portions of Area B would be provided by a pedestrian crossing located on Culver Blvd. A pedestrian bridge located near the historic rail crossing would link Area B to Area A. Formal parking areas would be located at the gateway entrance behind Gordon's Market and along Jefferson Blvd at the Freshwater Marsh. Public access features in Area C would include two loop trails originating from the gateway entrances at La Villa Marina and near the Little League fields. A parking area would continue to be located at the Little League fields. Overlooks would be located at viewing points for the seasonal wetland area near the Little League fields and north of Culver Blvd at the restored estuarine wetland area.

2.4 ALTERNATIVE 4 - A LARGE AREA TIDAL WETLAND RESTORATION WITH SUBTIDAL COMPONENT

Alternative 4 (Figure 2-7) resembles Alternative 3 with the exception of a larger connection with Marina del Rey and creation of shallow subtidal and intertidal habitats in Area A. This increased excavation would create a shallow subtidal basin and increased intertidal mudflats, while shifting the excavation to the northwest edge of Area A would allow for the creation of a more diverse marsh plain. Culver Boulevard and the levee system south of Culver Boulevard would be improved by raising the road on piles or a levee, these would provide greater hydraulic connectivity through larger culverts or between piles. Portions of the project area would remain fragmented and isolated by Ballona Creek and Jefferson Boulevard. Existing dune habitat, constructed freshwater marsh and recreational facilities would be retained.

Area A would be modified to include a shallow subtidal embayment, tidal channels, intertidal mudflat, low salt marsh, mid-high marsh and associated transition zone habitats. This would be accomplished by increasing the tidal connection under Dock 52 to create an open culvert with a cross-sectional area of 500 ft^2. A narrow, linear strip adjacent to Ballona Creek would be converted to enhanced CSS habitat.

In Area A there would be a loop trail on the existing Gas Company Road, and a perimeter trail along the southern edge of the restored estuarine wetland, portions of which would be boardwalk (Figure 2-8). Gateway entrances would be located at the existing parking area near Fisherman's Village and along the Ballona Creek Bicycle Path. The loop and perimeter trails would link the gateway entrance near Fisherman's Village to the Ballona Creek trail located along the north levee and the two gateway entrances along Ballona Creek. Overlooks would be located near the Fisherman's Village gateway entrance and along the perimeter trail. A formal parking/staging area would be developed at the gateway entrance near Fisherman's Village. Public access features in Area B and C would be the same as Alternative 2.

2.5 ALTERNATIVE 5 - A REALIGNMENT OF BALLONA CREEK

Alternative 5 (Figure 2-9) proposes the greatest amount of change to the project area, including the greatest degree of fully tidal wetland creation. The most obvious change would be the removal of the Ballona Creek flood control channel levees and creation of a sinuous natural creek and associated tidal basins through the site. The site would be interconnected across all areas, with shallow subtidal and mudflats grading through all marsh habitats to higher wetland-upland transition habitat. The channel would be free to migrate across the tidal floodplain, limited where necessary by buried rock protection. The existing Ballona Creek channel would be filled where necessary. The intersection of Culver and Jefferson Boulevards would be moved westward, closer to Lincoln. Culver and Lincoln Boulevard would be raised on pilings above the fully tidal marshlands. The gas/oil monitoring facilities in Area A and recreational facilities in Area C would be minimized and converted to fully-tidal channel, low, and. mid-high marsh, transition zone and enhanced CSS. The constructed freshwater marsh and existing dunes would be retained.

Phasing would be an important aspect of this alternative. Phase 1 would lower the levees and surface elevations and excavate the main channel in Area A; Phase 2 would extend the channel into Area B; Phase 3 would extend the channel into Area C following the raising of Lincoln Boulevard.

Areas A, B and C would be modified to include the reengineered fully-tidal Ballona Creek, two shallow tidal ponds, tidal channels, low salt marsh, mid-high marsh and associated transition zone habitats. The northern breakwater of Ballona Creek would be lowered to allow flood flows to spill into Marina Del Rey. Buried rock protection would be provided along the south east edge to prevent the channel meandering too far west. A narrow, linear strip in the north and west portions of the area would be converted to enhanced CSS habitat.

A perimeter trail would be constructed along Fiji Way and gateway entrances located at the existing parking area near Fisherman's Village and along Fiji Way (Figure 2-10). A boardwalk containing an overlook would link the two gateway entrances as well as overlooks located at both gateway entrances. A vehicular pullout would be located along Culver Blvd and would also provide an overlook. Linkages within Area A would be provided through two pedestrian crossings located along Lincoln Blvd. A formal parking/staging area would be developed at the gateway entrance near Fisherman's Village. Area B gateway entrances would be located behind Gordon's Market, along the southern bank of Ballona Creek, along Lincoln Blvd, and along Jefferson Blvd at the entrance to the Freshwater Marsh. Boardwalk spur trails leading to overlooks would be located along the Freshwater Marsh Trail and at a vehicular pullout along Culver Blvd. Overlooks would also be located at the existing Boy Scout Overlook Platform, at the gateway entrance along the south levee, and along the Cabora Drive trail at Pershing Drive. Linkages throughout Area B would be provided by three pedestrian crossings located on Culver Blvd. An upland area along Lincoln Boulevard provides for a possible visitor center location. Formal parking areas would be located at the gateway entrance behind Gordon's Market, at the visitor center, and along Jefferson Blvd at the Freshwater Marsh.

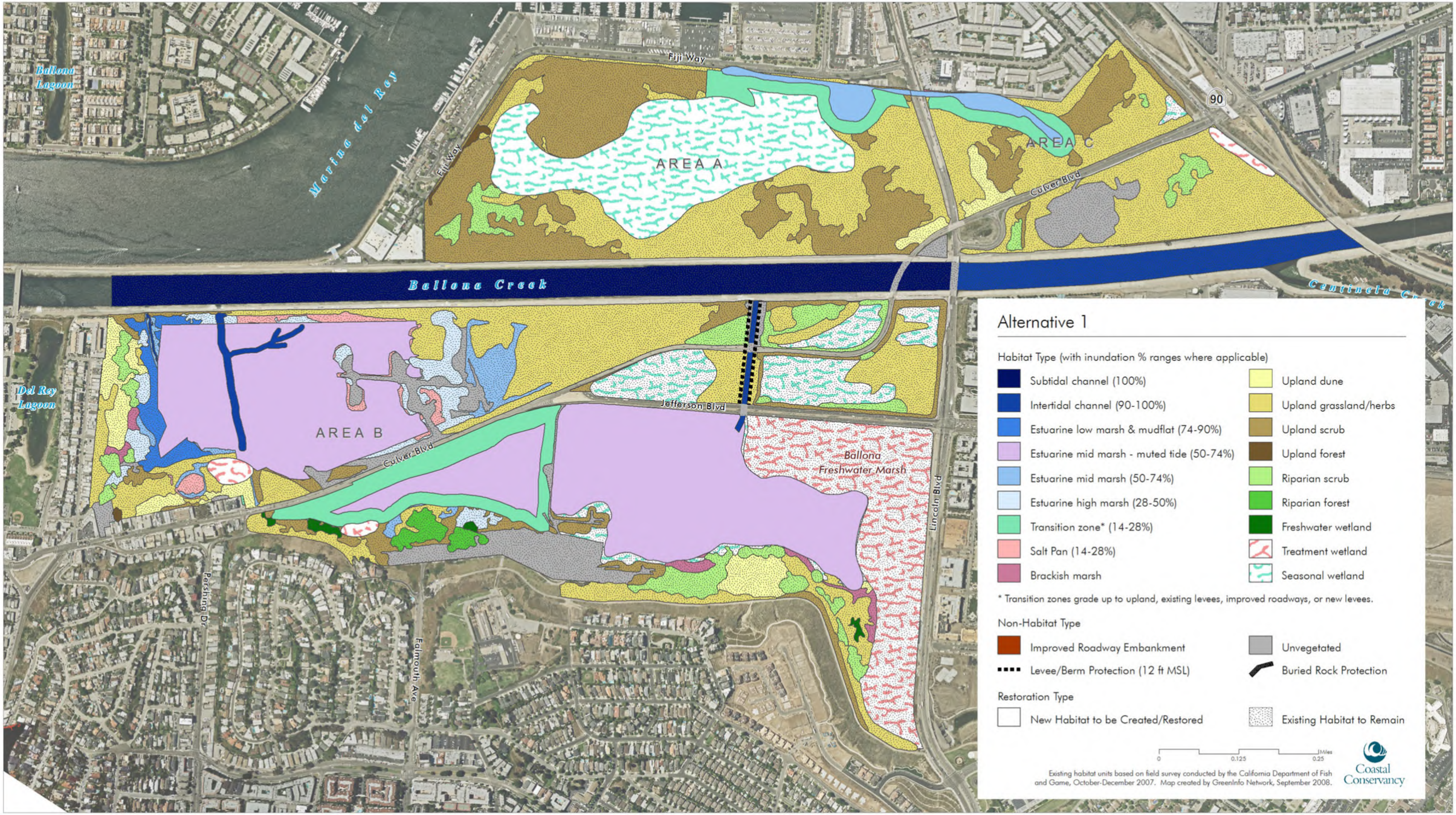
Public access features in Area C would include a perimeter trail from the La Villa Marina gateway entrance to the Lincoln Blvd pedestrian crossing to Area A. Regional trail connectivity would be preserved by connecting the Ballona Creek Bicycle Trail (previously located on the north levee) to a dual pedestrian and bicycle trail along the southern boundary of Area C. This trail would continue both to the north along Lincoln Blvd and to the south along Culver Blvd. Since both roads would be improved within this restoration alternative, improved bicycle lanes would facilitate this regional connectional. A pedestrian bridge would cross Ballona Creek connecting this new trail alignment to the existing Ballona Creek Bicycle Trail. An overlook would be located at the La Villa Marina gateway entrance.

2.6 SECTION 2 FIGURES

Ballona Wetlands
Restoration Project

FIGURE 2-1

Alternative 1 - Habitat Restoration



Ballona Wetlands
Restoration Project

FIGURE 2-2

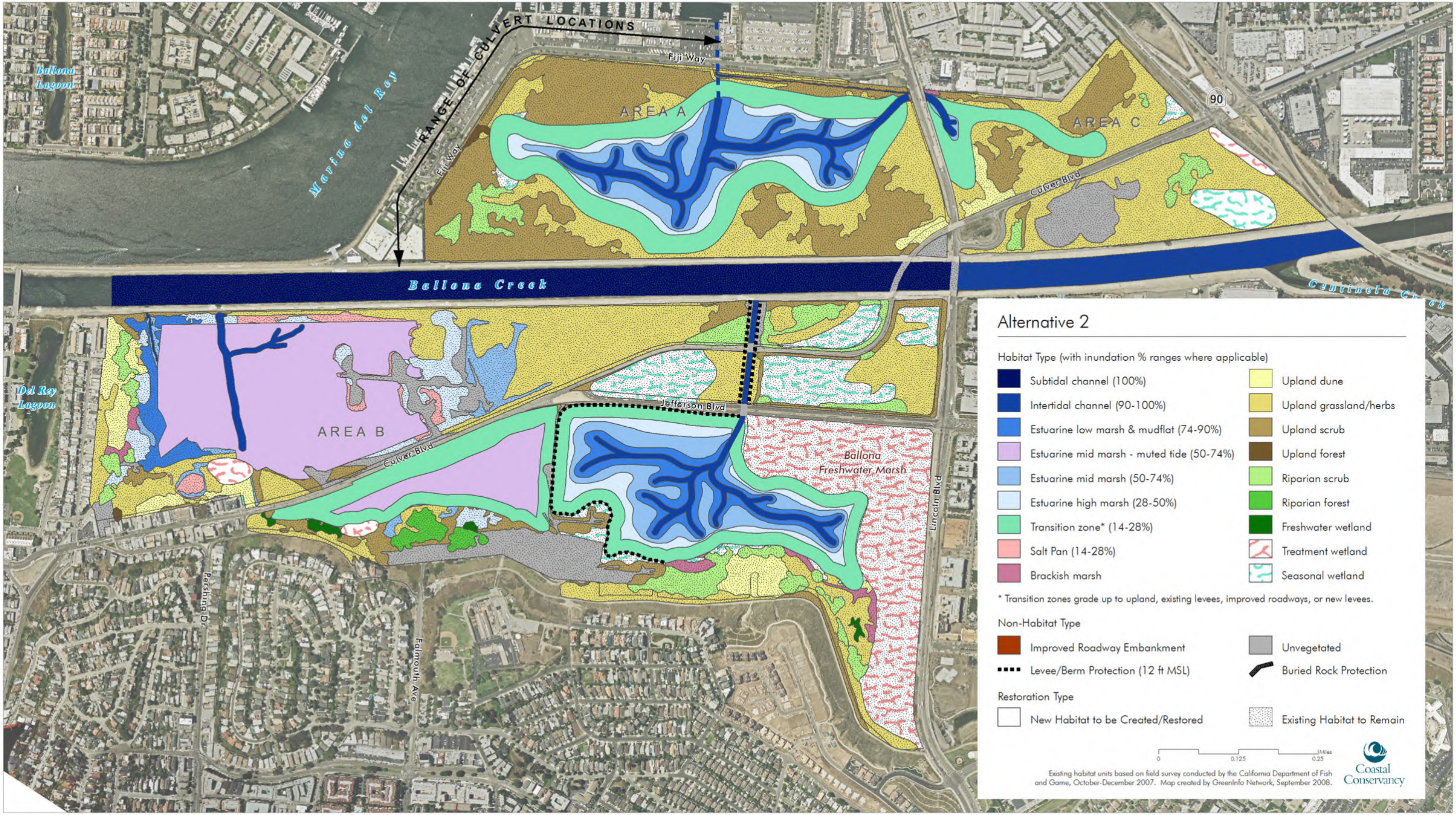
Alternative 1 - Public Access

Habitat concepts created by Philip Williams and Associates (PWA) and EDAW. Map created by GreenInfo Network and EDAW, September, 2008.

Ballona Wetlands Restoration Project

FIGURE 2-3

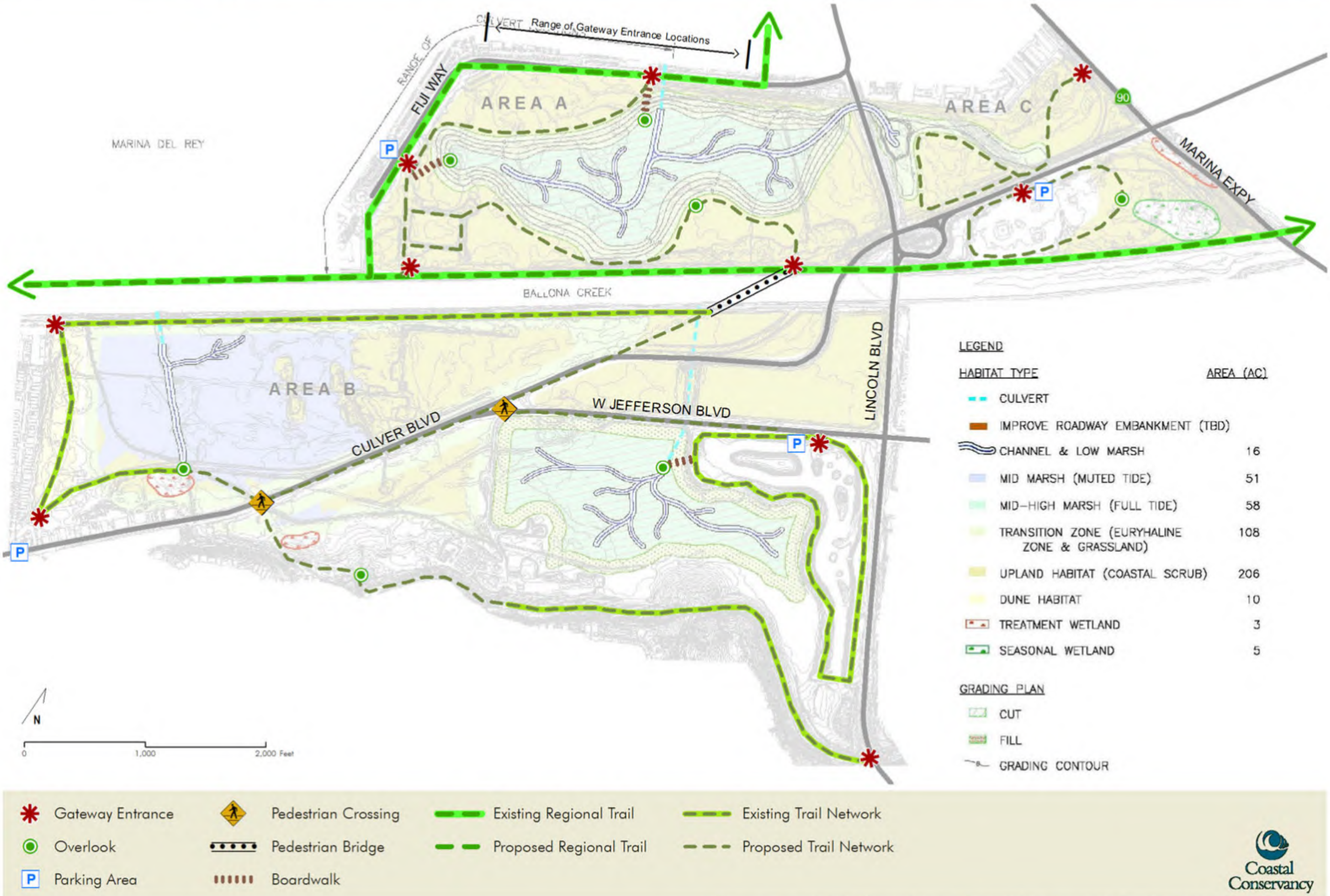
Alternative 2 - Habitat Restoration



Ballona Wetlands Restoration Project

FIGURE 2-4

Alternative 2 - Public Access

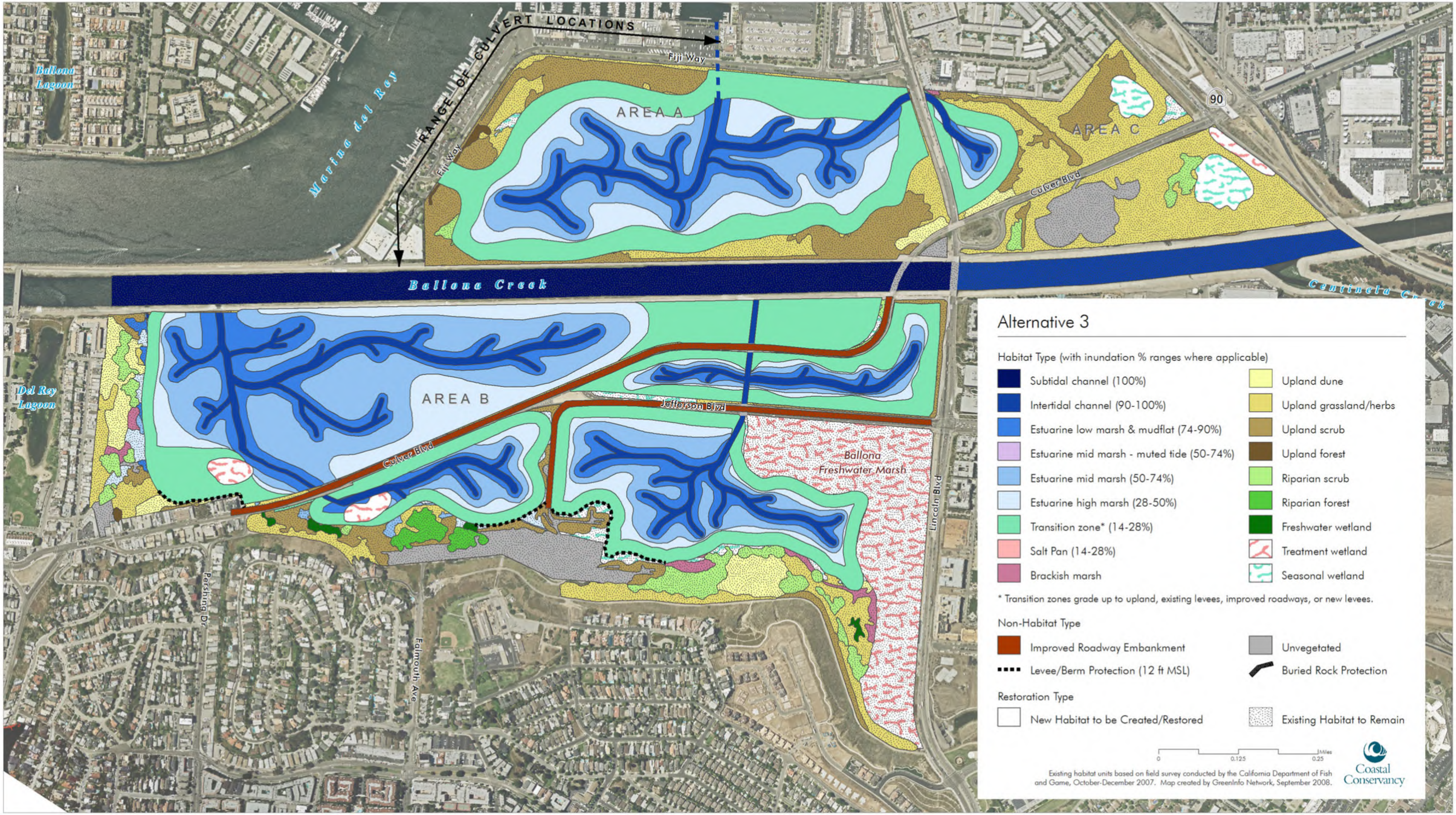


Coastal Conservancy

Habitat concepts created by Philip Williams and Associates (PWA) and EDAW. Map created by GreenInfo Network and EDAW, June, 2008.

FIGURE 2-5

Alternative 3 - Habitat Restoration



Ballona Wetlands Restoration Project

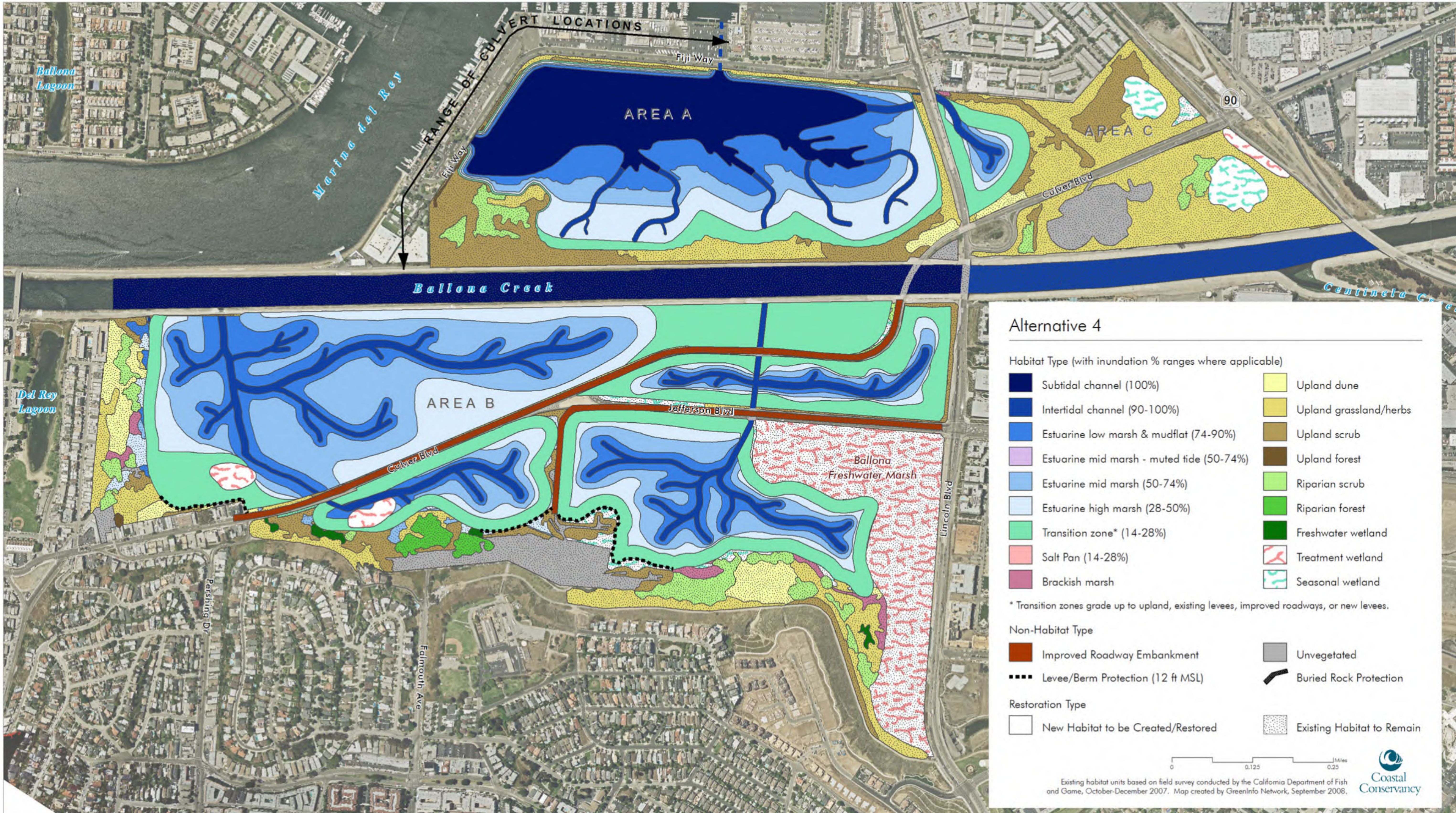
FIGURE 2-6

Alternative 3 - Public Access

Habitat concepts created by Philip Williams and Associates (PWA) and EDAW. Map created by GreenInfo Network and EDAW, June, 2008.

FIGURE 2-7

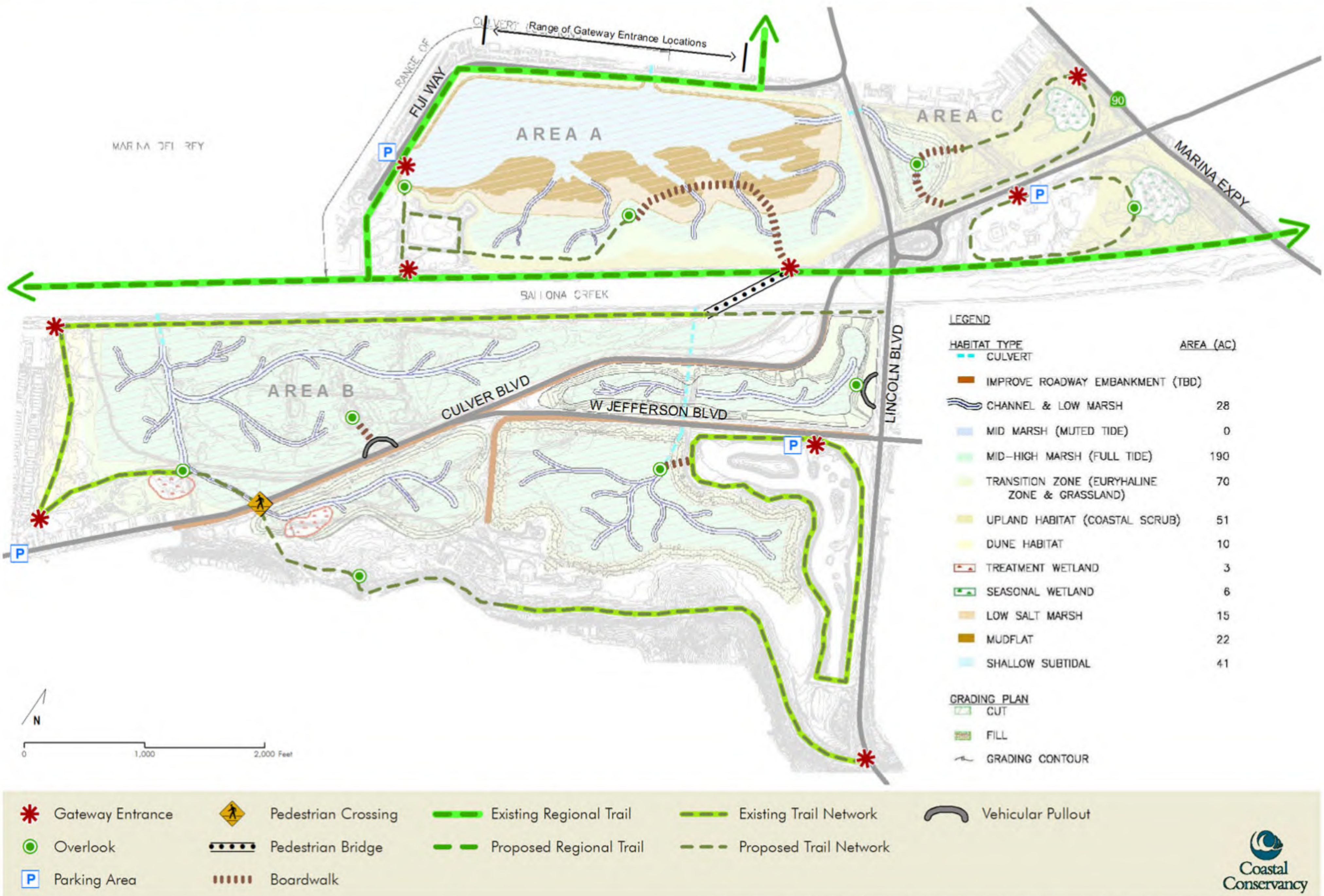
Alternative 4 - Habitat Restoration



Ballona Wetlands Restoration Project

FIGURE 2-8

Alternative 4 - Public Access



Habitat concepts created by Philip Williams and Associates (PWA) and EDAW. Map created by GreenInfo Network and EDAW, June, 2008.

FIGURE 2-9 | Alternative 5 - Habitat Restoration

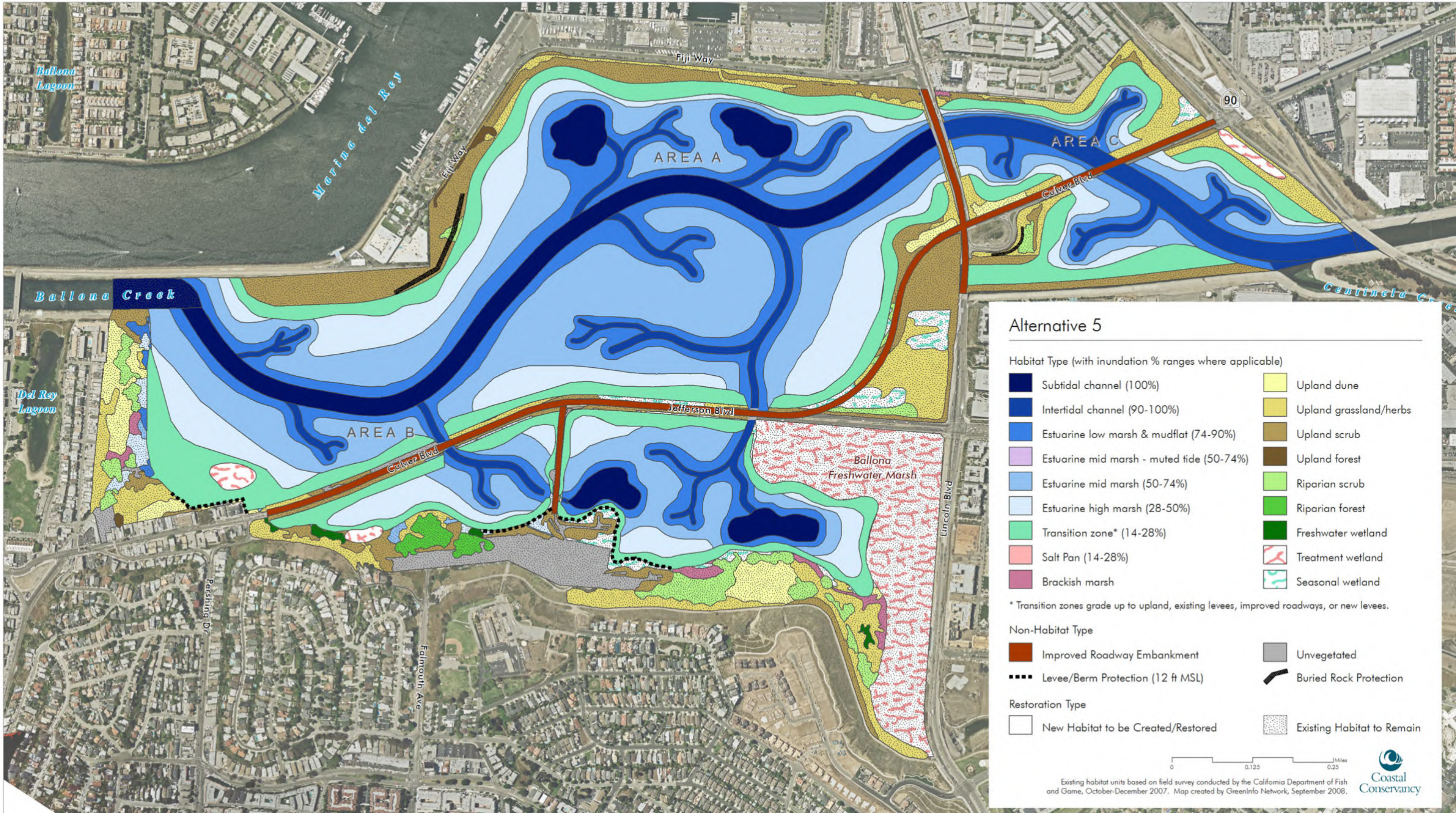


FIGURE 2-10

Alternative 5 - Public Access

Habitat concepts created by Philip Williams and Associates (PWA) and EDAW. Map created by GreenInfo Network and EDAW, June, 2008.

3. MEASURES OF CHANGE

3.1 HABITAT

The Ballona Wetlands historically covered over 2000-acres and likely included a mix of fluvial, tidal, deltaic and dune habitat types. Today this wetland has been reduced to less than 170 acres within the project area and the hydrology of the watershed has been severely altered by extensive development. Remnant areas of the historic wetland complex include Del Rey Lagoon, Ballona Lagoon, Grand Canal, Oxford lagoon, Marina Del Rey, and the Venice Canals. Given the significant alteration, restoring Ballona Wetlands to its historic condition is infeasible; however, the opportunity to recreate a vibrant wetland system would still require consideration of the mix of habitat types that would benefit the ecological functioning.

This section provides a brief description of the different habitat types that would be restored under each of the alternatives (for more detail see Appendix B). A number of broad habitat types are identified in the alternatives: shallow subtidal and open water habitats, intertidal channels and mudflat habitats; low, mid and high marsh and salt pan habitats; wetland-upland transition habitat; brackish marsh; seasonal wetland habitat; freshwater marsh and riparian scrub habitats; and coastal dune, coastal sage scrub and native grassland habitats. Estuarine intertidal wetland habitat includes shallow subtidal, intertidal channels, mudflats, and low, middle and high marsh, salt pan, and transition zone habitats. Each component is necessary to recreate the Ballona Ecosystem and without each component the estuarine wetlands within the system would not function properly. Some components are currently absent from Ballona, and may be important additions in the restoration of Ballona Wetlands.

Tidal Wetlands

Given the estuarine location of the site, the degree of tidal inundation would be a major factor in influencing the habitat type. The period, depth, and frequency of inundation by tidal water are dependent upon the tidal range, density of soil, degree of slope, and ground elevation.

Shallow subtidal habitats include channels, embayments, basins and other features, which at extreme low water do not drain with the outgoing tides. This estuarine water regime results in permanently flooded habitats and permanent open water bodies. These habitats are generally considered truly aquatic systems and are adjacent to and downslope from tidal estuarine wetlands. Estuaries with extensive subtidal habitat areas often support extensive intertidal low marsh and mudflat habitats, providing refugia for fish during low tides, and feeding opportunities for wetland birds.

Intertidal channels and creeks play a critical role in salt marshes as they convey tidal waters and associated nutrients and dissolved gases. They also support a complex assemblage of plants and animals. Estuarine channels and creeks are subjected to a wide variety of environmental conditions. Typically, tidal flushing is greatest at the tidal inlet and decreases with distance from the inlet. This general gradient, in turn influences, water movement, salinity, temperature, nutrients, and dissolved gases. These environmental factors influence the species composition, distribution, and population dynamics of the channel fauna.

Intertidal mudflats are situated low in the intertidal zone, between subtidal open water and vegetated salt marsh (low marsh), at the open water edge and along channel banks. Mudflats are inundated and exposed during most tide cycles. Mudflat habitat support invertebrate population and provides valuable foraging habitat, particularly for shorebirds.

Intertidal salt marsh ranges from low marsh, dominated by California cordgrass (*Spartina foliosa*), to a diverse mosaic of species that comprises the mid-marsh, to very high marsh species that transition to upland. Salt marsh vegetation changes gradually with elevation. Nearly every species has its peak occurrence at its unique elevational band and the vegetation forms a continuum rather than a set of zones. However, the presence of shrub-like succulents at the uppermost elevations and tall cordgrass at the lowest elevations helps to delineate low to high marsh.

Low salt marsh is regularly inundated by tides and is dominated by California cordgrass that forms dense monotypic stands. At its lower elevation, cordgrass intergrades with mudflat habitat; at its upper elevation it intergrades with a mosaic of mid-marsh species. This highly productive species decomposes to form the base of the detrital food chain that supports many lower order estuarine consumers. Many of the animals of the low marsh are adapted to periods of frequent inundation.

Intermediate elevations within the salt marsh are inundated irregularly by tides but at a greater frequency than are higher elevations. As a result, the plant species that inhabit this elevation are adapted to highly saline soil conditions due to long periods of exposure. The animals of the mid-marsh are abundant and diverse. Food is abundant in the form of algae and the epifaunal invertebrates and insects that feed on algae. In addition, when flooded by the tides, fish move into the marsh plain to forage on these abundant invertebrates. Several bird species such as the Beldings' savannah sparrow and light footed clapper rail also forage in this zone.

High marsh habitats are also irregularly to intermittently inundated by tidal water and generally range from saline to hypersaline conditions. The vegetation varies depending on the density of the soil (i.e. ratio of clay to sand), which often is correlated with salinity.

Salt pans form in the high marsh where drainage is poor. These higher elevation areas along the upland edge are only inundated during the highest spring tides and typically have no tidal channels. As a result, ponded areas are formed that become hypersaline as water evaporates, thereby inhibiting vegetation establishment. These salt pans provide habitat diversity and have habitat value for foraging and refugia.

The wetland transitional zone represents that area where the halophytic (salt-tolerant) and hydrophytic salt marsh vegetation overlaps with upland communities. Scrub-shrub plant species of the transition zone overlap with the highest of the salt marsh species. The animals at the higher elevations of the transition zone are primarily terrestrial species. The transitional zone may also include nontidal palustrine habitats both salt influenced and non-saline types. Seeps from perched water tables on deltas and the toe of slopes and along dune transitions often support a variety of palustrine emergent and scrub-shrub types. Seasonal wetlands also occur in this area, especially in low-gradient deltaic deposits and may include salt pans. Transitional zones provide refugia during extreme weather or tides, as well as foraging opportunities. These areas also support a unique set of plant species, which may only occur or coexist in the habitat conditions provided in these transition zones.

Muted tidal habitats are created by the installation of gate structures and flow restrictions, which typically reduce tidal flows and the tide range compared to a fully tidal wetland. Muted tidal wetlands may support subtidal, mudflat, and vegetated wetland habitats. Hydraulic control structures have proven to severely limit fish passage, decrease tidal flushing, and restrict the diversity of habitat of a restored tidal wetland. A muted tidal system typically limits the creation of upper marsh and transitional habitat.

Additional habitats, which either occur on the site or are included in the alternatives consist of, brackish marsh, seasonal wetlands, freshwater and riparian habitat, and upland habitats, including coastal dune, coastal sage scrub and native grassland habitats. Some of these additional habitats are important to the restoration of the tidal wetland system; they may provide buffers from human disturbances, refugia during extreme weather or tides, or complementary habitats. These habitat types may also be significantly impacted in the region due to limited range along the coast.

Brackish conditions, with intermediate salinities, occur where freshwater mixes with seawater. This phenomenon is less frequent in southern California where many estuaries are less influenced by runoff from rainfall than in more northerly latitudes. Local influence from seeps and springs and seasonally impounded stream and river-mouths can produce brackish environments that support emergent vegetation and aquatic bed species.

Non-tidal Wetlands

Seasonal wetlands are non-tidal wetlands and transitional habitats that are flooded to varying degrees by seasonal rainfall and runoff. If there are sufficient salts in the soil, the seasonal wetland may support plant species more typical of coastal salt marsh. If the soils do not contain salts, the seasonal wetlands may support freshwater marsh species and a mixture of weedy opportunists. “Vernal pools” and seasonal saline wetlands in transition zones can occur on alluvial and deltaic deposits adjacent to estuarine habitats and are known to support special-status plants and invertebrate animals. A majority of the existing seasonal wetlands at Ballona occur on saline dredge spoils from the excavation of Marina del Rey. These habitats only support common intertidal plant species in a severely degraded state, and provide little habitat for wildlife. Some of the alternatives include the creation of seasonal wetlands in areas that do not support salt marsh plant species; in these areas freshwater seasonal wetlands may be created that could support vernal pool habitat.

Riparian scrub and woodland occurs in small groves or in riverine corridors that drain into estuaries. As with other riparian habitats, riparian scrub supports a diverse assemblage of wildlife species, especially passerine bird species. Mammal assemblages are similar to those found in freshwater marsh habitats as the two often intergrade. In an undisturbed estuarine system, wouldow scrub habitat would generally occur upstream of tidal influence as wouldows are very sensitive to salt. Like freshwater marsh, this habitat is dependent upon a constant source of freshwater.

Uplands

Most of the peripheral uplands of estuaries have been disturbed in southern California. Historically, upland communities of the systems were likely comprised of coastal dunes, scrub, or grasslands, and woodlands in some cases.

Dune habitat represents a form of transition zone between the land and the sea and includes Coastal Dune Scrub and Dune Herb vegetation. Coastal dune habitats have been largely lost due to development in southern California. Prior to development, plants stabilized the loose sand, and the dunes were thereby anchored. Following human disturbance, many of the native plants were eliminated and exotics, such as sour-fig (*Carporotus edulis*) and sea rocket (*Cakile maritima*) invaded or were planted.

Coastal sage scrub can be described as low, soft to woody shrubs and subshrubs that occur in a variety of situations and are characterized by a variety of dominant plant species. Coastal Sage Scrub is now generally rare along the coast. This vegetation community is typically dominated by coastal sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*), together with laurel sumac (*Malosma laurina*), white sage (*Salvia apiana*) and others. Other forms of upland coastal scrub include, for example, Delta Scrub and Baccharis Scrub, which can be transitional to wetland scrub types. A variety of terrestrial animals, including amphibians, reptiles, mammals and birds are supported by coastal scrub habitat.

Native grasslands were a common upland vegetation associated with estuarine ecosystems in southern California. Existing conditions within coastal ecosystems often include extensive areas of non-native annual grassland and forblands generally dominated by introduced species. The function and importance of perennial and annual grasslands, however, are often similar for the support of small mammals and the raptors that prey upon them.

The proposed creation of treatment wetlands provide a means of cleaning contaminated water before it enters the wetlands. Treatment wetlands require periodic maintenance, including harvesting of wetland plants and removal of sediments as they accumulate contaminants. Thus, treatment wetlands are not considered valuable for their structure, but for their function.

3.1.1 Habitat Acreages

Each of the alternatives would make changes to the existing distribution of habitats. In some places there would be enhancement of the existing habitat, either by management or by increasing tidal inundation (for the case of muted tidal areas). In some places, there would also be replacement of existing habitat by a different habitat type, which would generally involve the regrading of the existing ground elevation and introduction of tidal flows.

For each alternative the area for each habitat type was calculated. Where the alternative did not change the existing habitat then that habitat was assumed to remain. Where a muted tidal regime has been proposed, the distribution of low, mid and high marsh has been defined by the specified tidal inundation regime.

Table 3-2 shows the acreage of each habitat type by subarea and alternative. Table 3-3 show the area of habitat type by alternative. Totals are given for estuarine, freshwater/riparian and upland habitats. These show the shift in emphasis from upland and muted tidal habitat, in the existing situation, to increasing proportion of fully tidal estuarine habitat. Alternatives 3, 4 and 5 each create over 450 acres of estuarine habitat. Included in Table 3-3 is the acreage of shallow subtidal habitat adjacent to mudflat habitat for each alternative. As noted earlier, extensive dredging and development along the southern California coastline has reduced the amount of functional subtidal habitat adjacent to mudflats and wetlands. Alternatives 4 and 5 are the only alternatives that create subtidal habitat adjacent to mudflats, each with over 40 acres.

3.1.2 Quality of Habitat

Each of the proposed restoration alternatives implies varied degrees of improvement over the current existing conditions. Alternative 1, for example, proposes minimal grading and creation of wetland habitats; however, it offers enhancement of existing uplands and seasonal wetlands, resulting in an increase in the quality of the existing habitats (CSS and palustrine wetlands on fill). For the purposes of this document, quality of habitat is described based on a variety of factors: the regional “rarity” of each habitat; the characteristics of habitat patches; the connectivity between habitats both within the project site and with adjacent complimentary habitats; the relationship to adjacent developed areas; and the degree of transition from wetland to upland habitats.

3.1.2.1 Regional Rarity

One important factor in prioritizing habitats for restoration is to identify those habitats that are rare in the region. This includes habitat types that have been lost due to development as well as habitats that require a specific combination of natural processes so that they can only be created in a few, specific places. Regional rarity, which may be considered both in terms of local (Santa Monica Bay or Los Angeles County) or regional (Southern California coast) extent of habitats, can be used to aide in this selection.

Estuarine Wetlands

Due to the dredging of wetlands and the expansion of harbors, subtidal habitat is not regionally rare; but it is often severely degraded. Shallow subtidal habitat connected to functioning wetland habitat is rare.

Estuarine wetlands, including vegetated tidal marsh, intertidal channels, mudflats and salt pans, are a regionally rare habitat that can only be restored in very specific locations. The Ballona Wetlands has long been identified as a significant regional opportunity for estuarine wetland restoration. The Southern California Wetlands Recovery Project, identifies tidal wetland restoration as a key priority in their Regional Strategy. The Regional Strategy states tidal wetlands can only be established within a small elevation range and a compatible geologic setting, and the region's rugged topography and extensive development restricts opportunities for restoration of tidal wetlands in Southern California. The project site represents the only opportunity to restore a large tidal wetland in Santa Monica Bay, and fills a large gap in the chain of wetlands along the Southern California coast.

Transitional zones provide a rare habitat due to the unique conditions created as tidal wetlands convert to uplands with increasing elevation. These habitats are regionally rare and have been significantly impacted as tidal wetlands have been lost.

Brackish marsh habitat is found at the transition of freshwater and intertidal marsh. These habitats are regionally rare and have been significantly impacted as tidal wetlands have been lost.

Non-tidal Wetlands

The seasonal wetlands in Ballona are on saline dredge spoils and are not a naturally occurring habitat type. However, seasonal wetlands may be created that could support vernal pool habitat of much more significant value. Vernal pool habitat has been nearly extirpated from Los Angeles County. These unique habitats support plant and wildlife species that rarely occur elsewhere.

Freshwater marsh and riparian scrub/woodland have also been severely degraded throughout southern California. These habitats require a consistent surface or subsurface freshwater input. While there are additional sites in the region to restore riparian and freshwater habitat, few occur in the vicinity of the Ballona Wetlands.

Upland Habitats

Coastal dunes habitats once stretched from Torrance to Santa Monica. Some of the small remaining patches are currently being restored along the south bay. Dune habitats are also rare in the sense that they require sandy substrate and specific physical processes (wind) to be maintained. Given impacts of the development surrounding the project area, there are limited opportunities to restore functioning dune systems and there may be better opportunities for coastal dune restoration adjacent to the coast.

Coastal sage scrub habitat is considered sensitive by the CDFG, but it is much more common in southern California than coastal wetland habitats. The bluffs immediately adjacent to the site and the nearby Baldwin Hills provide significant areas for potential restoration of coastal sage scrub.

Grassland habitats provide essential foraging habitat, and much of this habitat has been lost or severely impacted along the southern California coast. Restoration of upper marsh and transitional zones may provide equivalent foraging opportunities.

3.1.2.2 Habitat Patch Characteristics

The number, size and shape of habitat patches can determine the long-term stability of the created ecosystem. Restoration plans that incorporate numerous, small patches of different habitats are less likely to be self-sustaining in the long term due to edge effects. Edge effects may include colonization by invasive exotic plant species and/or competition with dominant plant species from other nearby created native habitats. Edge effects may also be reduced in habitat patches of similar area with smaller perimeters (edges). Small patches are also more susceptible to disease as fewer individual plants or clones may equate to reduced genetic diversity. Additionally, specialized pollinators may not be supported by small habitat patches. In general, larger more genetically diverse patches are more likely to survive in the long term without active management.

Edge to area ratio and edge to area index for each alternative is presented in Table 3-4. Patches have been defined by combining together all connected estuarine habitats. Edge to area ratio is simply the ratio of perimeter length to habitat patch size. Alternatives with larger patch sizes would have a lower edge to area ratio. Edge to Area Index is the ratio of the shape's edge-to-area ratio compared to the edge-to-area ratio for a circle of the same total area. The lower the index the closer patch shape is to a circle; the shape that maximizes area and minimizes edge length.

3.1.2.3 Connectivity Between Habitat Patches

Habitat connectivity includes the connection between similar habitats, as well as the connection between complementary habitats. The degree of habitat connectivity within each restoration alternative is an important factor to determine the quality of habitat which may result. Connectivity of similar habitats allows for local migration of plant and animal species providing alternative sites for these species when conditions of one site or patch become unsuitable, i.e., during drought. While bird and insect species may be able to migrate across roads and waterways, terrestrial animals, such as reptiles, amphibians and mammals, are prevented or discouraged from by these barriers. Tidal exchange is an important component of connectivity in a wetland system. Tidal exchange provides diurnal replenishment of gases and nutrients; conveys pelagic eggs and larvae of marine organisms, and distributes floating propagules of salt marsh and other plant species. Connectivity of wetland and to transitional or upland habitat is also important to the quality of a restored wetland, allowing migration terrestrial species to migrate to dry areas during high tides. Thus, habitat connectivity can be measured on at least three scales within a restoration project: 1) connectivity of similar habitats within the project area, 2) hydraulic connectivity between wetland/estuarine habitats and the ocean, and 3) connectivity between wetland habitats and the uplands or transition zones.

Roads or levees can affect the connectivity within the project area. They bisect habitat areas, restrict movement of species, increase the area of disturbed habitat and force channels through culverts. Alternatives 1 through 4 contain 3 miles of roads and 3.8 miles of levees, while Alternative 5 has 2.2 miles of roads and no levees within the project area.

3.1.2.4 Relationship to Adjacent Developed Areas

Transition zones affect the species diversity and function of both the intertidal wetland and the adjacent upland. This habitat supports a unique assemblage of both plants and animals that may not exist in either the adjacent upland or wetland. Thus, the inclusion of transitional habitats in restoration projects is highly desirable. Table 1 gives the areas of transitional habitat for each alternative. The approximate slopes for transitional habitats in the alternatives is about 1:50 to 1:100.

In addition to a wetland-upland transition zone, buffer areas are important for various wetland functions, such as area for transgression, sediment filtration or retention, pollution retention, habitat and food web support, and flood protection. These would improve the quality of the wetland habitat.

Typically, southern California wetlands are bounded by homes, roads and levees that create abrupt, narrow transitions from wetland to upland. This adjacency does not allow animal species the refugia needed during some tides and introduces human disturbances to the wetlands. For example, during extreme high tides, species like light-footed clapper rail are subjected to predation by cats as they are forced from their preferred low marsh habitat into adjacent uplands. In some cases, adjacent developed areas provide habitat for desirable species. For example, non-native cedar trees located to the north of the Area A provide nesting habitat for a small colony of great blue herons. These herons may forage in the wetland and upland habitats of Ballona, but it is the adjacent habitat that serves as the rookery.

3.1.3 Connectivity

Connectivity may be measured in terms of geographical position of the restored wetland relative to other similar or complimentary habitats, locally and regionally.

3.1.3.1 Connectivity Within the Greater Ballona Ecosystem

Within the greater Ballona system there exist areas of complimentary habitat. These include Del Rey Lagoon, Grand Canal, El Segundo Dunes, Oxford Lagoon, adjacent bluff areas, nearshore and beach habitat, Ballona Creek and Marina del Rey jetties and breakwater, and the Pacific Ocean. Some of these sites are hydraulically connected and support a limited wetland component; those that are not provide upland habitat primarily for avian and insect species.

Connectivity within the greater Ballona ecosystem can be accomplished, via improved hydraulic connection, for fish and other aquatic species and for wetland and upland plants. This allows exchange of nutrients gases; transportation of eggs, larvae, juveniles and adult aquatic organisms; provides habitat for avian species and a pathway for water-dispersed seed. Connection by air is possible for flying insects and birds, as well as wind-dispersed seeds. The ability to access similar habitats within the greater system provides refugia for animal species during times of environmental instability; provides greater genetic variation and a greater potential foraging area.

3.1.3.2 Regional Connectivity to Other Southern California Wetlands

A further measure of connectivity is the position of the restored wetland to other wetlands in southern California, such as Mugu Lagoon and Upper Newport Bay. Such connectivity applies primarily to avian and fish species. It may also apply to aquatic plankton and nekton and plant propagules, as these are transported tidally. Certain habitats, such as mudflat, may be created in order to facilitate the connectivity between these wetland systems by providing a string of mudflats along the southern Californian coast.

3.1.4 Tables

Table 3-1. Tidal Habitat Types with Elevation Limits and Inundation Regime
(Based upon Ferren et al, 2007)

Habitat Type	Lower	Upper	Lower	Upper
	NAVD ft	NAVD ft	% time tide exceeds	% time tide exceeds
Subtidal	-5.0	-3.0	100%	100%
Intertidal Channel /Mudflat	-3.0	1.0	100%	90%
Salt pan	4.5	5.5	28%	14%
Low Marsh	1.0	2.5	90%	74%
Mid Marsh	2.5	3.5	74%	50%
High Marsh	3.5	4.5	50%	28%
Transition Zone	4.5	5.5	28%	14%

Table 3-2. Acreage of each habitat type by area and alternative

Habitat Type	Existing					Alternative 1					Alternative 2					Alternative 3					Alternative 4					Alternative 5	
	Area A	Area B	Area C	Ballona Creek	Total	Area A	Area B	Area C	Ballona Creek	Total	Area A	Area B	Area C	Ballona Creek	Total	Area A	Area B	Area C	Ballona Creek	Total	Area A	Area B	Area C	Ballona Creek	Total	All Areas	Total
TOTAL Existing	137.6	347.5	71.4	74.0	630.5	137.6	347.5	71.4	74.0	630.5	137.6	347.5	71.4	74.0	630.5	137.6	347.5	71.4	74.0	630.5	137.6	347.5	71.4	74.0	630.5	137.6	630.5
TOTAL for Alternative						137.7	334.7	71.8	74.0	618.1	139.8	335.4	71.7	74.0	620.9	141.4	357.3	71.5	74.0	644.2	141.4	356.7	71.5	74.0	643.5	632.4	632.4
Subtidal				74.0	74.0				74.0	74.0				74.0	74.0				74.0	74.0	41.4			74.0	115.4	48.6	48.6
Intertidal Channel /Mudflat		1.7			1.7	0.3	10.2			10.4	2.9	8.7	0.1		11.7	5.6	14.5	0.3		20.4	25.7	14.5	0.3		40.6	26.2	26.2
Salt pan		22.4			22.4					0.0					0.0					0.0					0.0		0.0
Muted Low Marsh		8.5			8.5		64.7			64.7		37.0			37.0					0.0					0.0		0.0
Muted Mid Marsh		17.6			17.6		34.3			34.3		19.6			19.6					0.0					0.0		0.0
Muted High Marsh		40.6			40.6		17.8			17.8		10.2			10.2					0.0					0.0		0.0
Fully Tidal Low Marsh					0.0	1.3				1.3	14.7	14.2	0.4		29.3	27.8	72.5	1.6		102.0	13.5	72.5	1.6		87.6	131.0	131.0
Fully Tidal Mid Marsh					0.0	0.8				0.8	9.5	9.2	0.2		19.0	18.1	47.1	1.1		66.3	10.3	47.1	1.1		58.4	85.2	85.2
Fully Tidal High Marsh					0.0	0.8				0.8	9.5	9.2	0.2		19.0	18.1	47.1	1.1		66.3	10.3	47.1	1.1		58.4	85.2	85.2
Transition Zone					0.0	5.7	26.1			31.9	28.9	44.4	7.7		81.1	38.4	79.2	5.9		123.5	10.0	79.2	5.9		95.2	96.1	96.1
Brackish Marsh		3.0	0.1		3.1		2.6	0.1		2.7		2.6			2.6		2.6			2.6		2.6			2.6	2.6	2.6
TOTAL Estuarine	0.0	93.8	0.1	74.0	167.9	8.9	155.6	0.1	74.0	238.7	65.6	155.2	8.6	74.0	303.5	108.0	263.0	10.0	74.0	455.0	111.2	263.0	10.0	74.0	458.2	474.8	474.8
Fresh Water Marsh		1.1			1.1		1.0			1.0		1.0			1.0		1.0			1.0		1.0			1.0	1.0	1.0
Seasonal Wetland	10.9	74.2	0.6		85.7	10.9	2.5	0.6		14.0		2.5	4.0		6.5		2.5	5.8		8.3		2.5	5.8		8.3	2.5	2.5
Riparian Scrub	3.2	15.1	3.3		21.6		5.1	1.7		6.7		5.1	0.5		5.6		5.1	0.5		5.6		5.1	0.5		5.6	5.6	5.6
Riparian Woodland		2.9			2.9		2.9			2.9		2.9			2.9		2.9			2.9		2.9			2.9	2.9	2.9
TOTAL Freshwater/Riparian	14.1	93.3	3.9	0.0	111.3	10.9	11.5	2.2	0.0	24.6	0.0	11.5	4.6	0.0	16.0	0.0	11.4	6.3	0.0	17.7	0.0	11.4	6.3	0.0	17.7	11.9	11.9
Grassland/Herbaceous	64.0	62.7	49.7		176.4		13.3	30.0		43.4		13.3	7.3		20.7		13.2	7.3		20.5		13.2	7.3		20.5	13.5	13.5
Coastal Scrub	58.9	26.0	8.9		93.9	117.2	91.7	30.6		239.5	73.5	92.9	44.4		210.9	32.9	7.3	41.1		81.3	29.7	7.3	41.1		78.1	69.8	69.8
Coastal Dunes		9.9	2.1		12.0		8.3	2.1		10.4		8.3			8.3		8.3			8.3		8.3			8.3	8.3	8.3
Forest/Woodland	0.6	0.2			0.7		0.1			0.1		0.1			0.1		0.1			0.1		0.1			0.1	0.1	0.1
TOTAL Upland	123.5	98.8	60.7	0.0	283.0	117.2	113.5	62.7	0.0	293.4	73.5	114.7	51.8	0.0	240.0	32.9	28.9	48.4	0.0	110.2	29.7	28.9	48.4	0.0	107.0	91.7	91.7
Unvegetated/Paved		10.9			10.9	0.7	0.7			1.4	0.7	0.7			1.4	0.6	0.7			1.2	0.6				0.6	0.7	0.7
Ballfields			6.7		6.7			6.7		6.7			6.7		6.7			6.7		6.7			6.7		6.7		0.0
Gas Company		10.9			10.9		13.6			13.6		13.6			13.6		13.6			13.6		13.6			13.6	13.6	13.6
The Freshwater Marsh		39.8			39.8		39.8			39.8		39.8			39.8		39.8			39.8		39.8			39.8	39.8	39.8
TOTAL Other areas	0.0	61.6	6.7	0.0	68.3	0.7	54.1	6.7	0.0	61.5	0.7	54.1	6.7	0.0	61.5	0.6	54.0	6.7	0.0	61.3	0.6	53.4	6.7	0.0	60.6	54.0	54.0

Table 3-3. Summary of Habitat Acreages

Habitat Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Subtidal	74.0	74.0	74.0	115.4 (41.4†)	48.6 (48.6†)
Intertidal Channel And Mudflats	10.4	11.7	20.4	40.6	26.2
Low Marsh	66.0 (64.7††)	66.3 (37.0††)	102.0	87.6	131.0
Mid Marsh	35.1 (34.3††)	38.6 (19.6††)	66.3	58.4	85.2
High Marsh	18.6 (17.8††)	29.2 (10.2††)	66.3	58.4	85.2
Transitional Habitat	31.9	81.1	123.5	95.2	96.1
Brackish Marsh	2.7	2.6	2.6	2.6	2.6
Total Estuarine	**238.7**	**303.5**	**455.0**	**458.2**	**474.8**
Freshwater/Riparian	10.6	9.5	9.5	9.5	9.5
Seasonal Wetland	14.0*	6.5	8.3	8.3	2.5
Upland	293.4	240.0	110.2	107.0	91.7
Unvegetated	8.1	8.1	7.9	7.3	0.7

† Area of shallow subtidal habitat adjacent to mudflats
†† Area of muted tidal
* Habitat created on saline soils

Table 3-4. Edge/Area indices for Estuarine Wetland Habitats

Alternative	Edge to Area Ratio (ft/ac)	Edge to Area Index*
ALT1	218.3918	4.4645
ALT2	243.0364	4.7857
ALT3	193.1576	4.6057
ALT4	178.0851	4.4550
ALT5	111.3358	2.8696

* Edge to Area Index is the ratio of the shape's edge-to-area ratio compared to the edge-to-area ratio for a circle of the same total area.

3.2 BIODIVERSITY

Habitat restoration provides opportunities for the preservation of the region's plant and animal species as well as the opportunity for the recovery of lost or declining biodiversity. The biological communities of coastal southern California have experienced a decline in species richness, or diversity, as a result of loss of over 90% of their wetland habitat following urban and agricultural development. Declining biodiversity includes plant and animal species that are listed as threatened or endangered, many of which are associated with wetland habitats. Restoration of Ballona wetlands offers the opportunity to create refuges for these species and habitats for other species to recover locally and potentially act as a "seed" source for other nearby wetland systems. Because a major goal of this restoration project is to restore estuarine habitats and processes, diversity of species supported by estuarine habitats would be of particular interest. Therefore, for the purpose of this document, biodiversity is discussed in terms of the sustainable richness of representative interdependent native estuarine habitats along with their associated and expected species biodiversity. The diversity of species dependent upon other habitat types (eg. freshwater wetland or coastal dune habitats) included in the alternatives is also noted.

The five restoration alternatives for Ballona range from preservation and enhancement of large areas of upland habitat with limited wetland habitat to restoration and creation of large areas of wetlands with less upland habitat. Upland-dominated restoration should increase the biodiversity of the existing upland habitats. This would primarily benefit woody vascular plants and associated animals at the expense of opportunities to increase diversity of wetland plant and animal groups. Wetland-dominated restoration would benefit non-vascular aquatic plants, vascular plants, aquatic invertebrates, aquatic vertebrates, terrestrial invertebrates and terrestrial vertebrates.

Biodiversity is discussed at the level of large taxonomic groups. Some specific examples are given; however, not all species that may be supported by each of the restoration alternatives are discussed. For the purposes of this document, taxonomic groups are defined as vascular and nonvascular plants; terrestrial invertebrates (insects); terrestrial vertebrates (birds, herpetofuana, mammals); aquatic invertebrates (infauna and epifauna); and aquatic vertebrates (fish).

Estuarine Wetlands

Maximizing shallow subtidal habitat would benefit the biodiversity of the system especially for birds and fishes. Non-vascular plants (e.g., phytoplankton) would presumably be most functional in the upper water column where light penetration is greatest and thus would not necessarily benefit from deeper water. Similarly, vascular plants, insects, benthic invertebrates, herpetofuana and small mammals would not directly benefit from deeper salt water.

Fishes, primarily those associated with the nearshore ocean habitat, would be supported by deeper waters with a connection to the open coast. Such species as Queenfish (*Seriphus politus*), white croaker (*Genyonemus lineatus*), northen anchovy (*Engraulis mordax*) that inhabit the mid- to upper water column would increase the biodiversity of the system as would demersal species such as California halibut and shovel-nose guitarfish (*Rhinobatos productus*).

Gulls and terns, including California least tern and such species as double-crested cormorant (*Phalacrocorax auritus*) and brown pelican (*Pelicanus occidentalis*) would be supported by increased fish diversity and abundance. Osprey (*Pandion haliaetus*) may also forage for fish in the subtidal areas.

As more tidal wetland habitat is included in an alternative, additional taxonomic groups are supported. Creation of channel, low and mid-high marsh would support non-vascular aquatic plants, vascular plants, aquatic invertebrates, aquatic vertebrates, terrestrial invertebrates and terrestrial vertebrates.

Non-vascular plants include phytoplankton, micro-algae, and macro-algae, that are found in the channels and marsh habitats. Salt marsh micro-algae are dominated by diatoms. Macro-algae include green algae and blue-green algae. Tidal influence, light penetration and nutrients are factors that can limit salt marsh algal populations.

Vascular plants that inhabit a typical Southern California tidal salt marsh include the perennials Pacific cordgrass (*Spartina foliosa*), common pickleweed (*Sarcocornia pacifica*) and fleshy jaumea (*Jaumea carnosa*), as well as annual pickleweed (*Salicornia bigelovii*). They occur in narrow elevation zones determined by the frequency of tidal inundation, salinity, duration of saturated soil, and temperature. These plants, along with non-vascular algae, contribute to the complex food web that supports the high productivity of coastal wetlands. The detritus of vascular and non-vascular plants provides food for aquatic invertebrates, including both infauna (organisms that live within the sediment) and epifauna (those that live on the surface of the sediment).

Common infauna associated with mud or sand bottoms of channel and low marsh habitats include polychaete worms and filter-feeding bivalves, such as California jackknife clam (*Tagelus californica*), littleneck clam (*Prototheca staminea*) and bent-nose clam (*Macoma nasuta*). Common epifuana of channels include detritivores, such as California horn snail (*Cerethidia californica*), bubble snail (*Bulla gouldiana*), and *Nassarius* sp., and omnivores such as lined shore crab (*Pachygrapsus crassipes*) and yellow shore crab (*Hemigrapsus oregonensis*).

Restoring intertidal mudflat area would increase the biodiversity of benthic infauna, including polychaetes, which in turn would support a higher diversity of wading birds. Perhaps the most conspicuous animals of the intertidal mudflats are the shorebirds that feed and rest there during low tide. Many of their invertebrate prey items are widely distributed, from the subtidal channels to the lower limit of the salt marsh. Wading shorebirds, such as western sandpiper (*Calidris mauri*), semipalmated sandpiper (*C. pusilla*) and dowitchers (*Limnodromus* spp.) would be expected to forage on the mudflats during their migration.

Cordgrass associated with low marsh habitat provides structure, and possibly food, for insect species, such as the larvae of *Incertella* and *Cricotopus* species, the beetle *Coleomegilla fuscilabris* and the plant hopper (*Prokelesia* sp.). The longjaw mudsucker (*Gillichthys mirabilis*) forages in the low and mid-high marsh, especially along creek banks during high tides. Mid-high marsh habitat provides food and structure for California horn snails, amphipods, and snails of the genus *Assiminea*. Water boatmen (*Trichocorixia* spp.) feed on algae in pools and in turn provide food for California killifish (*Fundulus parvipinnis*) that feed in the marsh during high tides

The wetland-dominated restoration alternatives would create/restore large blocks of habitat that would be connected via channels and tidal flows. These large blocks of habitat would be more sustainable in the long-term as they would be less susceptible to edge effects of invasive species. They would also be less susceptible to human disturbance, as many areas would be inaccessible.

Creation of channels and mudflats provides habitat for breeding and foraging for estuarine fishes. Some, such as gobies (Gobiidae), complete their life cycle in southern California estuaries, attaching their eggs to the burrows of commensal invertebrates. Other common wetland fish species, such as topsmelt (*Atherinops affinis*), attach their eggs to filamentous algal mats that also shelter their larvae and post-larvae. Species such as California halibut spawn offshore but spend the first few years of life in protected coastal waters. Still others, such as striped mullet (*Mugil cephalus*) live their lives in protected inshore habitat but spawn offshore. In general, the channels and low marsh habitats of southern California coastal wetlands act as nursery grounds for coastal fisheries.

Larger aquatic benthic invertebrates, such as snails and crabs, as well as fish, are preyed upon by a number of bird groups, including herons and egrets, wading birds and terns and gulls. Southern California coastal wetlands support dozens of species and many thousands of individual birds that migrate along the Pacific flyway. Herons, egrets, gulls, terns, shorebirds, ducks, geese, coots, gallinules and rails occur in southern California wetlands throughout most of the year. Most of these birds appear to prefer intertidal flats to salt marsh habitats for foraging and other activities. However, marsh habitats contribute to the support of birds by: providing food (either directly or indirectly), cover from predators, and structure for nesting and roosting. Birds of the low marsh include rails, such as Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), and the endangered light-footed clapper rail (*Rallus longirostris levipes*).

Common bird species of the mid-high marsh include wading species such as willet (*Catoptrophorus semipalmatus*), marbled godwit (*Limosa fedoa*), long-billed curlew (*Numenius americanus*) and great blue heron (*Ardea herodias*). These species prey upon fishes and aquatic invertebrates and, in the case of herons, upland terrestrial animals such as small mammals and herpetofauna.

Terns and gulls observed in southern California coastal wetlands occur primarily in intertidal flats and on the adjacent beaches; however, some taxa do utilize salt marsh habitats. Western gull (*Larus occidentalis*) and ring-billed gull (*Larus delawarensis*) forage and roost in intertidal salt marsh habitats while the endangered California least tern (*Sterna antillarum browni*) forages in intertidal channels. Forster's tern (*Sterna forsteri*) and elegant tern (*S. elegans*) can use a variety of wetland habitats, including salt marsh. Most of the bird groups, with exception of a few small species, forage and roost in southern California wetlands but breed elsewhere.

The mid-high marsh provides structure for some nesting birds, including the state endangered Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*). This small songbird builds its nest low to the ground under marsh vegetation, such as pickleweed. Belding's Savannah sparrows forage on insects, often at the interface of marsh and channel.

Small mammals associated with southern California tidal wetlands include the western salt marsh harvest mouse (*Reithrodontomys megalotis limicola*) and meadow mouse (*Microtus californicus stephensi*). Harvest mice are granivorous, while meadow mice are primarily herbivorous. While little is known about their diets, neither feeds on pickleweed, the most common vascular plant species at Ballona.

Both upland-dominated and intermediate tidal restoration alternatives preserve areas that are currently muted-tidal wetlands. Muted-tidal wetlands provide functions similar to fully-tidal wetlands, but reduced in terms of biodiversity. For example, muted tidal channels may have similar species composition and densities of phytoplankton and benthic micro-algae but may support fewer salt marsh vascular plant species than do fully tidal channels. Similarly, fewer fish species might occur in muted tidal systems. With less tidal influence, muted tidal areas would be susceptible to periodic fresh water inflows. Conversely, during neap tides, muted tidal systems may be subjected to prolonged drying and increased salinity, unless they impounded water continuously, in which case, they would not support vascular plants. Thus, muted tidal systems are likely to be less sustainable than fully tidal systems.

Creation of wetland habitats allows for creation of transitional habitats, which would increase the regional diversity of vascular plants and terrestrial vertebrates. Examples of transition zone vascular plants include boxthorn *(Lycium californicum)*, bush seepweed *(Suaeda nigra)*, coast golden bush (*Isocoma menziesii*), and Parish's glasswort (*Arthrocnemum subterminale*). These overlap with the highest elevation salt marsh species including, for example, saltgrass, alkali weed *(Cressa truxillensis)*, and shoregrass *(Monanthochloe littoralis)*. Boxthorn is a common perch for birds and various small mammals and herpetofauna burrow beneath it or use it for shade.

The transition zone of southern California wetlands, such as Carpenteria salt marsh, have a euryhaline zone that fluctuates between wet season low salinities and dry season hypersaline conditions. The habitat is characterized by winter annual plant species such as salt marsh daisy (*Lasthenia glabrata* ssp. *coulteri*), salt marsh sand-spurry (*Spergularia marina*), toad rush (*Juncus bufonius*), and hutchinsia (*Hutchinsia procumbens*), which tolerate the fluctuating salinities by growing in the wet season.

The animals of the higher elevations of the transition zone are primarily terrestrial species. These include various snakes, lizards, small mammals and birds. Herpetofauna may include California kingsnake *(Lampropeltis getulus californiae)*, San Diego gopher snake *(Pituophus melanoleucus annectens)* and side-blotched lizard *(Uta stansburiana)*. Common mammals of the shrub-dominated transition zone include western harvest mouse, deer mouse *(Peromyscus maniculatus)*, pocket gopher (*Thomomys* sp.), and California ground squirrel *(Spermophilus beechyi)*. The small mammals are preyed upon by a variety of birds including northern harrier *(Circus cyaneus)* and white-tailed kite *(Elaneus caeruleus)*. Ground-nesting bees that pollinate salt marsh bird's-beak (*Cordylanthus maritimus* spp. *maritimus*) live above the high tide in this habitat.

Non-tidal Wetlands

It is anticipated that brackish marsh would develop in areas where fresh water marsh and salt marsh intergrade. This habitat supports many of the taxa associated with both of those habitats, although species that cannot tolerate either extreme are likely to be absent. Brackish water marsh habitat has a range of conditions from briefly fresh to briefly hypersaline and would provide a small increase in the biodiversity of the wetlands. For example, *Juncus acutus* is regionally rare and can thrive where soil is at least briefly brackish; tall tules can provide critical cover for rails during high tide.

Seasonal wetlands would support regional biodiversity of non-vascular and vascular plant species, herpetofauna, birds and small mammals. However, much of the existing seasonal wetlands are on saline fill soils that would not support biodiversity. Vascular plants that might be supported include common pickleweed (*Sarcocornia pacifica* = *Salicornia virginica*), alkali weed (*Cressa truxellensis*), and alkali heath (*Frankenia salina*). Smaller areas of freshwater seasonal wetlands would provide breeding grounds for toad and frog species, such as Pacific chorus frog (*Pseudacris regilla*) and California tree frog (*Hyla cadaverina*). Ponded water provides nesting and foraging habitat for American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*) and killdeer. Small mammals common to upland habitats could also use seasonal wetlands.

Creation of vernal pool habitat has been proposed as part of upland-dominated restoration schemes. Vernal pools are regionally rare habitats, and adding water-holding depressions would increase the biodiversity of the Ballona ecosystem. Vernal pools are formed over impervious substrates, such as a soil with a subsurface clay layer that impounds seasonal rainfall. Such topography and soils are lacking from Ballona upland areas. Creation of vernal pools would benefit primarily non-vascular and vascular plants, aquatic invertebrates, and herpetofauna, although small mammals and birds may also benefit. Non-vascular species that inhabit vernal pools include diverse phytoplankton, green and blue-green micro-algae, and occasional macro-algae. These are food sources for a number of invertebrates, including fairy shrimp (*Branchinecta* spp.), several species of which are listed as endangered. Many of the vascular plants associated with vernal pools are unique in their adaptations to water levels that fluctuate widely over short periods of time. These range from fairly common species, such as isoetes (*Isoetes* spp.) to the endangered San Diego mesa mint (*Pogogyne abramsii*). Herpetofauna, such as discussed above, would benefit from vernal pools, although survival through metamorphosis depends on the amount of rainfall and the duration of impoundment.

Created vernal pools, especially those requiring importation of clay to line the pools so they would hold water for the appropriate duration, would not only be difficult build but subject to invasion by unwanted species once wetted. Imported soils often contain plant propagules, such as non-native grasses, that could invade the proposed restoration. Furthermore, small vernal pools would be subject to edge effects. Pools that dry early in the growing season of vernal pool vascular plants would be subject to invasion by non-desirable species, such as non-native grasses.

Fresh water marsh and riparian habitats would, in some way, provide support to all of the taxonomic groups. Detritus from vascular plants, such as cattail (*Typha* spp.) and bulrushes (*Scirpus* spp.), and a variety of non-vascular algae would provide food for aquatic invertebrates, including gastropods, copepods, amphipods and decapods, and insects, such as beetles (Coleoptera), flies (Diptera) and true bugs (Hemiptera). These taxa provide food for passerine birds, such as blackbirds (*Agelaius* spp.), wrens (*Cistothorus* spp.), rails (*Rallus* ssp.) and waterfowl; fishes, primarily non-native species; herpetofauna, including Pacific chorus frog and California tree frog, and snakes, such as two-striped garter snake (*Thamnophis couchi hammondi*); and small mammals. Larger mammals, such as raccoon (*Procyon lotor*), may forage directly on invertebrates and fish.

Treatment wetlands could support similar species as fresh water marsh habitat. However, these areas would require active management and removal of sediments, contaminants, and invasive plants, all of which would limit their value for biodiversity support.

Upland Habitats

Existing disturbed uplands would be preserved and their biota enhanced through the removal of exotic plant species and planting of native coastal sage scrub and native grassland species. Coastal sage scrub habitat (CSS) would be enhanced through planting of species such as coastal sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), deerweed (*Lotus scoparius*), sage species (*Salvia* spp.) and lemonadeberry (*Rhus integrifolia*). Planting of these vascular plant species would, in turn, provide nesting and foraging habitat for a number of migratory and non-migratory terrestrial passerine bird species, including the federally-listed threatened coastal California gnatcatcher (*Pilioptila californica californica*), towhees (*Pipilo* spp), wrens (*Troglodytes* spp.), and finches (*Cardeulis* spp.). Many of these passerine birds rely on insects and seeds for food. CSS enhanced by more diverse flowering plants would support insects that provide forage for the above birds. Enhanced CSS would also support insect pollinators, including bees and flies. The diversity of other insects, such as butterflies and moths, would be enhanced by providing plant species that serve as larval foods and adult nectaring plants.

Native grassland habitat would be created from disturbed upland habitat through the removal of exotics and planting with a variety of native grasses and annual forbs. Examples include purple needlegrass (*Nassela pulchra*), nodding needlegrass (*N. cernua*), bluegrass (native *Poa* spp.) goldenstar (*Bloomeria* spp.), brodiaea (*Brodiaea* spp.), clarkia (*Clarki*a spp.) and valley tassels (*Castilleja attenuata*). Populations of these vascular plant species would enhance nesting and foraging habitat for passerine birds such as western meadowlark (*Sternella neglecta*) and grasshopper sparrow (*Ammodramus savannarum*), and also wading birds such as killdeer (*Charadrius vociferous*) and owls, including burrowing owl (*Athene cunicularia*). Grasslands are important foraging grounds for raptors including red-tailed hawk (*Buteo jamaicensis*) and white-tailed kite (*Elanus leucurus*). Like coastal sage scrub, this upland habitat would increase the diversity of flowering plants which, in turn, would support a variety of insects.

A number amphibians and reptiles occur in upland habitats, including Gilbert's skink (*Eumeces gilberti rubricaudatus*), western toad (*Bufo boreas*), spadefoot toad (*Scaphiphus hammnodi*), western fence lizard (*Sceloporus occidentalis*), side-blotch lizard (*Uta stansburiana*), rosy boa (*Charina trivirgata roseofusca*), gopher snake (*Pituophis catinefer*), horned lizard (*Phrynosoma coronatum*) and various species of rattle snake (*Crotalus* sp.). Enhancement of the existing habitat would increase foraging and breeding habitat for these and other herpetofauna.

Upland habitats also support numerous small mammals. Examples include shrews (*Sorex* sp.), deer mice (*Peromyscus* spp.), voles (*Microtus* sp.), rabbits (*Sylvilagus* spp.), and skunks (*Mephitis mephitis*). These small mammals are preyed upon by larger upland mammals, such as coyote (*Canis latrans*) and grey fox (*Urocyon* sp.), and birds of prey, such as red-tailed hawk and northern harrier (*Circus cyaneus*).

The existing disturbed upland habitats at Ballona are dominated by non-native vascular plant species, such as crown daisy (*Chrysanthemum coronarium*), mustard (*Brassic*a spp.), wild radish, fennel, castor bean, pampas grass and brazillan pepper tree. Seeds of many of these and other invasive plants are wind dispersed and off-site sources are numerous. Non-native animal species, such as Virginia opossum (*Didelphis virginianus*) and house mouse (*Mus mus*) are also common. Non-native animals that are adapted to humans are also likely to disperse into created upland habitats, competing for food with native species. Additionally, upland predators, including red fox and feral cats, can significantly affect birds nesting in the wetland as well as small mammals. Because restored upland habitats are highly susceptible to invasion by non-native plants and animals, their sustainability is constrained by the urban landscape.

All alternatives include the preservation and enhancement of coastal dune habitat at Ballona. Similar to CSS and native grassland, coastal dunes would support flowering vascular plants, such as lupines (*Lupinus* sp.), which would support and benefit from insect pollinators and provide larval and adult food sources. Coastal dune habitats provide habitat for reptiles, including horned lizard (*Phrynosoma* spp.) and California silvery legless lizard (*Anniella pulchra pulchra*). Passerine birds and small mammals could forage on seeds produced by vascular plants.

3.3 HYDROLOGY

The hydrology of each of the alternatives would have a significant impact on the functioning of the habitats. The depth and period of tidal inundations is a major influence on the type of habitats that would each alternative would support. The flow of water would erode, deposit and transport sediment. The period of time water stays on the wetlands and the amount it mixes with water from other water bodies would affect water quality. The hydrology of each alternative also affects the flood protection for existing infrastructure surrounding the wetlands. Hydrology is one of the main processes that link both the different project areas with each other and with Ballona Creek and Marina del Rey. The hydrology of the site would be sensitive to climate change and sea level rise in particular; the sustainability of the alternatives is discussed in Section 3.5.

Each restoration alternative proposed for the project has varying degrees of tidal inundation in terms of area and tidal range. Alternative 1 has minimal grading and most of the tidally inundated areas have a muted tidal range in portions of Area B. Alternative 2 and 3, by contrast, have fully tidal wetlands covering significant portions of Areas A and B. Alternative 4 has a large subtidal component connected to Marina del Rey. Alternative 5 has the greatest hydraulic connectivity with the main channel and between the restoration areas, due to the removal of levees. The degree of tidal inundation has a fundamental impact on the vertical and horizontal distribution of habitat types that would be supported.

The degree of tidal inundation inside the wetlands would also change the way the wetlands interact with Ballona Creek and Marina Del Rey. Larger, fully tidal wetlands would have larger tidal prisms which would have a greater impact on the surrounding water bodies, in particular on the amount of mixing. The location of the tidal connections is also important; a location inside Basin H, with its smaller tidal prism, would have a greater local effect on mixing than one connected to the main channel of Marina del Rey, which has a very large tidal prism.

3.3.1 Muted Tidal System versus Full Tidal System

A fully tidal wetland at Ballona would experience a tidal range equivalent to the oceanic tide in Santa Monica Bay. Mean Lower Low Water (MLLW, the long term average of the lowest tide each day) is -0.21 ft NAVD, Mean Higher High Water (MHHW, the long term average of the highest tide each day) is 5.29 ft NAVD and the diurnal tidal range (MHHW-MLLW) is 5.49 feet. The land area between the upper and lower limits of tidal range is the total area of intertidal habitat.

A muted tidal wetland experiences a more limited tidal range than a fully tidal wetland. Existing muted tidal wetlands at Ballona have Self-Regulating Tide gates (SRT), which close when the water surface elevation reaches a set height. Muted tidal systems would tend to compress the vertical range of wetland habitat types and would cause intertidal habitats to be created at lower elevations. Connections through culverts, open breaches and removal of levees are intended to allow the full oceanic tide to enter the site.

Inundation regime is the percentage of time that a given water level is exceeded during a Neap-Spring tidal cycle. It a useful parameter for characterizing the tidal inundation at a particular location with a specific elevation. The inundation regime for the unrestricted tidal system in the Santa Monica Bay is shown in Table 3-3; for example 2 ft NAVD is exceeded for 80% of the time and 4 ft NAVD for 38% of the time.

The inundation regime in some of the alternatives can be modified by setting the closure of the SRT in Area B at different elevations, which limits the maximum tidal elevation but maintains the rate of rise and fall of the tide. The inundation regimes were estimated for three SRT closure elevations using hydraulic modeling. The existing gate is set to close at 3.6 ft NAVD. Two additional closure elevations were modeled at 4.9 ft NAVD and 6.6 ft NAVD.

Table 3-3 shows how the inundation regime varies with different closure elevations. The inundation regime for lower elevations stays roughly the same between gate settings (e.g. 2 ft NAVD is exceeded about 77% of the time in all cases, which is comparable to the 80% for Santa Monica Bay). The effect of the muting is more pronounced at higher elevations (e.g. 4 ft NAVD is exceeded 38% of the time in Santa Monica Bay, but only 6% with a gate that closes at 4.9 ft NAVD). The inundation regime for intermediate closure elevations can be estimated by interpolation.

The vertical zonation of intertidal habitats can be estimated from the inundation regime. Different species would favor being inundated for different frequencies. For instance, high marshes are inundated approximately 28 to 50% of the time, while for low marsh the range of frequencies are 74 to 90%. Table 3-4 shows the inundation regime for intertidal habitats and the corresponding elevations for the oceanic tide in Santa Monica Bay (based on Ferren *et al*, 2007 in Appendix B). Each of the marsh habitat types covers a vertical range of about one foot.

Habitat zonations for the muted tidal regimes have been derived by determining the muted tidal elevation that has the same inundation regime as the open ocean. Table 3-4 shows the expected habitat distribution for different closure elevations for the SRT. Muting can also be achieved by undersized culverts that constrict the flow. These change the rate at which the tide rises in the site such that maximum elevation would not be the same on each tide. However, undersized culverts cause problems of erosion, backwater effects, and drainage.

For muted tidal systems the elevation range for the intertidal habitats is compressed which in turn limits the areal extent of these habitats compared to fully tidal alternatives. The zonation for intermediate closure elevations can be estimated by interpolation. This compression is most significant for the highest zones of the marsh (e.g. high marsh, transition zone). For instance, with the existing SRT closure elevation of 3.6 ft NAVD, mid marsh has the same vertical range as in a fully tidal system (1 foot) but occurs 0.3 feet lower. However, for the same SRT setting, the high marsh has a much reduced vertical range of 0.3 ft (between elevations 3.2 -3.5 ft NAVD).

In summary:

- varying the SRT closure elevation would mute the inundation regime in a predictable manner in Area B;
- vertical zonation of habitat would be compressed, particular at higher elevations, by muting of the tidal inundation;
- habitat area would be limited by the reduced vertical range of habitats.

3.3.2 Tidal Prism

The tidal prism is the volume of water entering the wetland on each tide. The tidal prism is a function of the topography and the tidal range of the site. For example, Alternatives 2 to 5 include substantial grading which would increase the volume of tidal water entering the site on each tide. If the tidal range is muted, the tidal prism would be reduced. The tidal prism was evaluated for each restoration area and for each of the main water connecting water bodies (Basin H, Marina Del Rey and Ballona Creek).

The tidal prism is important both within and outside the wetland:

- the tidal prism would influence the channel geometry and channel network properties.
- the tidal prism would influence the source of tidal water (as it affects the excursion length) and the residence time.

Table 3-5 shows the tidal prism of Ballona Creek in relation to the southwest wetland of Area B. In this case the main variable is the type of connection, either a SRT (Alt 1) or open breach (Alt 3). The muted tidal wetland has a tidal prism of about 30 ac-ft. Replacing muted tidal wetlands in Area B with fully tidal wetlands (Alt 3), connected to the creek by a breach, adds about 150 ac-ft to the existing tidal prism. One effect of increasing the tidal prism of Ballona Creek would be to increase the potential for scour at the mouth, in the vicinity of the jetty heads. Increased scour at the mouth has both positive and negative implications. It may reduce the need for dredging of Ballona Creek, improving the flood conveyance of the channel; however, it may also remobilize contaminated sediment that has settled at the mouth and there is the potential for undermining the breakwater as the channel readjusts to the larger tidal prism.

Table 3-6 shows the variation of tidal prism in relation to the southwest wetland of Area B. For a muted tidal wetland in this area the tidal prism is about 15 ac-ft. A tidal wetland created in this area in Alternatives 2 to 4 has a tidal prism of about 30 ac-ft.

Table 3-7 shows the variation of tidal prism for Area A. For those alternatives that connect to Marina del Rey, the tidal prism across the mouth of Basin H was used as a measure as this allows the effect of restoring the wetland tidal prism on Basin H water quality to be assessed. The larger the combined tidal prism, the greater the turnover of water in Basin H. The existing tidal prism of Basin H is about 12 acre-feet. A 38 acre wetland in Area A (Alt 2) increases the tidal prism by about 25 ac-ft, a 73 acre wetland (Alt 3) adds about 46 ac-ft, and the large subtidal pond and wetland in Alternative 4 adds about 330 ac-ft. The same alternatives connected to Marina del Rey at Via Venetia do not have a significant effect on the overall tidal prism as the tidal prism of Marina del Rey is so large.

Alternative 5 has the largest tidal prism of all of the alternatives at 600 ac-ft. This is nearly three times the existing tidal prism and it is expected that tidal flow velocities through the mouth of Ballona Creek would increase.

In summary:

- in the southwest wetland of Area B, an open breach and full tide would have a tidal prism about 100 ac-ft greater than a muted tidal option;
- southeast wetland would have a tidal prism of about 30 ac-ft;
- a tidal connection from Area A at Dock 52 has a large impact on the circulation of Basin H, but no alternative has a tidal prism sufficiently large to impact the much larger Marina del Rey channel.
- Alternative 5 has the largest tidal prism at 600 ac-ft.

3.3.3 Connections

The nature of the connection between open water and the wetland would greatly influence tidal conditions within the wetland. Four types of connections are present in at least one of the five alternatives:

- open (non-gated) culverts,
- gated culverts (e.g. self-regulating tide gate (SRT) and flood gates)
- open breach, and
- complete levee removal

The large pipes which penetrate levees to convey water between Ballona Creek and the inundated areas are referred to as culverts. Conveyance through a culvert is limited by its dimensions, particularly its cross-sectional area. Flow through culverts can be controlled by different types of gates that prevent flow through the culvert. SRT include a mechanism to close itself when water levels reach a specified elevation. Manual flood gates can be closed manually as dictated by conditions. Gated culverts can be used to prevent contaminants entering the site from Ballona Creek or Marina del Rey or to reduce peak flood elevations. The SRT has an advantage of being adaptable so that the desired water surface elevation within the site may be controlled.

The second type of connection through a levee is a breach. Breaches would be sized to the same width and depth as the connecting marsh channel and would have no top boundary. Breaches would therefore convey water with negligible restriction during normal tides and much more effectively during flood conditions. Breaches may be combined with lowering of the levee to about marsh plain elevation, thereby allowing higher tides to enter the site. This would mimic the flood routing of natural overmarsh tides and restore the hydraulic connection between the creek and the marsh plain. Controlling regular tidal flows or flood events is not possible with either a breach or levee removal.

The capacity of connections would vary. The SRT and culvert would have fixed capacity dependent upon their physical dimensions. A breach, depending on the nature of the material in which it is excavated, may be able to erode wider or deeper. Sizing levee breaches and connecting channels to the predicted tidal prism is generally necessary to limit how much the channel and breach erode. Tidal exchange and sediment supply to a wetland would be limited if the levee breaches or channels are undersized compared to the tidal prism. As the breaches or slough channels erode in response to the large tidal prism, tidal exchange and sediment supply would increase. Levee removal provides the most complete connection for water exchange and sediment supply between wetlands and the tidal source.

The location of the connections would have an impact on the evolution of the wetland, in particular the channel network. The alternatives have been developed to maximize opportunities for creating a single unified channel network within each marsh unit rather than multiple smaller networks, each with their own connection to open water. Using two connections for a hydrologic unit may increase the circulation in subtidal areas if there is sufficient head difference between the two entrances; this would be most effective in Alternative 4, which has a large open water area. For intertidal channels, flow may occur preferentially through only one of the entrances. Ideally, each marsh unit should be large enough to sustain its own network, containing a range of channel sizes and habitat. The southwest wetlands in Area B have the only remnant channel system that could be rejuvenated.

The use of structures as part of the connection, while increasing control, does have a number of issues:

- Gates and trash grilles, common on such structures, can impede the movement of sediment, seeds, fish and fish larvae. These restrictions would not be present with breaches.
- Culverts and gates generally have a smaller cross-section than natural channels and flow velocities within the structures would generally be higher. Scour would therefore be expected in the vicinity of the structure, especially in the channels leading into the wetlands.
- The potential for blockage is greater for gates and culverts, compared to an open breach, due to the smaller size of the opening and the presence of moving parts.
- Failure of a gate in the open position, due to trapping of debris or the failure of the control mechanism, may allow increase the potential for flooding. Failure of a gate in the closed position could delay drainage of tidal habitats.

3.3.4 Channel Network

Vegetated wetlands are typically drained by a complex network of dendritic and sinuous tidal channels. A dendritic sinuous tidal channel network is expected to provide better habitat and support a wider range of wetland functions than linear channels. For examples, channel bends provide sheltered foraging habitat for birds. Each tidal channel within the channel network drains and fills an area of marsh or "tidal watershed." Marsh drainage areas in natural marshes are distinguished by very subtle changes in marsh plain elevation and inundation patterns. The channel size adjusts to the flow to and from the marsh drainage area (i.e., the tidal prism of the marsh drainage area). Tidal channels may scour or fill in with sediment (shoal) in response to changes in the tidal prism and/or sediment dynamics.

In a natural system, as mudflats accrete to intertidal elevations, mudflat tidal channels form and become fixed as vegetation establishes and the marsh plain develops. Within this channel network, the tidal channel geometry at any given point is mainly dictated by the tidal prism of the watershed upstream. If the channel geometry is too small for the tidal prism, current speeds would increase and erode a larger channel. If the channel geometry is too large for the tidal prism, current speeds would decrease, allowing sedimentation to decrease the channel geometry.

Much of the natural channel system in Ballona Wetlands has been lost and a new channel networks would be constructed in tidal marsh restoration areas using the same tidal prism channel geometry relations found in natural channels. Larger tidal channels may be graded by excavating channels with dimensions that closely mimic channels in natural tidal marshes. The smallest channels may only be partially excavated, allowing these channels to develop over time through channel scour. Channel dimensions would be sized relative to the tidal prism of the marsh drainage area. Table 3-8 shows the channel network characteristics expected for each alternative, including tidal prism, channel length and order of channels. The method of calculation is described in Appendix C.

Channel networks constructed within the Ballona restoration are expected to be relatively stable, with limited potential for channel scour or shoaling. Tidal habitat would be restored by excavating fill and grading the site to elevations suitable for high, mid, and low marsh plain; mudflat; and subtidal habitat. The restored marsh plain would be graded with gentle slopes from the channel edge to upland areas to allow for the transgression of tidal habitats with sea level rise (see Section 3.5.1 below). Sedimentation rates within restored marsh areas are expected to be slow due to low sediment supply from the urbanized Ballona Creek watershed. The tidal prism of the restored marsh is therefore not expected to change rapidly after construction. The constructed tidal prism and channel dimensions are expected to maintain a relatively stable equilibrium condition. Also, as the restored marsh would be graded to higher marsh elevations, the tidal prism would be less than for lower elevation tidal areas. The potential for channels to form through channel scour is therefore expected to be low.

The presence of roads and levees within the site somewhat constrain the channel pattern as flow through this infrastructure must be routed through culverts. These culverts would set both the location and capacity of the channel at that place, reducing the ability of the channels to evolve over time. The culverts should be oversized in anticipation of larger tidal prisms in the future to increase the sustainability of the wetlands.

Permanent ponds in the marsh plain may be constructed to increase the amount of subtidal habitat. These would be connected to the channel network. These ponds would be shallow, well-defined, persistent depressions, 1 to 2 ft deep, that contain about 0.5 ft of standing water at all stages of the tide. They would receive tidal inflow on most tides.

3.3.5 Residence Time

Residence time is an estimate of how long water would remain in a flooded area before it is replaced by water from outside the wetland. A shorter residence time indicates a faster rate of turnover of the water. For this study, the residence time is estimated as the fraction of volume exchanged each tidal period, calculated by dividing the total volume in the flooded area by the tidal prism.

The residence time would depend on the proportion of tidal prism to total (subtidal plus intertidal) volume. Intertidal areas with an open connection to the ocean would have a residence time equal to the average tidal period because they dry out each tide. In areas with a large subtidal volume relative to intertidal volume (such as in Area A in Alternative 4), the residence time can be as long as several tidal periods. Short residence times indicate rapid and continuous exchange with the ocean water, with positive effects, for example, on exchange of gases, nutrients, fish larvae, sedimentation and water quality. Longer residence times indicate delayed exchange with the ocean.

The method for estimating residence time is an average for the entire flooded area and range of tides. Actual residence time would vary across the site. For example, residence times would be longer for regions of the flooded areas which are far from the exchange outlet or during periods of reduced tidal prism, such as neap tides. Similarly, actual residence times would be shorter for regions of the flooded areas which are close to the exchange outlet or during periods of increased tidal prism, such as spring tides.

3.3.6 Excursion Length

Excursion length is an estimate of the distance traveled by water during a tidal period. It is analogous to dropping a buoy in the water and measuring how far the buoy travels during a single tide. Excursion length provides an indication of the spatial extent of water movement within the tidal timeframe. As a first approximation, the water within an excursion length of a particular location is the source of inflowing water, the destination for departing water, and the volume of water that would most rapidly mix with that location's water. Water within an excursion length can be categorized as hydraulically well-connected to that location.

A major influence on excursion length is the addition of intertidal area upstream of a location which increases the flow of water past that location. In accordance with increasing flow, current speeds and hence, excursion length, also increase. Alternatives with the largest intertidal area would yield the largest excursion lengths.

Water in Ballona Creek, at the western side of the project area, exchanges with Santa Monica Bay on each tide. In contrast, water at the eastern side of the project area remains in Ballona Creek for more than a single tide. The different outlets from Area B are just a bit further than an excursion length of each other, indicating that water that exits one flooded area would typically take at least two typical tidal cycles to enter into another flooded area. The outlets from Area A to Marina del Rey and the outlets from Area B to Ballona Creek are separated by approximately three times the excursion distance and pass through a portion of Santa Monica Bay. This indicates that Area A and Area B are not well connected by Alternatives 1-4. Only Alternative 5 would closely connect Area A and Area B.

3.3.7 Flooding

Increasing tidal inundation within the Ballona wetlands may also affect the potential for flooding. Potential changes to the flood hazard as a result of the alternatives were evaluated.

Flood hazard was considered to arise from two sources – stormwater discharge from the Ballona Creek watershed and elevated ocean water levels in Santa Monica Bay. The watershed of Marina del Rey is small and its stormwater contribution is not considered a significant flood hazard. Flood events are typically characterized by their likelihood of occurrence, where the likelihood is expressed as a return interval. For this study, the selected stormwater discharge event has a return interval of 50 years or a 2% chance of occurring in any one year. The hydrograph of this 50-year stormwater discharge, which relates the rate at which water enters Ballona Creek as a function of time, was developed by the U. S. Army Corps of Engineers (2008). This hydrograph was developed by combining: (1) modeling of the transformation of rainfall into runoff and (2) frequency analysis of past discharge events.

The second source of flood hazard, elevated ocean water levels, arises from meteorological events acting at the regional or global scale. Regional meteorological events which elevate water levels include low atmospheric pressure associated with storm systems and wind setup. El Niño is the global meteorological event which leads to elevated ocean water levels along the entire western coastline. Since a detailed frequency analysis of elevated ocean water levels has not yet been conducted, this study relied upon an event selection approach to identify typical increases in ocean water level. Water levels at the Port of Los Angeles during 12 large storm events increased an average of 1.1 ft above expected water levels (USACE Hydrology Report).

These sources of water, stormwater discharge and elevated ocean water levels, interact with the ground surface elevation to determine the depth and spatial extent of flooding. Because of the existing levees which bound Ballona Creek, flooding is also a function of hydraulic connection. By adding tidal connections, the restoration alternatives alter the potential for flooding while decreasing the peak water levels within Ballona Creek. Within the flooded areas, flood exposure increases because of additional conveyance through the new tidal connections. However, the exposure within these flooded areas can be managed to acceptable levels by configuring the tidal connections and/or the flood hazard to infrastructure can be mitigated by structural means. The input of flood waters into the flooded areas acts to reduce the flood hazard within Ballona Creek itself. Because the flooded areas provide additional storage for flood waters, flood peak water levels along Ballona Creek, downstream of the tidal connection, are reduced.

Infrastructure that is exposed to flood hazard as a result of its location within or adjacent to the project area can be protected in several ways. The infrastructure itself can be raised above peak flood levels. For instance, roadways which cross the project site could be raised on structures or earthwork to elevate them above anticipated flood levels. Flood risk for infrastructure adjacent to the project area can be mitigated by constructing new levees or improving existing levees to constrain the flooded area extent.

Alternatives 1 and 2, which have muted tidal systems, have flood peaks at or below the closure elevation. If the rate at which the water level rises is rapid then the gate may close when elevations within the site are lower. For those alternatives that allow a full tide, flood peaks in the wetland channels are generally about a foot lower than in Ballona Creek. For instance, with the 50-year storm, Ballona Creek has a flood elevation of about 8.9 ft NAVD; for the same storm conditions the southeast wetland in Area B records 7.1 ft NAVD, and the southwest marsh was 7.6 ft NAVD.

Flood peaks also lower along Ballona Creek. At the seaward end of the channel, the existing peak flood elevation is predicted to be 8.9 ft NAVD. Predictions under Alternatives 1 and 2 have similar elevations as existing conditions. Alternatives 3 and 4 exhibit a 0.5 ft reduction in peak levels because of storage in the restored wetlands. Alternative 5 has slightly less of a reduction of 0.3 ft, due in part to the channel configuration and roughness of the vegetated floodplain.

3.3.8 Tables

Table 3-3. Inundation Regime of the SRT Gates in Area B, Showing Percentage of Time Tidal Water at or Above a Given Elevation

Elevation	% of time tides at or above given elevation				
ft NAVD	Santa Monica Bay (open ocean)	SRT closes at 3.6 ft NAVD	SRT closes at 4.9 ft NAVD	SRT closes at 6.6 ft NAVD	
7.5	0%				Inundation muted
7.0	1%				
6.5	4%				
6.0	8%				
5.5	14%			0%	
5.0	19%			4%	
4.5	28%		0%	16%	
4.0	38%	0%	6%	29%	
3.5	51%	23%	42%	44%	
3.0	65%	56%	58%	57%	
2.5	74%	69%	72%	70%	
2.0	80%	76%	78%	77%	Inundation similar
1.5	85%	82%	83%	82%	
1.0	90%	87%	88%	87%	
0.5	95%	100%	91%	91%	
0.0	98%	100%	97%	97%	
-0.25	100%	100%	100%	100%	

Note: all these examples use the existing 39 ft^2 culvert; with the gate set to close at 6.6ft NAVD the tide range is damped due to the lack of capacity of the culvert.

Table 3-4. Habitat Zonation in Terms of Inundation Regime and Elevation for Full and Muted Tidal Regimes

Habitat type	Inundation regime	Elevation range, ft NAVD			
	%r	Santa Monica Bay (open ocean)	SRT closes at 3.6 ft NAVD	SRT closes at 4.9 ft NAVD	SRT closes at 6.6 ft NAVD
Salt pan	14-28%	4.5-5.5	3.5-3.6	3.8-3.9	4.0-4.6
Transition Zone	14-28%	4.5-5.5	3.5-3.6	3.8-3.9	4.0-4.6
High Marsh	28-50%	3.5-4.5	3.2-3.5	3.3-3.8	3.3-4.0
Mid Marsh	50-74%	2.5-3.5	2.2-3.2	2.4-3.3	2.2-3.3
Low Marsh	74-90%	1.0-2.5	0.7-2.2	0.7-2.4	0.7-2.2
Intertidal Channel /Mudflat	90-100%	-3.0-1.0	-0.1-0.7	-0.1-0.7	-0.1-0.7
Subtidal	100%	-5.0- -3.0			

Table 3-5. Variation of Tidal Prism for Area B Southwest Wetland

	Ballona Creek tidal prism,
	ac-ft
Ballona Creek only	235
Alt 1 and 2 Area B SRT	267
Alt 3 and 4 Area B breached	386

Table 3-6. Variation of Tidal Prism for Area B Southeast Wetland

	Ballona Creek tidal prism,
	ac-ft
Ballona Creek only	235
Alt 1 Area B add muted tidal HW and tp	250
Alt 2, 3, 4 Area B fully tidal	390

Table 3-7. Variation of Tidal Prism for Area A

	Basin H tidal prism,
	ac-ft
Existing	9
Alt 2 Area A	36
Alt 3 Area A	69
Alt 4 Area A subtidal	345

Table 3-8. Channel Network Characteristics

Alt	Area	Channel length, ft			Order, no. of channels				
		Subtidal	Intertidal	Total	1	2	3	4	5
2	Area B East	1,530	13,730	15,260	43	12	4	1	
	Area A and C	1,820	14,730	16,550	43	12	4	1	
	Total	**3,350**	**28,460**	**31,810**	**86**	**24**	**8**	**2**	**0**
3	Area B East	1,530	20,270	21,800	67	20	6	1	
	Area B West	8,010	42,070	50,080	150	43	12	4	1
	Area A and C	4,770	27,030	31,800	150	43	12	4	1
	Total	**14,310**	**89,370**	**103,680**	**367**	**106**	**30**	**9**	**2**
4	Area B East	1,530	20,270	21,800	67	20	6	1	
	Area B West	8,010	42,070	50,080	150	43	12	4	1
	Area A (5 sub watersheds)	0	10,850	10,850	60	20	5		
	Total	**9,540**	**73,190**	**82,730**	**277**	**83**	**23**	**5**	**1**
5	**Total**	**17,810**	**164,650**	**182,460**	**678**	**198**	**58**	**14**	**2**

3.4 SEDIMENT AND WATER QUALITY

Water and sediment quality are key to the proper functioning of wetland systems. Contaminants associated with poor sediment and water quality can have an effect on the health of wetland plant and animal communities and to the long-term sustainability of any restoration efforts. Accumulated contaminants may also pose a human health risk. A healthy wetland depends on the continuing flow of non-impacted tidal waters and sediment into and out of the restored areas.

Contaminants that have been detected in the water column in Ballona Creek above the water quality criteria include copper, lead, zinc, bacteria indicators, polyaromatic hydrocarbons (PAHs), and several pesticides. These contaminants are generally associated with urban runoff that may contain heavy metals, PAHs and pesticides. These constituents generally are adsorbed to, and carried by, fine-grained soils (clays) and organic materials. These materials then settle out when the water flow velocity decreases such as in a wetland. Continuous flushing through adequate circulation and channel flows would reduce the accumulation of impacted sediments; in a muted tidal system there may be periods of high water slack where increased sedimentation may occur.

Evaluation of sediments in both the Ballona tidal prism and in Marina del Rey has indicated benthic impacts and in some cases toxicity responses to aquatic organism. As indicated by the toxicity testing and benthic studies, these constituents may have negative impacts to the benthic and aquatic organisms within the wetland. Certain metals such as selenium and mercury can bio-accumulate in the wetland environment and are carried up the food-chain. Organic compounds such as PAHs and pesticides such as DDT can also bio-accumulate in organisms in the wetlands resulting in a long-term impact.

Through the Total Maximum Daily Load program, pollutant load reduction is required to reduce these impacts to the benthic and aquatic communities. TMDL implementation is, however, in its initial phases which include developing an implementation plan and identifying source of pollutants. Due to the challenges of reducing pollutant loads from highly urbanized watersheds, improvements in water quality and significant reduction in potential impacts may take twenty years or more. Therefore, alternative for the wetland restoration need to consider the potential impacts from storm flows within this projected timeframe.

Water quality in Ballona Creek may improve as a result of efforts to meet TMDL targets. The need for restricted wet weather flows would diminish compared to the importance of water quality within the wetlands achieved through adequate circulation and residence time that would require less restriction of flow in and out of the wetland

Alternatives are compared by evaluating the sediment and water quality issues associated with different sources of tidal and fresh water flows, which include Ballona Creek, tidal waters and urban storm water runoff. These issues form the criteria for which the alternatives can be assessed to assure a healthy and sustainable wetland.

3.4.1 Ballona Creek Flows

Historical and current water quality data indicate that dry weather flows from Ballona Creek exceed water quality objectives for bacteria indicators, metals, and other constituents. Dry weather flows may result in pollutant loading to the restored areas. Any alternative that increases the connection of the creek to the wetlands, through larger culverts and breaches, may increase this loading.

Storm water flows frequently exceed water quality objectives for bacteria, metals, PAHs, and pesticides in Ballona Creek. Alternatives that allow for the use of flood gates can prevent the inflow of contaminated storm water into the wetlands and reduce pollutant loading. Restricted connections, for example culverts, may reduce inflow from the Creek but would also restrict drainage leading to ponding of polluted waters on the wetlands. Unrestricted storm flows from Ballona Creek, through larger breaches and levee removal, would allow the greatest exchange of water between the Creek and wetlands. Compared to muted tidal systems this would maximize the area exposed to pollutants but this may be mitigated by the improved circulation and flushing of the system.

3.4.2 Tidal Water from Ballona Estuary and Marina del Rey

In general the oceanic water quality is better than in Ballona Creek or Marina Del Rey. In Ballona Creek the tidal influence extends up to Centinela Creek and water quality reduces further away from the ocean as a result of less mixing (a function of tide and fresh water flow). Water in Marina del Rey also exceeds the water quality objectives for bacteria indicators, metals and other constituents. However, the magnitude and frequency of these exceedances are lower in comparison to Ballona Creek. The main channel of Marina del Rey has better water quality than the back basins due to greater circulation, proximity to the ocean, and less direct input from urban runoff.

Accessing the cleaner oceanic water is dependent upon the location of the tidal connection and the excursion length of the waters in the wetlands. Alternatives that have inlets or breaches closer to the ocean would provide water of higher quality to the restored areas. Alternatives that have greater excursion lengths, through larger tidal prisms, would draw from more distant, higher quality waters. Water quality within the wetlands, compared with the muted tidal systems, would also be improved by adequate circulation and lower residence time.

3.4.3 Suspended Sediment Loading

Suspended sediment and organic matter in urban runoff attract and provide the mechanism to transport constituents such as heavy metals (copper, lead, zinc), bacteria, pesticides, PAHs and other organic compounds to receiving waters. These sediments then settle out as velocity decreases when storm flows meet tidal waters or enter into the wetlands.

Historical and current data indicate long term accumulation of these constituents in sediments in Ballona estuary and at the tide gates into Area B; sediment testing has indicated toxic effects on aquatic organisms. Suspended sediments from Ballona Creek and from local resuspension during storms, may continue to enter the wetlands and impact sediment quality.

Marina del Rey also has impacted sediments in the main channel and in several of the back basins. The sources of the impacted sediments may include the Ballona estuary, resuspension of coastal sediments during storms, storm water discharges directly into Marina del Rey and human activities within the Marina.

Alternatives that restrict flows into the wetlands during and, for a period, after storm events may reduce the supply of sediment to the wetlands but increase the potential for settling of finer material due to longer slack periods. In the long term, restricted flow and import of sediment would limit sediment cycling. This may further reduce the already limited sediment supply from the urbanized watershed.

Other storm water inflows are at the ends of Falmouth and Pershing Drives and along Lincoln Boulevard and Marina Freeway. Continued loading of these constituents into the existing wetland areas has resulted in localized impacts to sediment. All the alternatives include storm water treatment wetlands to reduce the pollutant loading. Treatment wetlands can be effective in removing heavy metals, sediment and organic compounds that adsorb to fine-grain soil particles and organic matter. The effectiveness of these systems depends on the retention time that flows entering the wetlands and the maintenance of the plants and sediments. These wetlands may only be able to reduce loads from a portion of storm water flows due to the constraints of size, through flow, and number of inflow locations.

3.4.4 Sediment Impacts

Within the project area there are contaminated soils in the creek and wetland channels. Grading of the site for an alternative may make these contaminants bioavailable. All the alternatives would alter the local flow patterns within the wetlands, either by altering the path or velocity of the flow. As a result there would be localized accretion and erosion of the existing sediment as the channels adapt to the new flow regime. This may result in the mobilization of contaminated soils which may be deposited within the site or transported out to the Creek or Marina del Rey.

Culverts and other constrictions should be sized to reduce the flow velocity below that for significant erosion. Alternatives may also include structures that reduce the velocity at locations of high flow.

3.5 SUSTAINABILITY AND MAINTENANCE

All natural systems have a certain amount of variation or trends that occur over different time scales. In a tidal wetland, these variations may include floods or droughts over the short term or changes in climate over the long term. These variations can cause stress to the system, which may be anticipated and accommodated within the design of a restoration project. Climate change, for example, would affect not only sea level but also temperature and precipitation.

In addition to long term changes, there would also be individual events that would stress the system. Variations in timing and frequency of storms are difficult to predict, as is the accidental release of contaminants. The uncertainty in the timing and magnitude of these stressors makes the operation and maintenance (O&M) of the system to unexpected changes important.

3.5.1 Long-term Sustainability - Sensitivity to Climate Change

Long-term sustainability of the restored wetlands is evaluated as the sensitivity to climate change and other long-term trends, including sea level rise and also changing rainfall patterns and sediment supply within the watershed.

Tidal wetlands exist within a very narrow vertical range, set primarily by the tidal frame. A small change in the tidal frame due to sea level rise would result in movement of the vertical distribution of tidal habitats. The response of tidal wetland to sea level rise depends primarily on:

1. sediment supply to the wetland and the associated rate of wetland accretion, and
2. the availability of space for the transgression of wetland habitats to higher elevations.

If sediment is readily available, vertical accretion may keep pace with sea level rise and the spatial distribution of tidal habitats may not change significantly. If sediment supply is low, as in Ballona Creek, accretion rates may be slower than sea level rise and habitats would transgress landward. In Alternatives 2, 3, 4 and 5, tidal wetlands would be graded to elevations that support the desired vegetation, as it is assumed accretion rates would be slow.

As sea level rises, habitats that are higher in the tidal frame would be converted to habitats that are lower in the tidal frame (e.g., high marsh is converted to low marsh, low marsh is converted to mudflat, and mudflat is converted to open water). If the transitional zone has a shallow slope, higher tide levels due to sea level rise would inundate transitional and upland habitats and convert these areas to high marsh. The space provided by shallow upland slopes allows tidal habitat to transgress up the slope with sea level rise, thereby maintaining similar acreages of habitat. If the transitional slope is steep, higher elevation habitat acreages would decrease as open water and lower elevation habitats transgress landward.

The tidal wetland habitats in Alternatives 2, 3, 4 and 5 include broad transitional slopes (1:50 to 1:70) that allow habitat transgression and can accommodate 2 to 3 feet of sea level rise. These shallow slopes would also provide valuable interim transitional habitat and act as a buffer from the surrounding urban activity. Where space is constrained and shallow slopes are not feasible, particularly where wetlands are located close to levees or roads, the transgression process would still occur but the higher elevation marsh habitat would be compressed against the slope of the levee into a narrow horizontal band. There may be loss of some wetland in the future due to the steep transitional slopes in these locations.

Alternatives 1 and 2, which include culverts or gates, allow some control of the water surface elevation. In these alternatives, a muted tidal regime would be implemented that limits the maximum water surface elevation. The result would likely be a vertical and horizontal compression of the higher elevation habitats (high marsh and transition zones). The culverts and gates would be designed to accommodate expected sea level rise.

Current assessments of climate change in California do not indicate a clear trend or significant change in precipitation patterns. Higher temperatures are expected to cause a significant shift from snow to rain in the mountains, but coastal California is relatively unaffected by snow. Significant changes in precipitation and streamflow in coastal watersheds are therefore not currently predicted. There is the potential for decreased precipitation and more severe droughts. Small changes in water balance for sensitive habitats, such as seasonal wetlands and brackish marsh, may result in temporary or permanent changes in the salinity regime of these areas. Those areas that are already fully tidal wetlands may not be directly affected but they may still be influenced by changes in occasional freshwater inputs. In this respect, wetland areas connected to Ballona Creek and its watershed would be more sensitive than those connected to Marina del Rey.

3.5.2 Operations and Maintenance (O&M)

The alternatives require varying levels of ongoing operations and maintenance (O&M). Fully tidal wetlands in Alternatives 3, 4, and 5 would be designed to be self-maintaining and are expected to require little O&M. Muted tidal wetlands in Alternatives 2 and 3 would require regular and ongoing O&M of tide gates.

In addition to routine O&M for typical conditions, there would always be unforeseen or difficult to predict events – a large flood, the accidental release of a pollutant, the failure of a mechanical structure. Ideally the alternatives should be flexible enough to accommodate such unknowns and allow the opportunity for intervention. The muted tidal wetlands in Alternatives 1 and 2 provide the ability to occasionally close off the wetlands from its main tidal source, which could prevent high flows or contaminants from entering the site. A flood or tide gate may be added to a culvert with relative ease; however, it is much more difficult to close off the breaches and lowered levees in Alternatives 3, 4, and 5 from Ballona Creek. On the landward side, preventing flows from entering the site is more difficult due to the number of potential inflows and the difficulty of rerouting the flows to the ocean. For fully tidal wetlands in Alternatives 3, 4, and 5, the breaches may allow better flushing of contaminants entering from either the creek or adjacent land.

If controls are used as part of the management of the alternative, planning should include system response if the control fails. For instance, if a tide gate fails to operate then the impact it would have on the wetlands would differ depending on whether it failed open or shut, at high or low water. Ideally the tide gate should not be the only protection against excessive water levels, there should be redundant measures such as additional ebb culvert barrels and landward levees.

Another consideration is the reversibility of an alternative. All alternatives would have an adaptive management plan in which it may be desirable to manipulate conditions. Changing the operation of an existing gate has less risk than changing the tidal inundation by removing a section of the levee. If conditions change and the system does not respond as required then the ability to revert to the former state may be desirable. Another example may be the enhancement of existing uplands, where changes envisioned in Alternative 1 and 2 are mainly related to management rather than structural changes and could more easily be reversed.

3.5.3 Vectors

Mosquitoes occur in wetland ecosystems where certain species can be vectors for viral diseases such as forms of encephalitis and more recently West Nile Virus. Understanding the life cycles and habitat requirements of the species that can be disease vectors is important in their control. Mosquitoes breed in standing water. Mosquitoes rarely occur in significant numbers in areas of tidal wetlands that are regularly inundated and drained over the tide cycle. Problems can occur in areas of tidal wetlands that are not well drained, such as ponds and pans that are infrequently or seasonally inundated, densely vegetated areas that pond water between tides, or locations where tidal drainage has been interrupted. Maintenance (e.g., spraying) may be required to address vector issues for poorly drained areas of tidal marsh.

For muted tidal wetlands, the designs should provide the ability to drain areas of standing water when required. This could be accomplished by operating gated culverts to drain the wetland on an occasional basis. Open areas of standing water should be large enough to allow wind waves to disturb the surface and dense vegetation around the edges should be avoided.

Additionally, wide buffers between wetlands and residential areas can reduce the likelihood of vector issues. The design of the alternatives should provide access points for mosquito surveillance and control.

3.5.4 Invasives

Biological invasions by exotics represent one of the most serious threats to ecosystem integrity and functioning. Invaders can detrimentally alter habitats, eat native species, and act as disease agents. Millions of dollars are spent annually in combating exotic plant pests just within southern California. Managing exotic species is complicated, as invaders are living organisms that can adapt to their new environments and have diverse, cascading effects. Invasive species may become established in restored upland and wetland habitats, requiring costly removal and maintenance efforts.

Salt marshes in southern California have been relatively free from invasions of wetland plants. Some localized exceptions include a mangrove (*Avicennia marina*) intentionally introduced into Mission Bay, San Diego, a sea lavender (*Limonium ramosissimum provinciale*) in Carpinteria salt marsh in Santa Barbara and *Tamarix* which has invaded the high marsh at Tijuana Estuary in San Diego County.

Upland area in southern California have some particularly troublesome plant invaders including giant reed (*Arundo donax*), which forms dense stands in riparian, brackish and fresh water wetlands, and salt cedar (*Tamarix* spp.), which have invaded riparian habitats, uplands, transition zones and high salt marsh. The major invaders at Ballona include , wattle (*Acacia* spp.), myoporum (*Myoporum laetum*), Russian thistle (*Salsola tragus*) mustard (*Brassica* spp.), garland daisy (*Chrysanthemum coronarium*), wild radish (*Raphanus sativus*), castor bean (*Ricinis communis*), pampas grass (*Cortaderia jubata*), fennel (Foeniculum *vulgare*), brazillian pepper tree (*Schinus terebinthifolia*), slender fan pam (*Washingtonia robusta*), non-native spurge (*Euphorbia* spp.), multiple varieties of ice plant (*Aizoaceae*) and non-native grasses have invaded disturbed upland areas and continues to spread.

Important vertebrate invaders that may affect restoration efforts include cowbirds, which are nest parasites that affect the endangered Least Bell's Vireo, and predatory red fox and house cats. These primarily upland invaders can also enter the wetland areas, impacting the native species. Estuarine and marine invaders include the clam-smothering mussel (*Muscalista senhousia*) and the carnivorous yellowfin goby (*Acanthogobius flavimanus*), the "killer" alga *Caulerpa taxifolia*, the salt-marsh destroying crustacean *Sphaeroma quoyanum*, and the mud-flat invading cordgrass *Spartina alterniflora*.

Alternatives with greater area of upland habitats would have greater impacts from invasive species and provide more opportunities for them to impact the adjacent wetland habitats. Alternatives 3, 4 and 5 provide the greatest area of contiguous wetland habitat (see Table 3-3), while Alternative 5 provides a significantly smaller edge to area ratio (Table 3-4).

3.6 PUBLIC ACCESS, RECREATION AND SAFETY

The goal of the public access plan is to provide "enhanced access to and within the Ballona Ecosystem consistent with ecosystem preservation and restoration values in a safe, consistent, coherent and functional manner," as per project objectives in the Ballona Wetland Restoration Plan Goals and Objectives (Appendix A). Public access features would be developed in concert with habitat restoration efforts to ensure maximum resource protection while providing a valuable recreational experience for the community. Providing public access and interpretive features about habitat restoration in turn provides increased public education, awareness, and support of local biological and physical resources present within the Ballona Wetlands. Providing strategically-placed public access features and limiting the intensity and duration of recreational use at the Ballona Wetlands would reduce impacts to the wetlands and enhance opportunities to involve the public in restoration and monitoring efforts.

The proposed public access and recreation features include a system of trails and overlooks, gateway entrances, interpretive stations, pedestrian bridges, bicycle parking, parking areas, boardwalks, vehicular pullouts, and visitor center. These would provide a diversity of public access and recreation opportunities for a wide range of users. The goal for the future design of these features would be to integrate all aspects of the project into a coherent system of restoration and public access that provides a clear sense of place within the context of the Ballona Wetlands and surrounding landscape.

The California Fish and Game Commission has designated the majority of the project area as a State Ecological Reserve. The purpose of the designation is to provide protection for rare, threatened or endangered native species. Public entry and recreational use of ecological reserves is subject to general rules and regulations to ensure that recreation is compatible with the primary purpose of resource protection.

In order to protect natural resources on the site and limit impact to wetland areas, a controlled and appropriate level of access to the Ecological Reserve would be provided as part of restoration. The public access strategy would focus on managing and concentrating recreation use within the site. The restoration and public access design would accommodate an appropriate level of fishing, boating, walking, and other activities consistent with the Ecological Reserve designation and ecosystem restoration values:

- **Walking**. Currently, access to the Ecological Reserve for walking or hiking is authorized on a case-by-case basis, and the site is not yet open to the general public. However, there is a public trail and self-guided interpretive tour located along the perimeter of the Freshwater Marsh. Walking or hiking would likely be the predominant recreational use of the site.

- **Biking**. Several local and regional bicycle routes are located near the Ballona Wetlands. No formal off-road or trail bicycle paths exist within the wetlands. The Ecological Reserve designation permits biking only on the designated bicycle path located on the north bank of Ballona Creek. Bicycle use is not permitted within the Ecological Reserve or Freshwater Marsh area.

- **Fishing**. Fishing currently occurs on both sides of Ballona Creek and from the downstream pedestrian bridge. The Ecological Reserve designation permits fishing with barbless hooks from the shoreline of Ballona Creek or from boats within the Ballona Creek channel. Fishing within the wetland area is restricted and by permit only.

- **Boating**. The Ballona Creek channel is currently used for both motorized and non-motorized boating. The University of California Los Angeles and Loyola Marymount University rowing teams use the Ballona Creek channel for crew practice. The Ecological Reserve designation permits boating within the Ballona Creek channel. Boating within the wetland area, however, is restricted and by permit only.

- **Other Recreational Uses**. Playa Vista Little League currently plays baseball on three fields located within the Ecological Reserve (Area C).

Public access and recreation features would provide a variety of settings, including access to the estuarine environment and retreat from urbanized areas, and would provide recreation opportunities for a variety of visitors. Access would be designed to be as barrier-free as possible to provide access for visitors of varying abilities and to comply with the Americans with Disabilities Act. In some locations, trails may be designed to accommodate vehicular use in order to provide access for security or maintenance. Raised boardwalks would be strategically located to maximize interpretive and educational opportunities related to the site and ongoing restoration activities. Exact trail locations and characteristics would be further developed when the preferred alternative is identified.

Table 3-9 details the number, length and location of public access features.

The Ballona Wetlands are also an important crossroad within the regional trail network. Both the coastal South Bay Bicycle Trail and the Ballona Creek Bicycle Trail run along the boundary of the site. Running north/south, the South Bay Bicycle Trail is a 22-mile paved trail that runs from Will Rogers State Beach in the north to Torrance County Beach in the south. Running east/west, the Ballona Creek Bicycle Trail runs along the south boundary of Area A and concludes in Culver City. The project is an opportunity to increase regional connectivity by developing an integrated trail network within the project site that connects to the surrounding regional trail network. The Alternatives would both preserve and enhance regional connectivity through connections of loop trails within the project area to the regional network. These connections would provide regional and local trail users with a range of opportunities and destinations.

Providing public access and interpretive features regarding habitat restoration in turn provide increased public education, awareness, and support of local biological and physical resources present within the Ballona Wetlands. Interpretive stations would be developed at strategic locations such as at gateway entrances, overlooks, or along the trail network within the project area. Educational signage and interpretive panels would facilitate a greater understanding and appreciation of the landscape. A potential visitor center and other opportunities for outdoor education and interpretation would provide a rich diversity of public access and recreation opportunities for a wide range of users. The goal for the future design of these features would be to integrate all aspects of the project into a coherent system of restoration and public access that provides a clear sense of place within the context of the Ballona Wetlands and surrounding landscape.

The prehistoric resources within and near the Ballona project area, including LAN-54, contain human remains and other materials that are of extremely high heritage value and sensitivity to the contemporary Gabrielino/Tongva Native American groups. Efforts to enhance cultural awareness of these resources and Native American lifeways in general should therefore be closely coordinated with the California Native American Heritage Commission and those groups identified as having specific concerns for the Ballona area.

As outlined in the Ballona Wetland Early Action Plan, interpretive panels would highlight habitat characteristics and diversity, watershed history, and Native American site usage through clear, consistent and attractive displays (Conservancy 2007). Overlooks or viewing platforms would be located at vista points where important features of the landscape can be viewed and/or opportunities for wildlife viewing and birding exist. Associated interpretive information would be provided at these facilities based on the opportunities provided at the facility sites.

Public access within Ballona Wetland would be developed in a manner that is “safe, consistent, coherent and functional” for the safety of the public, long-term management, and maintenance of the site. The separation of incompatible uses, such as bikers and walkers or bikers and cars is important for public safety and security in the area. The Ballona Wetlands are located in a densely population area surrounded by busy roads and popular regional bike paths. The Ecological Reserve designation provides clear guidance on allowable recreational uses within the site.

The most common unauthorized uses within the project area are BMX biking, dog walking, homeless encampments, dumping, and off-trail walking. Unauthorized use of the site can have an adverse impact on the landscape. Therefore, controlling these uses is critical to successful habitat restoration. Wetland restoration would inherently preclude access to portions of the site by creating deepwater and wetland habitat.

Lincoln Boulevard, Jefferson Boulevard, and Culver Boulevard, as well as street ends to the west and north, provide site access for automobiles. Current on-site parking includes an unimproved lot behind Gordon’s Market in Area B, paved on-street parking along Jefferson Boulevard at the Freshwater Marsh, and a paved parking lot at the Little League baseball fields in Area C. Safe traffic access would be provided by designating parking areas, creating roadside pullouts to provide formalized automobile access and viewing locations, and discouraging unauthorized roadside parking.

3.6.1 Tables

Table 3-9. Public Access Features Comparison

Public Access & Recreational Features	Alternative 1 (length/ number)	Alternative 2 (length/ number)	Alternative 3 (length/ number)	Alternative 4 (length/ number)	Alternative 5 (length/ number)
Trails					
Area A: Trails	8,800 feet	8,000 feet	9,450 feet	3,550 feet	4,450 feet
Area B: Trails	29,600 feet	29,600 feet	27,000 feet	27,000 feet	16,200 feet
Area C: Trails	7,200 feet	6,700 feet	7,150 feet	6,550 feet	2,250 feet
Boardwalks	1,900 feet	1,450 feet	1,350 feet	3,650 feet	3,850 feet
Access Points & Overlooks					
Gateway Entrances	11	11	11	10	7
Overlooks	4	6	9	9	10
Parking and Pullouts					
Formal Parking Areas	4	4	4	4	4
Vehicular Pullouts	0	0	2	2	2
Pedestrian Crossings					
Pedestrian Creek Bridge Crossing	1	1	1	1	1
Pedestrian Road Crossing	2	2	1	1	5

3.7 PHASING AND COSTS

This section describes the probable construction costs for the five selected alternatives as described in Chapter 2. In determining an opinion of probable construction costs appropriate to conceptual level design, several assumptions were required. These assumptions included:

- construction methods
- unit costs
- project sequencing and phasing
- permitting
- property acquisition

Table 3-10 is included to illustrate the level of accuracy and amount of contingency which is typically included in cost estimation for construction projects at various levels of design. This table is from the Cost Estimate Classification System, developed by the Association for the Advancement of Cost Estimating (AACE, 1997). As shown in the table, a particularly wide range in accuracy is assumed inherent for project design at the conceptual level. In addition, contingency is a large percentage of the estimated project costs, decreasing as the level of design is increased.

The “estimates of probable costs” are summarized in Table 3-11. Appendix D contains detailed cost estimates for each alternative by area and supporting information. It is important to note that these are large scale construction projects and that the alternatives involve significant intervention, and hence would require further detailed analysis and engineering design that would likely lead to additional refinements. Consequently, at this conceptual design phase, a cost contingency of 35% is included. We anticipate that actual construction costs could be reduced significantly through more detailed engineering. This is particularly true of the unit costs identified for fill placement; if a major fill element is included in the project, there is an opportunity to develop a construction methodology with a lower cost. Also, land costs are not included. At this stage, it is anticipated that all construction can be accomplished on publicly-owned land, and land and easement purchase costs are therefore not included. Also, costs associated with environmental restrictions of construction including timing and phasing are not explicitly treated.

These estimates are subject to refinement and revisions as the design is developed in future stages of the project. The cost tables summarize the cost of construction, and do not include estimated project costs for additional studies, permitting, detailed design, construction observation, monitoring and ongoing maintenance. Estimated costs are presented in 2008 dollars, and would need to be adjusted to account for price escalation for implementation in future years. This opinion of probable construction costs is based on: PWA’s prior experience, prices from similar projects, and consultation with contractors and others involved in comparable projects.

Note these estimates of probable construction costs and the actual costs at the time of construction may vary. The cost of construction would be impacted by the availability of construction equipment and crews and fluctuation of supply prices at the time the work is bid. PWA makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bids or actual costs.

3.7.1 Notes on Cost Estimate Assumptions

Quantities were estimated conservatively (high). For the grading of the subtidal, mudflats and marsh plain, it is assumed the grading was to the desired elevation and volumes were calculated using the "average end area method." For channels, it is assumed that only the largest channels (order 3, 4 and 5) would be excavated, and that these channels would be excavated to their modeled, equilibrium dimensions. Quantities of material used in levees were increased to account for settlement.

Appendix D (Table D-2) includes the unit costs and assumptions used in the cost estimate. The cost of excavation is the most expensive item in Alternatives 2 to 5. The cost used for excavation is $15/CY, which may be high. The use of scrapers or other efficient construction methods may have a lower unit cost. However, in this case, over-excavation and/or ripping of the soil may be required to give a suitable substrate for wetland restoration. This additional work would increase costs. Therefore, lower unit costs are not recommended for use in the cost estimate without further analysis of engineering and constructability considerations.

Onsite trucking and placement of excavated material is included as a separate item in the cost estimate. The cost estimate assumes that as much material as possible is reused within the same area to construct levees. Even so, each alternative generates more material than can be reused on site. There is no requirement to move material from one area to another, with the exception of Alternative 1. In Alternative 1, material excavated in Area A would be trucked to Area B and used as fill for levee construction along the daylighted culvert. It is assumed that the excess quantity from each area will be placed on site in stockpiles, at least until the material is disposed of off site. Table 3-12 lists the volume of excess material to be stockpiled (Appendix D, Table D-4 includes a rough calculation of possible stockpile areas).

Options for disposal may include:

Option 1 / 2. Remove sediment, barge sediment to the Port of Los Angeles (POLA), and unload dredged material at POLA (Option 1) or dispose material at a confined disposal facility (CDF) at POLA (Option 2).

Option 3. Remove sediment, barge sediment to POLA, and truck to landfill for beneficial use as landfill cover.

Option 4. Remove sediment, barge sediment to POLA, and dispose contaminated material at a hazardous waste landfill. The level and extent of on-site contamination is presently unknown.

Option 5. Remove sediment, barge sediment offshore, and dispose sediment offshore (Offshore Disposal).

Option 6. Remove sediment and dispose sediment on a nearby beach (Beach Disposal).

POLA identified and evaluated disposal Options 1 to 4. A preliminary draft cost estimate table prepared for POLA by Weston (Weston, undated) for these options was provided. There are uncertainties associated with the preliminary draft table and conceptual-level cost estimates. Disposal costs were not estimated for this report. The POLA/Weston cost estimate information was used to estimate the costs for Options 1 to 3. Mobilization (8%) and a 35% contingency were added to the disposal cost estimates for consistency with the estimates in this report and to account for uncertainties. Cost estimates for Option 4 are not included because information on contamination is not currently available.

For offshore disposal (Option 5) and beach disposal (Option 6), a range of costs is included in the estimate. On the lower end of the range, the costs for offshore disposal (Option 5) and beach disposal (Option 6) may be as low as the costs for disposal at POLA (Option 1 / 2). The upper end of the range for offshore disposal (Option 5) may be as high as the unit cost for dredging and offshore disposal at Upper Newport Bay provided by the SCC (G. Gauthier, SCC, pers. comm.) This unit cost is $28 per cubic meter for dredging and disposal about three to five miles offshore (S. Brodeur, County of Orange, pers. comm.). For beach disposal (Option 6), the upper end of the unit cost may be about $10/CY higher than the costs for Option 1 / 2. The cost estimates for disposal options should be updated at the next opportunity. Table 3-13 summarizes the disposal option cost estimates for each alternative.

3.7.2 Phasing

Areas A and C and Area B are not hydraulically connected in Alternatives 1 to 4 and so their construction may be phased in either order. In addition, it would be possible to construct Area A prior to Area C in each of these alternatives. Since each area generates more than enough material to construct levees, there is no need to stockpile material for use in later phases.

Alternative 5 is shown as being constructed in three phases (see Figure 2-9). A breakdown of the cost estimate between phases is included in Table 3-11. Excavation of Area A and removal of the Ballona Creek levees downstream of Lincoln Boulevard would occur first. This would require the construction of a temporary levee across the northern part of Area B and adjacent to Culver Drive. This temporary levee would increase the costs of phasing Alternative 5 compared to the cost estimated for Alternative 5 without phasing. The second phase would consist of restoring the remaining portion of Area B once the first phase habitat had been successfully established. Finally, Area C would be restored in the third phase. The advantage of phasing would be to spread costs over a longer period of time and take advantage of the timing of other projects, such as the widening of Lincoln Boulevard. The project could be stopped at the end of any of the phases and still leave a functioning system.

3.7.3 Tables

Table 3-10. Levels of Cost Estimate Accuracy and Contingency for Different Levels of Design

Design Completion Level	Cost Estimate Accuracy	Contingency
Conceptual (order of magnitude costs)	-30% to +50%	35–50%
Preliminary (30%)	-15% to +30%	20-25%
40 to 70% complete	-15% to +30%	15-20%
70 to 100% complete	-5% to +15%	10-15%

Table 3-11. Summary of Engineer's Estimates[1] for Alternatives 1 to 5 (cost in Millions of Dollars)

Alternative	Area A	Area B	Area C	Total
1	$4.0	$2.6	--	**$6.6**
2	$42.6	$16.0	$3.3	**$61.8**
3	$69.3	$55.5	$5.2	**$130.0**
4	$108.4	$55.5	$5.2	**$169.0**
5	$99.8	$59.0	$50.4	**$209.3**
	Phase 1	**Phase 2**	**Phase 3**	
5 [2]	$110.4	$48.8	$50.5	$209.7

Notes:

1 - Estimated construction costs include a 35% contingency

2 - The cost estimate for phasing Alternative 5 is higher due to the construction of a temporary levee

Table 3-12. Estimated Volumes of Excess Material to Be Stockpiled.

	Stockpile Volume (ac-ft)			
	Area A	**Area B**	**Area C**	**Total**
Alternative 1	50	-	-	**50**
Alternative 2	590	120	60	**770**
Alternative 3	1,040	600	90	**1,730**
Alternative 4	1,700	600	90	**2,390**
Alternative 5	1,650	760	840	**3,250**
	Phase 1	**Phase 2**	**Phase 3**	
Alternative 5	1,790	570	830	**3,190**

Table 3-13. Summary of Estimated Costs[1] for Disposal Options. Costs in Millions of Dollars

							Alt 5 with Phasing [2]			
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Phase 1	Phase 2	Phase 3	Total [2]
On-Site Work		$6.6	$61.8	$130.0	$169.0	$209.3	$110.4	$48.8	$50.5	$209.7
Disposal Volume (CY)		86,400	1,241,440	2,789,580	3,853,140	5,231,600	2,889,960	923,500	1,344,600	5,158,060
Off-Site Disposal Options										
Option 1 / 2	Unload Dredged Material at POLA / Disposal at CDF at POLA	$1.3	$19.1	$43.0	$59.4	$81.0	$44.5	$14.2	$20.7	$81.0
Option 3	Beneficial Use - Landfill Cover	$4.2	$59.7	$134.1	$185.2	$252.6	$138.9	$44.4	$64.6	$252.6
Option 4	Disposal at Hazardous Waste Landfill [3]									
Option 5	Offshore Disposal (low end of range)	$1.3	$19.1	$43.0	$59.4	$81.0	$44.5	$14.2	$20.7	$81.0
	Offshore Disposal (high end of range)	$3.6	$51.0	$114.6	$158.3	$216.	$118.7	$37.9	$55.2	$216.0
Option 6	Beach Disposal (low end of range)	$1.3	$19.1	$43.0	$59.4	$81.0	$44.5	$14.2	$20.7	$81.0
	Beach Disposal (high end of range)	$2.7	$38.3	$86.0	$118.7	$162.	$89.1	$28.5	$41.4	$162.0

Notes

1 - Estimated construction costs include a 35% contingency

2 - The cost estimate for phasing Alternative 5 is higher due to the construction of a temporary levee

3 - Estimate not included for Beneficial Use - Landfill Cover, contamintant report pending

4. SUMMARY

1. The project goal is to create functional estuarine habitat, including shallow subtidal, mudflats, fully tidal wetlands, salt pan and transitional habitats. Extensive enhancement of muted tidal wetlands or upland habitat, such as coastal sage scrub, grassland and saline seasonal marsh, does not achieve the project goal. However, upland habitat may provide some support for functioning estuarine habitat. Alternatives 3, 4 and 5 create the largest areas of fully tidal estuarine habitat while Alternatives 1 and 2 have larger areas of upland and muted tidal habitat. As discussed in Section 3.1, tidal estuarine habitats would benefit vascular and non-vascular plants, small mammals, a diverse community of aquatic invertebrates and many bird species known to utilize other southern California wetlands. Alternatives 4 and 5 create large areas of shallow subtidal habitat adjacent to mudflat. This would provide spawning and nursery habitat for pelagic and demersal fish species; these may disperse to the adjacent nearshore habitat and to other regional wetlands.

2. Transitional habitats, between tidal wetlands and upland, support a unique assemblage of vascular plant species and provide additional support for terrestrial species such as snakes, lizards, small mammals and birds. Transitional habitats also provide refuge for wildlife during periods of high water, serve as buffers against human activity, and allow for transgression of wetland habitats with rising sea levels. Alternatives 3, 4 and 5 provide the widest and largest area of transitional habitat. Muted tidal systems, as in Alternatives 1 and 2, have a reduced tidal range and therefore a compressed vertical range of habitats, limiting the area of transitional habitat that can be created.

3. Upland areas would support populations of vascular plants and provide foraging and nesting habitat for a number of bird species. Upland areas would also provide breeding and foraging habitat for insect pollinators, butterflies and moths, birds, herpetofauna and some mammals. All alternatives provide some upland habitat; however, there is a trade-off between the acreage of estuarine habitat and upland habitat. Alternatives 1 and 2 have the most upland habitat and the least change to the existing habitat mix. Freshwater seasonal wetlands, including vernal pool habitat, would benefit specific vascular and non-vascular plants, aquatic invertebrates and herpetofauna uniquely adapted to this environment, Alternatives 2, 3 and 4 create vernal pools.

4. Alternatives with larger, contiguous, areas of wetland habitat are more likely to sustain populations of associated species. Alternatives 3, 4 and 5 have larger areas of contiguous wetlands with fewer roads, wider transitions and more channels. These alternatives would have a higher quality of wetland habitat because they would be more remote from noise, lights, cars, and other human impacts. Alternatives with larger areas of contiguous wetland would also have fewer impacts from, and require less active management for, invasive plant and animal species.

5. Fully tidal systems allow for greater tidal circulation and reduced residence time. This would lead to a more rapid exchange of water with the ocean, and positive effects on exchange of gases, nutrients, fish larvae, sedimentation and improved water quality. Alternatives 1 and 2 have large areas of muted tidal wetland; Alternatives 3, 4 and 5 create fully tidal wetlands. The large intertidal areas of Alternative 2, 3 and 5 would have the shortest residence times, completely draining on most tidal cycles. Alternative 4 has a substantial subtidal volume, which would flush over several tidal cycles.

6. A complex tidal channel system allows water, sediment and nutrients to reach all parts of the wetland and provides diverse habitats. The complexity of the channel network depends on the area of the wetland and its tidal prism. Alternatives 3, 4 and 5 have large tidal prisms and would support an extensive and complex channel network with a large range of channels sizes.

7. The higher quality sources of tidal water are the ocean and Marina del Rey. The ability to bring this water into the wetlands would depend on the location of the tidal connection and the tidal excursion length. Alternatives 2, 3 and 4 improve tidal connections between Area A and higher quality water in Marina del Rey; this would also benefit habitat connectivity for fish species. All alternatives have some connection to Ballona Creek, which has poorer water quality. Longer excursion lengths increase the mixing of water on each tidal cycle, improving water quality. Alternatives 3, 4 and 5, with the largest tidal prism, have excursion lengths extending to the ocean.

8. The form of the tidal connection would affect the connectivity and function of habitat by influencing the movement of sediment, seeds, gases, nutrients, fish and fish larvae. Tide gates in Alternatives 1 and 2 would control water surface elevations within the wetlands but would limit connectivity with Ballona Creek and Marina del Rey, reducing diversity, and limiting primary productivity. Gates can also control pollutant loading, especially during storm events, although muted tidal systems would have a longer residence time allowing greater settling of pollutants. Gates would require regular maintenance and management as failure could impact habitat and cause flooding. Fixed structures, such as gates and culverts, need to accommodate both scour and sea level rise in their design.

Breaches in Alternatives 3 and 4 allow for full tidal range, movement of larger fish and greater seed dispersal. Open breaches would allow greater tidal circulation, reduced residence times and would be able to adapt to rising sea levels. Levee removal in Alternative 5 has the advantages of breaches and increases the interaction between the wetlands and the Creek - creating gradients of inundation and salinity across the site, letting the morphology evolve and allowing for periodic disturbance by flooding and scouring.

9. All of the alternatives would maintain the existing level of flood protection. Alternatives 1 and 2 have muted tidal systems, which would maintain the existing flood levels. These

alternatives rely on tide gates. Alternatives 3, 4 and 5 can accommodate higher flood levels by the construction of new levees and provide additional flood storage, reducing peak flood elevations.

10. All the alternatives would include principles of adaptive management in their Operation and Maintenance strategy. Alternative 1 has little change from the present situation and the risk associated with implementation is low. The restoration of wetlands in Alternative 2, 3 and 4 could be undertaken in distinct hydrologic areas which would allow for adaptive management and experimentation. Alternative 5 restores a large, contiguous area of habitat connecting a number of existing hydrologic units with Ballona Creek. This alternative makes the greatest change to the site, would be the hardest to reverse and consequently has the most risk. This risk may be mitigated to an extent by phasing the implementation.

The following tables have been developed from the above summary. They indicate favorable characteristics in terms of habitat, hydrology and public access. Check marks indicate which alternatives have these characteristics and the number of check marks indicates the relative degree. The number in brackets refers to the relevant summary paragraph above.

4.1 TABLES

Table 4-1. Summary of Habitat Characteristics

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Large areas of fully tidal estuarine habitat (1)		√	√√	√√√	√√√
Large areas of mudflat (1)			√	√√	√√
Large areas of shallow subtidal habitat, adjacent to mudflats (1)				√√	√√
Extensive channel network (6)	√	√	√√	√√	√√√
Wide transitional habitat (2)		√	√√	√√	√√
Large areas of enhanced upland habitats (3)	√√	√√	√	√	
Allows for dynamic interaction between Ballona Creek and the Wetlands					√
Larger and more hydraulic connections between wetland habitats, Ballona Creek and the ocean (5, 7, 8)		√	√√	√√	√√√
Hydraulic connection to Marina del Rey (7)		√	√	√√	
Fewer culverts and tide gates; more breaches and levee removal (7, 8)			√	√	√√
Larger contiguous areas of estuarine habitat with fewer roads and more channels (4)			√	√	√√

Table 4-2. Summary of Hydrology, Sediment and Water Quality Characteristics

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Full tidal range (1)		√	√√	√√√	√√√
Large channel network (6)		√	√√	√√	√√√
Daylights culverts, creates breaches (8)	√	√	√√	√√	√√
Large tidal prism (5, 7)		√	√√	√√√	√√√√
Short residence time (5)		√√	√√	√	√√√
Long excursion length (7)		√	√√	√√√	√√√
Control of flows by gates (8)	√	√			
Maintains existing flood levels (9)	√	√			
Increase in flood storage (9)			√√	√√√	√√√
Stormwater wetlands	√	√	√	√	√
Hydraulic connection to Marina del Rey (7)		√	√	√√	

4.2 RANKING OF ALTERNATIVES

Ranking is based upon the ability of each alternative to meet the project goals: the creation of functioning estuarine habitats, tidal circulation, connectivity of habitat areas, ability to address sediment and water quality, sustainability and maintenance. The alternatives are ranked from 1 to 5, with 1 being the highest rank.

In order to protect natural resources on the site and limit impact to wetland areas, a controlled and appropriate level of access to the Ecological Reserve would be provided as part of restoration. The alternatives are not ranked according to public access; each alternative can be modified to accommodate varying degrees of access as described in the feasibility analysis.

<u>Alternative 1 – Rank 5</u>
Alternative 1 is ranked the lowest because this alternative:

- does not achieve the project goals of creating a functional estuarine habitat;
- maintains existing upland habitat and does not provide fully tidal habitat;
- does not address existing problems of invasive species, limited buffers, poor tidal circulation, poor connectivity between habitat areas, and supports only a limited number of targeted wetland species;
- has upland areas that would require continuous management for a muted tidal system, invasive species and human impacts; and
- accommodates sea level rise through tidal muting.

<u>Alternative 2 – Rank 4</u>
Alternative 2 is ranked 4th because this alternative:

- creates fully tidal areas with better connections to Marina Del Rey although existing muted tidal areas remain;
- maintains significant upland areas;
- does not take advantage of whole site;
- does not address existing problems of invasive species, limited buffers, tidal circulation restricted by levees, poor connectivity between habitat areas;
- has upland areas that would require continuous management for a muted tidal system, invasive species and human impacts; and
- accommodates sea level rise through tidal muting.

<u>Alternative 3 – Rank 3</u>
Alternative 3 is ranked 3rd because this alternative:

- creates fully tidal areas across the whole site;

- creates complex channel networks;
- improves tidal circulation with breaches and larger connection to Marina del Rey water;
- creates large contiguous areas of habitat and large buffer areas;
- has poor connectivity between habitat areas across the site; and
- accommodates sea level rise through transgression.

Alternative 4 – Rank 2

Alternative 4 is ranked 2rd because this alternative:

- creates fully tidal areas across the whole site;
- creates complex channel networks;
- improves tidal circulation with breaches and larger connection to Marina del Rey water;
- creates large contiguous areas of habitat and large buffer areas;
- has poor connectivity between habitat areas across the site;
- includes subtidal habitat adjacent to wetlands using Marina Del Rey water ;
- has longer residence time in subtidal areas; and
- accommodates sea level rise through transgression.

Alternative 5 – Rank 1

Alternative 5 is ranked the highest because this alternative:

- is the most likely to create a functional estuarine habitat as per the project goals;
- creates the largest complex channel network;
- improves tidal circulation through a direct connection to Ballona Creek;
- has the largest tidal prism, lowest residence time, and greatest tidal excursion;
- creates the largest contiguous area of wetland;
- has the greatest connectivity across the site;
- allows interaction between the wetlands and the Creek;
- restores gradients in salinity and inundation;
- allows periodic disturbance by flooding and scouring; and
- accommodates sea level rise through transgression.

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APPENDIX A.
GOALS AND OBJECTIVES, OPPORTUNITIES AND CONSTRAINTS

Appendix A

Ballona Wetlands Restoration Plan
Goals and Objectives,
Opportunities & Constraints

The purpose of this document is to identify key characteristics of the project area that present opportunities for achieving the restoration planning goals and objectives as well as those that may limit (or place constraints on) the achievement of those goals and objectives. The ideas listed below tend to be generalized, this document is an effort to take information about the existing conditions of the area and assess what that information tells us about achieving the project's goals and objectives.

This table does not evaluate the relative importance of specific opportunities or constraints and there are internal inconsistencies among the opportunities and constraints identified. Inherent in some of the opportunities are preferences, priorities and approaches to wetland restoration and because of these differences, some conflict with one another. The purpose of this document is not to resolve these potential conflicts, but rather to be sure there is a common understanding of the project area's potential for achieving the fullest range of goals.

Goal 1: Ecosystem Restoration: Restore, enhance, and create estuarine habitat and processes in the Ballona Ecosystem to support a natural range of habitat and functions, especially as related to estuarine dependent plants and animals.

Sub-goal 1. Habitat: Preserve, restore, enhance, and create a variety of functional wetland, estuarine and other habitats representative of the Ballona Ecosystem.

Objectives:

a. *Support existing and future habitat based on identified regional needs*

b. *Create spatial connectivity within the site*

c. *Create appropriate edge habitat and connectivity to adjacent areas of the Ballona Ecosystem*

d. *Provide landscape-level function at a regional scale addressing habitat/landscape patches, corridors, connectivity and mosaics landscapes. Provide habitat for migratory birds, fish nurseries, etc.*

Opportunities	Constraints
Preserve, restore, enhance, and create multiple habitats historically associated with both the Ballona Wetlands and the region.	Because the size of the site is limited, it may not be possible to incorporate large enough patches of all historic habitat types to ensure their viability.
Restore and create fully tidal wetland habitat	Habitats are fragmented by the existing roads, infrastructure and surrounding development
Preserve and enhance seasonal ponding areas	Existing habitats on site could be displaced by future enhancement, such as the restoration of tidal inundation
Create regional habitat linkages and corridors	Site has been filled, existing soil types may not be appropriate for reestablishment of all historic habitats
Incorporate adjacent upland habitats along with transitional habitats linking wetlands and uplands.	
Restore diverse habitats based upon gradients of elevation, hydroperiod and salinity	

Sub-goal 2. Biodiversity: Preserve and increase the native biodiversity of the Ballona Ecosystem. Identify and protect multiple levels of diversity (e.g. species, habitats, biogeographic provinces and trophic structure).

Objectives:

a. *Increase diversity and populations of rare and endangered plant and animal species.*

b. *Establish and maintain diverse native plant communities, including vascular plants, algae, and diatoms.*

c. *Support a diverse complement of species including: birds, fish, amphibians, reptiles, native aquatic and terrestrial invertebrates.*

Opportunities	**Constraints**
Restore biodiversity historically associated with the region, including common, rare and locally extirpated species.	Implementation of restoration efforts will entail impacts to existing species to some degree and may need to be mitigated in some way
Strategically design habitat to ensure recruitment and survival of targeted species	Site may too small and isolated to support some species
Restore microhabitats that support various life stages of species	May become a biological sink as a result of invaders, predators or other impacts
	Restricted tidal connection could limit the species of fish that can be established

Sub-goal 3. Physical/Chemical Processes: Maintain and establish physical and chemical processes consistent with the restoration goals.

Objectives:

a. *Improve tidal circulation and enlarge the amount of area that is tidally inundated.*

b. *Manage surface and subsurface freshwater inflows to support desired on-site habitats.*

c. *Establish and maintain a sediment transport regime that supports the desired wetland functions.*

d. *Re-establish a dynamic range of hydrologic conditions (intensity and duration) to support natural ecosystem processes.*

e. *Establish and maintain biogeochemical processes representative of natural wetland ecosystems.*

Opportunities	Constraints
Increase tidal flow into the site	Flood conveyance in Ballona Creek Channel needs to be maintained
Improve tidal connectivity within the site by enlarging existing channels and culverts, and creating new channel networks	Existing tidal connections are insufficient to create and maintain a significant area of natural tidal wetland
Improve management of tide gates to create a muted tidal system with long-term management of water levels	Elevations are too high, fill disposal will be difficult
Change the roads and berms to improve habitat connections, reduce flood hazards and accommodate sea-level rise	Existing infrastructure may limit hydrologic connections within the site
Include distributary channels in the bluff deltas for coarse sediment distribution where feasible	Urban watershed negatively impacts sediment supply, water quality and hydrograph of potential freshwater sources
Restore a more natural tidal slough system linking freshwater areas to tidal marsh	Natural channel formation may be limited due to lack of tidal scour, high elevations, soil type and absence of antecedent channel network
Enhance historic Centinela Creek in Area B by increasing freshwater flows.	Limited supply of fine sediments to the site may limit march evolution over time
Reduce current flooding problems around the project area	Low-lying properties around the periphery of the site may need to be protected from flooding
Daylight outlet culvert of the Freshwater Marsh	The upstream reach of Centinela Creek has been diverted.

Physical/Chemical Processes, continued

Opportunities	Constraints
Modify Ballona Creek levees by realignment or changing the form of the bank	
Coordinate the management of tide gates in the Ballona Ecosystem (Del Rey Lagoon, Ballona Lagoon & Ballona Wetlands)	

Sub-goal 4. Sustainability: Facilitate the conservation and restoration of natural resources in a manner that maintains and improves the ecological integrity, function, diversity and productivity for future generations.

Objectives:

a. *Accommodate potential sea level rise for transitional habitat provide appropriate elevations to accommodate habitat shifts*
b. *Use self-sustaining, low maintenance systems where possible*
c. *Minimize future adverse effects of nuisance species, including non-native, invasive species, feral predators and disease vectors.*
d. *Protect the wetlands from adverse impacts caused by contaminants in influent water or sediment.*
e. *Plan for the longterm management of the site*

Opportunities	Constraints
Accommodate rising sea level by using site slope to allow habitat migration	Future development of surrounding areas
Provide sufficient tidal flow to maintain channel system	Maintenance and management resources have not been identified
Incorporate principles of adaptive management in restoration design to phase implementation and test different methods	Some sources of water and sediment to the site may be contaminated, those contaminants may accumulate in the restoration area
Utilize (or employ) existing organizations to maintain and implement stewardship activities at the site	Accumulation of contaminants or pollutants on the site: including trash and aerial deposition
Use low maintenance processes to improve water quality of urban runoff entering the wetlands	Site vulnerable to invasive species, onsite and from local area
Design site to minimize the impacts of streetlights, traffic noise and other urban characteristics on habitat values	Rising sea level may inundate low lying areas
Reduce management costs associated with tide gates	Infrastructure, such as gas facilities, needs to be maintained

Goal 2: Social and Socioeconomic Values: Create opportunities for aesthetic, cultural, recreation, research and educational use of the Ballona Ecosystem that are compatible with the environmentally sensitive resources of the area.

Sub-goal 1. Public Access: Design enhanced access to and within the Ballona Ecosystem consistent with ecosystem preservation and restoration values in a safe, consistent, coherent and functional manner.

Objectives:

a. *Develop gateway entrances that attract, welcome and inform ecosystem visitors.*

b. *Phase-out inappropriate or uncontrolled access points.*

c. *Create public outreach, education and interpretive opportunities for visitors, organizations and institutions.*

d. *Develop appropriate signage that enhances visitor understanding of wetland restoration efforts; increase public awareness of local biological and physical resources present within Ballona Wetlands.*

e. *Develop overlooks and connections accessible to pedestrian, bike and bus users and provide the appropriate signage to facilitate such access.*

f. *Provide potential opportunities for the public to participate in restoration and monitoring efforts.*

Opportunities	**Constraints**
Develop parking areas and designated entry points for the public on currently disturbed or developed areas.	Informal access points and associated unauthorized and uncontrolled uses
Develop interpretative components to educate the public on the values of wetland functions and habitat, build on existing educational programs	Public access areas reduce the area available for restoration
Design access with buffers between people and sensitive habitat areas	
Install facilities to serve visitors of the site	
Improve overlook points. For example, potential to use sediment material onsite to create high points	
Install consistent signage	

Public Access, continued

Opportunities	Constraints
Provide access that serves people with disabilities	
Incorporate educational and stewardship activities into the Little League program	

Sub-goal 2. Cultural Access and Preservation: Initiate formal and informal consultation with representatives of the Gabrielino/Tongva Tribal Council to develop guidelines that contribute to the preservation of sacred and cultural sites.

Opportunities	Constraints
Provide access for cultural use of the site by native people	Protection of cultural resources on site may constrain site design
Preserve cultural resources onsite	
Educate the public regarding archaeological and historic resources	

Sub-goal 3. Recreational Use: Design site to accommodate an appropriate level of fishing, boating, walking, and other activities consistent with the Ecological Reserve Designation and ecosystem restoration values.

Objectives:

a. *Provide public trails and viewing areas around the perimeter of the wetlands with interpretive displays at selected locations.*

b. *Concentrate potentially incompatible human activities in non-sensitive areas*

Opportunities	Constraints
Develop a recreational plan compatible with the Ecological Reserve designation	Existing unauthorized uses, such as BMX use and dog walking, may be incompatible with Ecological Reserve designation
Integrate existing trails, features and disturbed areas into the designated trail network.	
Integrate trail network with local and regional trails, bikeways and transportation systems	

Sub-goal 4. Public Safety and Security: Design public access so that the wetlands are a safe place to visit.

Objectives:

a. *Design access to minimize maintenance costs*
b. *Provide access points at locations responsive to the needs of law enforcement.*
c. *Create and maintain access points in a manner that minimizes safety concerns and hazards.*

Opportunities	Constraints
Provide for a safe visitor experience through site design	Major roadways cross the site, fast moving traffic, limited places for parking
Consolidate Gas Company facilities, separate from habitat areas and public access	Poorly secured site, hard to control all unauthorized access in an urban setting
Improve traffic-related safety concerns through crosswalks, walkways and safe parking areas	Unknown extent of methane or other potentially harmful substances
Improve emergency access to the site	Need to protect public health by limiting disease vectors (such as mosquitos)

APPENDIX B.
HABITAT DESCRIPTIONS FOR RESTORATION ALTERNATIVES

Draft

BALLONA WETLAND RESTORATION PROJECT: HABITAT DESCRIPTIONS FOR RESTORATION ALTERNATIVES

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I. INTRODUCTION

The Ballona Wetlands Restoration Project seeks to restore ecosystem structure, function, and processes at Ballona Wetlands, in particular those related to the support of biodiversity. A method of organizing biological diversity information for the Ballona Wetland Restoration Project is to group plants and animals by the "habitat" in which they are most likely to be sustained under improved conditions. One measure of progress toward achieving habitat restoration goals, therefore, is a determination of whether or not these targeted organisms are supported by the manipulated habitats to a measurable and acceptable level of sustained occurrence. Performance criteria can be established to measure establishment of species populations in these habitats. Physical parameters of the environmental also can be monitored and compared against data from reference sites or expected conditions to determine if the restored areas are performing within a range of anticipated values.

The following are generalized groups of habitats (organized by category and type) with information regarding characteristics such as structural feature, ecosystem function, and landscape process as well as dominant or characteristic plant species, characteristic animal species, and presumed extirpated or rare or endangered species that could be candidates for translocation and recovery experiments or goals within the Ballona Ecosystem.

The categories and subcategories of habitats are arranged from estuarine deepwater habitats and wetlands to palustrine wetlands, followed by uplands within the Ballona Ecosystem and within the estuarine category from subtidal (deepwater) and intertidal open water and non-vegetated types of habitats to vegetated types, generally going from lower elevation and hence more frequently flooded types to less frequently flooded types, an important distinction when assessing habitat characteristics. Habitat restoration design as it relates to the potential for significant sea level rise due to global climate change is an important consideration for the Ballona Wetland Restoration Science Advisory Committee during the evaluation of restoration alternatives for the Ballona Ecosystem.

II. LIST OF HABITAT CATEGORIES AND TYPES

Habitat Category I – Estuarine Open Water: Non-vegetated Habitats and Flooded Substrates:

1. Deepwater Habitats (mud and sand substrates) – Open Water Subtidal Conditions

2. Deepwater Subtidal and Wetland Intertidal Channels (cobble/gravel and riprap substrates) – Open Water Subtidal, Intertidal, and High Tide Conditions

3. Intertidal Wetland Habitats (sand and mud substrates) – Intertidal and High Tide Conditions

Habitat Category II - Estuarine Non-vegetated Intertidal Wetland Habitats

4. Intertidal Margins, Beds, Banks, and Benches (mud and sand substrates) - Low Tide Conditions

5. Intertidal Channels (cobble/gravel and riprap substrates) - Low Tide Condition

6. Mudflats

7. Hyperhaline Salt Flats

Habitat Category III - Estuarine Vegetated Wetlands:

8. Aquatic Bed Wetlands

9. Cordgrass (Low) Marsh

10. Marsh Plain (Middle Marsh)

11. High Marsh (clay/mud or sand/loam substrates)

12. High Marsh Transition Zone (including Euryhaline and Hyperhaline Habitats)

13. Brackish Marsh (an associated Open Water Habitat)

Habitat Category IV - Palustrine Nontidal Wetlands:

14. Transitional Emergent Wetlands (delta distributaries and margins of estuaries)

15. Freshwater Marsh

16. Seasonal Palustrine Wetlands (including Haline Vernal Wetlands)

17. Palustrine Scrub/Shrub Wetland (= DFG "Riparian Scrub")

18. Palustrine Forested Wetland (= DFG "Riparian Woodland"?)

Habitat Category V - Upland Habitats:

19. Grasslands (= DFG Non-native Herbaceous Vegetation)

20. Coastal Scrub (including Coastal Bluff Scrub)

21. Coastal Dune Scrub and Dune Herbs (including Foredunes)

22. Forests, Woodlands, Groves, and Tree Rows (including DFG "Eucalyptus Grove")

III. HABITAT DESCRIPTIONS

Habitat Category I – Estuarine Open Water: Non-vegetated Habitats and Flooded Substrates:

In the estuarine system, deepwater habitats are characterized by the subtidal water regime and wetlands are characterized by various non-storm-influenced intertidal water regimes including irregularly exposed, regularly flooded, and irregularly flooded regimes.

1. Deepwater Habitats (mud and sand substrates) – Open Water Subtidal Conditions

Narrative (refer to other open water habitats for additional information): Subtidal deepwater habitats include channels, bays, basins, and other features, which at extreme low water do not drain with the outgoing tides. The subtidal estuarine water regime results in permanently flooded habitats and permanent bodies of open water. These habitats are generally considered truly aquatic systems and are adjacent to and down-slope from tidal estuarine wetlands. Estuaries with extensive deepwater habitat areas often support adjacent areas of intertidal mudflat and low marsh wetland habitats.

The "plants" of channels and creeks, both intertidal and subtidal, are generally nonvascular taxa, but under brackish conditions may include various aquatic bed and emergent vascular species. The non-vascular plants include phytoplankton (e.g., diatoms) and macroalgae, which, along with the detritus from decomposed Cordgrass (*Spartina foliosa*), are often direct links in the estuarine food chain (i.e., are directly consumed by higher order consumers). Benthic invertebrates are the most visible consumers of detritus, algae and plankton. Crabs and snails graze on detritus and macroalgae, while bivalve mollusks filter feed on phytoplankton. Polychaete worms inhabit the fine sediments of tidal creeks, while fish exploit the water column and substrate surface.

Fish use of subtidal habitats can be categorized by various functional groups or guilds including, for example, (1) adult and juvenile marine fish, such as Leopard Sharks (*Triakis semifasciata*), Grey Smoothhounds (*Mustelus californicus)*, and Stripped Mullet (*Mugil cephalus*) that enter estuaries with incoming tides to forage in estuaries, (2) adult marine fish such as Round Rays that feed and mate in estuaries; (3) marine fish such as California Halibut (*Paralichthys californicus*) that use flooded estuarine habitats especially channels as nursery habitat for young-of-the-year juvenile populations; (4) estuarine restricted fish such as Long-jawed Mudsuckers (*Gillichthys mirabilis*) that spend their entire life cycle in estuaries; (5) estuarine fish such as Tidewater Gobies (*Eucyclobius newberryi*) that are restricted to particular types of estuaries with brackish water but that survive under marine conditions during floods and return to estuaries under reduced runoff conditions; (6) anadromous fish such a Steelhead Trout (*Oncorhynchus mykiss*) that live under marine conditions as adults but enter estuaries to spawn either in estuaries or in rivers and streams on adjacent watersheds. In general most estuaries do not support all of the fish guilds, but collectively, southern California estuaries as a whole provide functions for each guild.

Estuarine open water habitats such as those provided by permanently flooded conditions are important foraging areas for birds from other habitats. Of note is the endangered California Least Tern (*Sterna antillarum browni*), which breeds on sandy habitats adjacent to marine and estuarine wetlands and forages on small fish, primarily Top Smelt *(Atherinops affinis)* and Northern Anchovy *(Engraulis mordax)* in the relatively shallow water of estuaries. Shallow water habitat also is important for foraging by wading birds [e.g., Snowy and Great Egrets (*Egretta thula*, *Casmerodias albus*) and Green, Black-crown Night, and Great Blue Herons (*Butorides virescens*, *Nycticorax nycticorax*, *Ardea herodias*], wading shore birds [e.g., Willet (*Catoptrophorus semipalmatus*)], diving birds including grebes, mergansers, and many ducks. The endangered Brown Pelican (*Pelecanus occidentalis*) is a frequent forager in estuarine open water habitats such as those provided by permanently, semi-permanently flooded, and intertidal water regimes. Open waters also provide low-tide refuges for species that move on to the mudflat and marsh plain during high tide.

Structural features: bays, lagoons, channels.

Deepwater habitats: Estuarine Unconsolidated Bottom and Rocky Bottom, and Estuarine Streambed Deepwater Habitats.

Physical processes: estuarine hydrology including tidal hydraulics; fluvial hydrology in river and creek mouth estuaries; marine and shoreline processes associated with estuary mouth dynamics; sediment transport; biogeochemistry.

Water regime/hydrology: subtidal, permanently flooded (i.e., deepwater habitats).

Salinity: haline to mixohaline.

Dominant/characteristic plant(s): diatoms, algae.

Associated plant(s): *Zostera marina*, *Potamogeton pectinatus, Ruppia maritima*, *Ruppia chirrosa* in various types of Estuarine Aquatic Bed Deepwater Habitat.

Characteristic animals: perhaps over 35 species of fish depending on type of estuary and guild of fishes present; suites of benthic and epibenthic invertebrates including various mollusks, crustaceans, worms, etc.; wading birds; dabbling and diving waterfowl; foraging Osprey.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; resident and migratory bird resting and foraging habitat, source populations of marsh-plain fish species (e.g., California Killifish, Long-jaw Mudsuckers); nutrient removal (denitrification at anoxic-soil/oxic-water interface; also P removal with sediment deposition); maintain predictable environment by maintaining hydrological connectivity and reducing extremes of drought (hypersalinity) and/or freshwater flooding (hyposalinity).

Recovery opportunities: foraging habitat for California Least Tern (*Sterna antillarum browni*), California Brown Pelican (*Pelicanus occidentalis californicus*), and Osprey (*Pandion haliaetus*); flat fish nursery habitat including California Halibut (*Paralichthys californicus*), Starry Flounder (*Platichthys stellatus*), and Diamond Turbot (*Hypsopsetta guttulata*).

Management Issues: water quality.

2. Deepwater Subtidal and Wetland Intertidal Channels (cobble/gravel and riprap substrates) – Open Water Subtidal, Intertidal, and High Tide Conditions

Narrative (refer to other open water habitats for additional information): Estuarine channels and creeks play a critical role in salt marshes as they convey tidal waters and associated nutrients and dissolved gases. They also support a complex assemblage of plants and animals, and are particularly diverse when cobble beds provide surfaces for attachment by some invertebrates (e.g., mussels, oysters, barnacles, and limpets) and protective habitats for others (e.g., crabs, gobies). This substrate differences separates this habitat type (#2) from type #3 (sand and mud substrates).

Estuarine channels and creeks are subjected to a wide variety of environmental conditions including fluctuations in salinity and depth of tidal inundation. Typically, tidal flushing is greatest at the tidal inlet and decreases with distance from the inlet. This general gradient, in turn influences, water movement, salinity, temperature, nutrients, and dissolved gases. These environmental factors influence the species composition, distribution, and population dynamics of the channel fauna.

Structural features: marine cobble deltas, cobble channel beds and bars, riprap.

Deepwater Habitats and Wetlands: Estuarine Streambed and Unconsolidated Shore and Bottom (cobble/gravel) Wetlands and Estuarine Rocky Shore and Rocky Bottom (boulder) Wetlands and Estuarine Deepwater Habitats.

Physical processes: estuarine hydrology including tidal hydraulics; fluvial hydrology in river and creek mouth estuaries; marine and shoreline processes associated with estuary mouth dynamics; sediment transport; biogeochemistry.

Water regime/hydrology: subtidal, permanently flooded (i.e., deepwater habitats); intertidal irregularly exposed, regularly flooded, irregularly flooded.

Salinity: haline and mixohaline.

Dominant/characteristic plant(s): micro-algae (e.g., diatoms, cyanobacteria); macro-algae (e.g., *Ulva* and *Enteromorpha*).

Associated plant(s): none.

Characteristic animals: oysters; mussels; crustaceans including Shore, Mud, and Fiddler Crabs; possibly over 70 species of invertebrates in cobble beds; wading birds; dabbling and diving waterfowl; foraging Osprey. Many estuarine fish species also use these channels depending on the type of estuary and habitat.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; biofiltration (e.g., bivalve filtration from mussels, oysters, etc.), nutrient cycling/biogeochemistry; N and P removal as above; carbon removal by shell forming mollusks.

Recovery opportunities: *Ostreola conchaphila* (native oyster) on cobble-gravel and other hard substrates; foraging habitat for California Least Tern, California Brown Pelican, and Osprey.

Management issues: water quality including sedimentation; loss of habitat due to dredging in some estuaries; expansion of habitat in other estuaries due to ongoing accretion of marine deltas.

3. Intertidal Wetland Habitats (sand and mud substrates) – Intertidal and High Tide Conditions

Narrative (refer to other open water habitats for additional information): Intertidal channels and creeks play a critical role in salt marshes as they convey tidal waters and associated nutrients and dissolved gases. They also support a complex assemblage of plants and animals. Estuarine channels and creeks are subjected to a wide variety of environmental conditions. Typically, tidal flushing is greatest at the tidal inlet and decreases with distance from the inlet. This general gradient, in turn influences, water movement, salinity, temperature, nutrients, and dissolved gases. These environmental factors influence the species composition, distribution, and population dynamics of the channel fauna.

Structural features: intertidal channels, creeks, basins, banks, benches, marsh plain, as well as margins of deepwater habitats in bays, lagoons and subtidal channels, natural creek levees and back-levee depressions (pools).

Wetlands: Estuarine Unconsolidated Bottom, Unconsolidated Shore, Streambed, Aquatic Bed, and Emergent wetlands.

Physical processes: estuarine hydrology including tidal hydraulics; fluvial processes in tidal river and stream channels; marine and shoreline processes in estuary mouths; sediment transport; biogeochemistry.

Water regime/hydrology: intertidal **–** semi-permanently flooded, irregularly exposed, regularly flooded, irregularly flooded.

Salinity: haline or mixohaline.

Dominant/characteristic plant(s): diatoms.

Associated plant(s): none or *Spartina foliosa* and *Sarcocornia pacifica* (*Salicornia virginica*), and other species as appropriate on flooded habitat margins and the marsh plain; channel banks provide substrate for germination of *Ulva* spp. spores, which then grow into blades that break free and become highly productive floating mats.

Characteristic animals: perhaps over 35 species of fish depending on type of estuary and habitat; suite of benthic and epibenthic invertebrates including Ce*rithidea californica* (California Horn Snail) and various clam genera including *Tagelus, Macoma*, *Protothaca*; wading birds including egrets and herons; dabbling and diving waterfowl; and foraging Osprey.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; resident and migratory bird resting and foraging habitat, source populations of marsh-plain fish species (e.g., killifish, mudsuckers); nutrient cycling/biogeochemistry; N and P removal.

Recovery opportunities: flat fish habitat including California Halibut, Starry Flounder, and Diamond Turbot; foraging habitat for California Least Tern, Brown Pelican, and Osprey.

Management issues: water quality including sedimentation; loss of habitat due to dredging in some estuaries; expansion of habitat in other estuaries due to ongoing accretion of marine deltas.

Habitat Category II
Estuarine Non-vegetated Intertidal Wetland Habitats

4. Intertidal Margins, Beds, Banks, and Benches (mud and sand substrates) - Low Tide Conditions

Narrative: Within the intertidal wetland portion of estuaries and in addition to mudflat features for those estuaries that support flats, other non-vegetated structures, including channel beds, banks and benches, often occur that can have similar functions to mudflats exposed at low tide conditions. These structures are group together here when lacking aquatic bed or emergent wetland vegetation cover.

Structural features: bay and lagoon margins and beds, bottoms, banks, and benches of estuarine channels and creeks.

Wetlands: Estuarine Streambed, Unconsolidated Shore, and Unconsolidated Bottom Wetlands.

Physical Processes: estuarine hydrology including tidal hydraulics; biogeochemistry.

Water regime/hydrology: irregularly exposed, regularly flooded.

Salinity: haline and mixohaline.

Dominant/characteristic plant(s): diatoms.

Associated plant(s): none or *Spartina foliosa*, *Sarcocornia pacifica* (*Salicornia virginica*) on margins; channel banks provide substrate for germination of *Ulva* spp. spores, which then grow into blades that break free and become highly productive floating mats.

Characteristic animals: suite of benthic and epibenthic invertebrates including C*erithidea californica* (California Horn Snail) and various clam genera including *Tagelus, Macoma, Protothaca*; wading and shore birds (foraging); polychaetes; oligochaetes.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; biofiltration, food chain support and nutrient cycling, N and P removal, C removal by bivalves.

Recovery opportunities: channel bench and similar habitat for Fiddler Crabs (*Uca crenulata*).

Management issues: water quality and sedimentation issues.

5. Intertidal Channels (cobble/gravel and riprap substrates) - Low Tide Conditions

Narrative: Estuarine channels and creeks play a critical role in salt marshes as they convey tidal waters and associated nutrients and dissolved gases. They also support a complex assemblage of plants and animals, and are particularly diverse when cobble beds provide surfaces for attachment by some invertebrates (e.g., mussels, oysters, barnacles, and limpets) and protective habitats for others (e.g., crabs, gobies). Estuarine channels and creeks are subjected to a wide variety of environmental conditions including fluctuations in salinity and depth of tidal inundation. Typically, tidal flushing is greatest at the tidal inlet and decreases with distance from the inlet. This general gradient, in turn influences, water movement, salinity, temperature, nutrients, and dissolved gases. These environmental factors influence the species composition, distribution, and population dynamics of the channel fauna.

Structural features: marine cobble deltas, cobble channel beds and bars, riprap.

Wetlands: Estuarine Unconsolidated Shore and Bottom (cobble/gravel) and Estuarine Rocky Shore and Rocky Bottom (boulder).

Physical processes: estuarine hydrology including tidal hydraulics; fluvial hydrology in river and creek mouth estuaries; marine and shoreline processes associated with estuary mouth dynamics; biogeochemistry.

Water regime/hydrology: intertidal irregularly exposed, regularly flooded, irregularly flooded.

Salinity: haline and mixohaline.

Dominant/characteristic plant(s): micro-algae (diatoms, cyanobacteria); macro-algae.

Associated plant(s): none.

Characteristic animals: oysters and mussels (hard substrates) crustaceans including Shore, Mud, and Fiddler Crabs; possibly over 70 species of invertebrates in cobble beds.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; low tide resting habitat for resident and migratory birds and foraging habitat for shorebirds and clapper rail; biofiltration (by bivalves), nutrient cycling/biogeochemistry; food chain support.

Recovery opportunities: *Ostreola conchaphila* (native oyster), shore bird feeding habitat.

Management issues: water quality including sedimentation**.**

6. Mudflats

Narrative: Extensive mudflats generally occur in estuaries that have gradually sloping shorelines and are sufficiently large enough to support a extensive open water and low marsh habitats or that are flooded for long periods due to closure of the estuary mouth or reduced tidal flow, presenting development of a vegetated marsh plain. Many estuaries that lack extensive mudflat habitat support functions for shore bird foraging and maintenance of invertebrate biodiversity because tidal channel beds and banks that are exposed at low tide provide similar habitat areas.

Structural features: down slope from low marsh and the marsh plain.

Wetlands: Estuarine Unconsolidated Shore and Unconsolidated Bottom Wetlands, and Estuarine Aquatic Bed Wetland (Irregularly Exposed).

Physical processes: extended periods of inundation prevent vascular plant growth.

Water regime/hydrology: regularly (daily) flooded by high tides.

Salinity: haline.

Dominant/characteristic plant(s): micro-algae, especially diatoms (over 100 species identified at some estuaries in s. CA).

Associated plant(s): at lowest tides, Eelgrass (*Zostera marina*) may be exposed (Estuarine Aquatic Bed Wetland, Irregularly Exposed) if present in estuary; macroalgae (e.g., *Ulva* spp.).

Characteristic animals: invertebrates: crabs, shrimp, clams, etc. (some are listed above regarding intertidal creeks] and shorebirds.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; nitrogen fixation by microalgae, sediment accumulation (and P removal), nutrient cycling, denitrification, invertebrate habitat, shorebird foraging.

Recovery opportunities: shorebird feeding habitat.

Management issues: mudflat is a very limited in most southern California estuaries. Sedimentation elevates the mudflat to levels that can support vascular plants; once vascular plants are established, the habitat is less suitable for shorebird feeding.

7. Hyperhaline Salt Flats

Narrative: Whereas intertidal mudflats occur at low elevations, permanently hypersaline salt flats are an important part of continuum from upland to low marsh. Salt flats but generally form only when the elevational gradient of the marsh plain is sufficient low for this evaporate zone to form at the higher levels of infrequent tidal inundation. As with restoration of all tide influenced habitats, establishment of hyperhaline salt flat and adjacent euryhaline marsh habitats require careful consideration of elevation, frequency and duration of inundation, and substrate texture. Salt flats alternate between flooded and drought conditions, which prevent most plants from occurring or from developing closed canopies if they are present. The open flat, with an occasional subshrub (e.g., *Arthrocnemum* (*Salicornia*) *subterminale*), offers certain shore birds a rare habitat that allows both feeding and refuge from predators.

Structural features: shallow depressions of upper marsh plain, banks, upper tidal deltas

Wetlands: Estuarine Unconsolidated Shore (Irregularly Flooded)

Physical processes: Estuarine processes including tidal hydraulics; geochemical processes including formation of evaporate deposits; salt concentration so that soils prevent invasion by exotic plants.

Water regime/hydrology: irregularly flooded by tides; < 25% of high tide.

Salinity: hyperhaline **-** 200 g/L or more in dry season.

Dominant/characteristic plant(s): none; scattered *Arthrocnemum subterminale.*

Associated plant(s): none.

Characteristic animals: Staphylinid beetles; shorebirds use these areas as refugia.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; resting and foraging areas for migratory birds, especially during high tides when other habitats are inundated.

Recovery opportunities: Tiger beetles (?); Elegant Tern (*Sterna elegans*) roosting habitat.

Management issues: Naturally occurring salt flat habitats, such as along the margins of estuarine deltas, were often some of the first areas filled in and developed in southern California estuaries. The Ballona Ecosystem supports habitat on dredge spoil in areas that were previously lower elevation habitats on the marsh plain. Preservation of salt plat habitat and functions may require relocation of the habitat if existing conditions are altered as part of a restoration plan.

Habitat Category III
Estuarine vegetated wetlands:

8. Aquatic Bed Wetlands

Narrative: This habitat category as described herein includes a number of different types depending on the structure of the habitat and the dominant organism, such as algae, bluegreen algae, vascular plants, etc. For example, nutrient-rich, estuarine channels are likely to be dominated by floating *Enteromorpha intestinalis* whereas nutrient-rich, exposed mud flats may be characterized by *Enteromorpha clathrata.* Lagoons, channels, and flooded marsh depressions with haline salinities may support dense, submersed colonies of *Ruppia maritima,* whereas similar areas that are mixohaline are likely to be characterized by *Ruppia cirrhosa* and other vascular aquatic-bed species.

Structural features: depressions in marsh plain, intertidal and subtidal channels, lagoons, and bays; haline vernal wetlands.

Wetlands: Estuarine Aquatic Bed Algal; Estuarine Aquatic Bed Rooted Vascular.

Physical processes: Estuarine processes including hydraulics.

Water regime/hydrology: variable depending on class of wetland and type of estuarine system; includes permanently flooded, semi-permanently flooded; intermittently exposed, regularly flooded, irregularly flooded.

Salinity: haline; mixo-haline.

Dominant/characteristic plant(s): Algae – various species represented including Enteromorpha, *Ulva*, *Porphyra*, etc, but many examples are not large enough or provide a dense enough cover to warrant distinction as a wetland type; Rooted vascular plants – various species depending on conditions, including *Ruppia maritima* (haline or euryhaline) and *Potamogeton pectinatus*, *Ruppia cirrhosa*, and *Zannichellia palustris* (mixohaline). Floating vascular plants – e.g., *Lemna gibba* (mixohaline).

Associated plant(s): as noted above or various emergent species in adjacent wetlands.

Characteristic animals: food and habitat for aquatic invertebrate species and for small fish species, including Tidewater Goby (*Eucyclogobius newberryi*) under mixohaline conditions.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; food chain support for waterfowl such as dabbling ducks; bio-assimilation of nutrient pollution; nutrient cycling/biogeochemistry; N and P removal.

Recovery opportunities: Mixohaline (i.e., brackish) environments that support *Ruppia cirrhosa* are frequently habitat for populations of Tidewater Goby (*Eucyclogobius newberryi)*, a federal endangered and state fish of concern.

Management issues: water quality.

9. Cordgrass (Low) Marsh

Narrative: Low salt marsh is regularly and daily inundated by tides and is dominated by California Cordgrass (*Spartina foliosa*) that forms dense monotypic stands, primarily along channel edges and adjacent to mudflats. At its lower elevation, cordgrass intergrades with mudflat habitat; at its upper elevation it intergrades with a mosaic of mid-marsh species. California Cordgrass is a highly productive species. It decomposes to form the base of the detrital food chain that supports many lower order estuarine consumers. The tall canopy provides cover for birds such as Curlew and Pintail Duck, which forage during migration.

Many of the animals of the low marsh are adapted to periods of frequent inundation. These include California horn snail, Lined Shore Crab *(Pachygrapsus crassipes)*, Yellow Shore Crab *(Hemigrapsus oregonensis)*, and Fiddler Crab *(Uca crenulata)*. The best-studied animal of the low marsh is the federal and state-endangered Light-footed Clapper Rail (*Rallus longirostrus levipes*). This species generally nests in the cordgrass that grows in the low marsh and feeds on fishes and crustaceans in adjacent tidal creeks. It also nests in pickleweed on the marsh plain and in bulrushes in brackish marsh vegetation.

Structural features: lower edge of the marsh plain, tidal channel margins

Wetlands: Estuarine Emergent Persistent Wetland (Regularly Flooded)

Physical processes: Estuarine processes including tidal hydraulics; sediment accumulation.

Water regime/hydrology: regular (daily) flooding by tides

Salinity: hypersaline and saline to brackish

Dominant/characteristic plant(s): *Spartina foliosa;* also patches of *Batis maritima.*

Associated plant(s): *Salicornia bigelovii.*

Characteristic animals: *Pachygrapsus crassipes; Hemigrapsus oregonensis; Uca crenulata;* California Horn Snail (*Cerithidea californica).*

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; sediment accumulation and reduced erosion along channel edges; nutrient cycling/biogeochemistry; N and P removal; C sequestration; high rates of primary productivity and food web support; invertebrate habitat; fish habitat when flooded by tide water.

Recovery opportunities: *Spartina foliosa* (where it previously existed or to compensate for areas where its population is declining); Light-footed Clapper Rail (Fed. & State endangered bird).

Management issues: potential impacts from native and introduced predators of marsh nesting birds (Light-footed Clapper Rail); excessive sedimentation.

10. Marsh Plain (Middle Marsh)

Narrative: Intermediate elevations within the salt marsh are inundated irregularly by tides but at a greater frequency than are higher elevations. As a result, the plant species that inhabit this elevation are adapted to occasional prolonged inundation. The dominant plant is Pickleweed [*Sarcocornia pacifica* (*Salicornia virginica*)] a perennial with the broadest elevation range of all salt marsh species. Other common mid-marsh species include Saltwort (*Batis maritima*), Arrow-grass (*Triglochin concinnum*), Estero Sea-blite (*Suaeda esteroa*), and Jaumea (*Jaumea carnosa*). An important feature of the marsh plain is its topographic heterogeneity, which includes creeks, creek banks, levees, and shallow depressions. The creeks provide habitat for Longjaw Mudsucker (*Gillichthys mirabilis*);

creek levees tend to support more plant species than the plain (e.g., Estero Sea-blite is especially abundant near creeks), and the shallow depressions (5-10 cm) tend to reduce biomass of perennial pickleweed. When this dominant is subdued, the annual pickleweed (*Salicornia bigelovii*) can establish and persist. Deeper depressions ($\geq$10 cm) retain tidal water and become feeding oases for the California Killifish (*Fungulus parvipinnus*); shallow depressions develop algal growths that support dense populations of invertebrates that are suitable prey for fish.

The animals of the mid-marsh are abundant and diverse. Food is abundant in the form of algae and vascular plant detritus. Animals that feed directly on algae include Ephydrid flies, amphipods, and snails such as the Olive Snail (*Melampus olivaceus*) in marsh vegetation and California Horn Snail (*Cerithidea californica*) in open flats and channels. A variety of birds forage in the mid-marsh, especially during higher tides when mudflats are under water, including Willet *(Catotrophorus semipalmatus)*, Marbled Godwit *(Limosa fedoa)*, Long-billed Curlew *(Numenius americanus)*, Great Blue Heron *(Ardea herodias)*, and Great Egret *(Ardea alba)*. The state endangered Belding's Savannah Sparrow *(Passerculus sandwichensis beldingii)* inhabits the marsh plain where it prefers to nest in pickleweed in mid and high marsh conditions.

Structural features: mid-marsh plain, rivulets, tidal pools, creek-side levees and back-levee depressions.

Wetlands: Estuarine Emergent Persistent Wetland (Irregularly Flooded).

Physical processes: estuarine processes including tidal hydraulics and maintenance of sediment and elevation.

Water regime/hydrology: irregularly flooded by tides (ca. 50% of high tides).

Salinity: saline to hypersaline.

Dominant/characteristic plant(s): *Sarcocornia pacifica* (*Salicornia virginica*).

Associated plant(s): *Frankenia salina, Jaumea carnosa, Distichlis spicata, Suaeda esteroa, Triglochin concinna.*

Characteristic animals: *Fundulus parvipinnis* (California Killifish); *Melampus* olivaceus; polychaetes; oligochaetes.

Ecosystem functions: plant diversity support (the mash plain is potentially diverse in native halophytes), habitat for rare, endangered, and special interest species; insect support, nutrient cycling/biogeochemistry; N and P removal; primary productivity and detrital food web support.

Recovery opportunities: Belding's Savannah Sparrow (State endangered bird); Long-billed Curlew (*Numenius americanus*); Estero Seep-weed (*Suaeda esteroa*); Northern Harrier (*Circus cyaneus*).

Management issues: sedimentation (increase in elevation and loss of shallow depressions that form pools and create feeding oases, or erosion (decrease in elevation); potential impacts to marsh nesting birds (Belding's Savannah Sparrow).

11. High Marsh (clay/mud or sand/loam substrates)

Narrative: High marsh habitats are irregularly to intermittently inundated by tidal water and generally range from saline to hypersaline conditions. Plants that comprise the high marsh include the Parish's Glasswort [*Arthrocnemum subterminale* (*Salicornia subterminalis*)], Shoregrass (*Monanthochloe littoralis)*, Alkali Heath (*Frankenia salina*), and Sea Lavender *(Limonium californicum)*. The vegetation varies depending on the drainage and density of the soil (i.e., ratio of clay to sand), which often is correlated with salinity. Vegetation in dense, hypersaline (salinity greater than seawater) or euryhaline (fluctuating salinity, seasonal hypersalinity) is quite different than loose, sandy soils. The endangered Salt Marsh Bird's Beak *(Cordylanthus maritimus* spp. *maritimus)* occurs in high marsh and is more abundant in sandy soils. Likely the open canopies of sandy areas allow seeds to germinate after rainfall while also offering roots for this hemiparasite to parasitize. High marsh vegetation provides habitat for Belding's Savannah Sparrow, staphylinid beetles, the snail *Assiminea transluscens*, and other estuarine restricted species.

Structural features: upper marsh plain, slopes of berms and banks; upper tidal deltas.

Wetlands: Estuarine Emergent Persistent Wetland (Irregularly Flooded).

Physical processes: Estuarine processes including tidal hydraulics; also Aeolian-influenced processes if adjacent to dune systems, or fluvial-influenced if on a delta.

Water regime/hydrology: Irregularly flooded by tides (< 50% of high tides.

Salinity: saline, hyperhaline, euryhaline.

Dominant/characteristic plant(s): *Arthrocnemum subterminale*; *Monanthochloe littoralis.*

Associated plant(s): *Sarcocornia pacifica, Limonium californicum, Distichlis spicata, Spergularia macrotheca, Atriplex watsonii, Frankenia salina*

Characteristic animals: *Asiminea transluscens* (snail); Belding's Savannah Sparrow; Cottontail; Ground Squirrels.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; high tide refuge for Light-footed Clapper Rail and Belding's Savannah Sparrow.

Recovery opportunities: Light-footed Clapper Rail (Fed. & State endangered bird); Belding's Savannah Sparrow (State endangered bird); Northern harrier (*Circus cyaneus*) foraging habitat; *Cordylanthus maritimus* ssp. *maritimus* (Fed. & State endangered plant)

Management issues: Loss of historic habitat due to filling and development. Vulnerable to invasion by many introduced invasive plant species including introduced species of *Limonium* (Sea Lavender), are less likely to invade lower elevations habitats, and introduced grass species such as Rabbit's Foot Grass (*Polypogon monspeliensis*), Sicklegrass (*Parapholis incurva*), Italian Ryegrass (*Lolium multiflorum*) because it is rarely tidal and can have very low salinities at least seasonally.

12. High Marsh Transition Zone (including Euryhaline and Hyperhaline Habitats)

Narrative: The transition zone represents that area where the halophytic and hydrophytic salt marsh vegetation overlaps with upland communities. Storm-surge high tides may flood habitats transitional to upland habitats, including various palustrine wetlands adjacent to high marsh estuarine wetlands; however, they are generally considered to be located beyond the limits of estuarine wetlands, but within the more broadly defined "estuarine" ecosystem (e.g., the Ballona Ecosystem). At relatively undisturbed southern California estuaries, examples of Estuarine Scrub Shrub Wetland may occur in the transition zone and may include Boxthorn *(Lycium californicum)*, Bush Seepweed *(Suaeda nigra)*, Coast Golden Bush (*Isocoma menziesii*), Parish's Glasswort (*Arthrocnemum subterminale*), and Quail Bush (*Atriplex lentiformis*). These overlap with the highest elevation salt marsh species including, for example, Saltgrass *(Distichlis spicata)*, Alkali Weed *(Cressa truxillensis)*, and Shoregrass *(Monanthochloe littoralis)*. *Lycium* is a common perch for birds and various small mammals burrow under it. The fact that it is deciduous shrub that greens up whenever there is water available makes it an indicator of sewage spills or other off-season sources of water.

The animals of the higher elevations of the transition zone are primarily terrestrial species. Those associated with shrubby uplands such as portions of the transition zone include, for example, various species of snakes, lizards, small mammals and birds. Herpetofauna may include California Kingsnake *(Lampropeltis getulus californiae)*, San

Diego Gopher Snake *(Pituophus melanoleucus annectens)* and side-blotched lizard *(Uta stansburiana)*. Common mammals of the shrub-dominated uplands include Western Harvest Mouse *(Reithrodontomys megalotis)*, Deer Mouse *(Peromyscus maniculatus)*, Pocket Gopher (*Thomomys* sp.), Opossum *(Didelphis virginianus)*, Striped Skunk (*Mephitis mephitis)*, and California Ground Squirrel *(Spermophilus beechyi)*. The small mammals are preyed upon by a variety of birds including Short-eared Owl *(Asio flammeus)*, Northern Harrier *(Circus cyaneus)*, and White-tailed Kite *(Elaneus caeruleus)*. Ground-nesting bees that pollinate Salt Marsh Bird's-Beak (*Cordylanthus maritimus* spp. *maritimus*) live above the high tide in this habitat. Boxthorn (*Lycium californicum*) offers a tall perch site for various birds, and its thorns can deter human intrusion.

One of the more interesting habitats is the euryhaline zone with fluctuating salinities between wet season low salinities and dry season hypersaline conditions. The habitat is characterized by winter annual plant species such as Salt Marsh Daisy (*Lasthenia glabrata* ssp. *coulteri*), Salt Marsh Sand-sperry (*Spergularia marina*), Toad Rush (*Juncus bufonius*), and Hutchinsia (*Hutchinsia procumbens*), which are adapted to the fluctuating salinities. The euryhaline zone is generally located upslope from hyperhaline salt flats and down-slope from nontidal palustrine wetland or grassland habitats and is perhaps the habitat most representative of Mediterranean climate estuarine wetlands.

The transition zone may also include nontidal palustrine habitats both salt influenced and non-saline types. Seeps from perched water tables on deltas and the toe of slopes and along dune transitions often support a variety of palustrine emergent and scrub-shrub types. Characteristic non-saline or slightly brackish species may include shrubs such as Mule Fat (*Baccharis salicifolia*) and herbaceous species such as spiny-rush (*Juncus acutus*), Willow-Dock (*Rumex salicifolia)*, and Alkali Ryegrass (*Leymus triticoides*). Seasonal palustrine wetlands also occur in this area, especially in low-gradient deltaic deposits and may include salt-influenced types supporting a variety of native annual species such as Alkali Barley (*Hordeum depressum*). Belding's Savannah Sparrows use the taller shrubs of this habitat during the non-nesting season.

Structural features: alluvial plain, upper deltas, banks.

Wetlands: Estuarine Emergent Persistent and Nonpersistent Wetland (Irregularly Flooded); Estuarine Scrub Shrub Wetland (Broadleaved Deciduous and Evergreen).

Physical processes: estuarine processes including tidal hydraulics; fluvial-influenced if on a delta; geochemical processes including formation of evaporate deposits.

Water regime/hydrology: (irregularly flooded by tides; i.e., < 20% of tides); and adjacent storm-tide influenced wetlands, palustrine wetlands, and uplands.

Salinity: fluctuating from mixohaline and saline to hyperhaline (more saline than sea water) and euryhaline (fluctuating salinity) and upslope to potentially non-haline.

Dominant/characteristic plant(s): *Arthrocnemum subterminale, Monanthochloe littoralis, Lycium californicum.*

Associated plant(s): winter annuals including *Spergularia marina, Juncus bufonius, Hordeum depressum, Lasthenia glabrata* ssp. *coulteri, Hutchinsia procumbens.*

Characteristic animals: (see animals discussed above regarding the high marsh habitat).

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; foraging areas for upland animals; resting areas for migratory birds; high tide refuge for Light-footed Clapper Rail; pollination support.

Recovery opportunities: *Lasthenia glabrata coulteri* (CNPS rare); *Hutchinsia procumbens* (locally extirpated); Tiger beetles (?); Northern Harrier (*Circus cyaneus*) foraging areas.

Management issues: Loss of historic habitat due to filling and development. Vulnerable to colonization by many introduced invasive plant species. This transitional habitat [and the high marsh as noted above] is highly susceptible to invasive species such as Rabbit's Foot Grass (*Polypogon monspeliensis*), Sicklegrass (*Parapholis incurva*), Italian Ryegrass (*Lolium multiflorum*), and other grasses because it is rarely tidal and can have very low salinities at least seasonally, especially during unusually wet winters and in areas that receive substantial anthropogenic freshwater inputs.

13. Brackish Marsh (and associated Open Water Habitat)

Narrative: Sites where freshwater mixes with saline seawater produce brackish conditions with intermediate salinities. This phenomenon is less frequent in southern California where many estuaries are less influenced by runoff from rainfall than in more northerly latitudes. In southern California, brackish sites vary seasonally, with dilution during the wet season and concentration of salts during the dry season. Local influence from seeps and springs and seasonally impounded stream and river-mouths can produce brackish environments that support emergent vegetation characterized, for example, by Prairie Bulrush [*Bolboschoenus* (*Scirpus*) *maritimus*], and Southern Cattail (*Typha domingensis*), and aquatic bed species including (*Potamogeton pectinatus)* and Ditchgrass (*Ruppia* spp.). The biggest difference in plant composition between brackish and salt marshes is often at the lower elevations in the marsh -- higher elevation areas of Mediterranean-climate brackish marshes tend to be similar to the mid-marsh plain or high marsh habitats of salt marshes. Tidewater Goby (*Eucyclogobius newberryi),* a Federal listed endangered species, occurs in systems or habitats within systems characterized by brackish water conditions.

Structural features: channels, depressions, basins, seeps and springs.

Wetlands: Estuarine Emergent Persistent and Nonpersistent Wetland (Semi-permanently Flooded); estuarine Aquatic Bed Wetland (Floating and Rooted Vascular; Algal).

Physical processes: Estuarine processes including tidal hydraulics; also fluvial-influenced if associated with a river channel and artesian-influenced if associated with seeps or springs from groundwater.

Water regime/hydrology: Tidally influenced with a wide range of tidal inundation frequencies depending on elevation and distance from the tidal inlet; seasonal dilution from surface water (runoff).

Salinity: brackish (mixohaline).

Dominant/characteristic plant(s): Prairie Bulrush [*Bolboschoenus* (*Scirpus*) *maritimus*]*;* California Bulrush, Tule [*Schoenoplectus* (*Scirpus*) *californicus*]; American Bulrush [*Schoenoplectus* (*Scirpus*) *americanus*]; Southern Cattail (*Typha domingensis*).

Associated plant(s): Salt Marsh Bulrush [*Bolboschoenus* (*Scirpus*) *robustus*] (unknown from Ballona?); Spiny Rush (*Juncus acutus*).

Characteristic animals: rails; bittern; wrens, Redwing Blackbird.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; biofiltration of freshwater runoff; nutrient cycling/biogeochemistry; N and P removal; C sequestration; sediment accumulation; very high rates of primary productivity in the lower portions of brackish and freshwater marsh areas; food web support.

Recovery opportunities: Light-footed Clapper Rail (Fed. & State endangered); Tidewater Goby (threatened); Brackish Water Snail (*Tyonia imitator*).

Management issues: Influence of stormwater runoff on formation of and impacts to brackish marshes; water quality; excessive sedimentation from upstream disturbances.

Habitat Category IV
Palustrine Nontidal Wetlands:

14. Transitional Emergent Wetlands (delta distributaries and margins of estuaries)

Narrative: The toe of slopes along estuary margins often provide opportunities for the formation of fresh or brackish water seeps and springs, including examples with well-developed dune fields containing freshwater lenses, deltas of rivers with shallow aquifers, and alluvial fans with artesian wells. These features can be the sites of estuarine brackish marshes and palustrine freshwater marshes. They also can support the development of palustrine emergent wetlands that are transitional in nature and similar to habitat type No 12 – High Marsh Transition Zone, but are distinctly palustrine and adjacent to estuarine habitats within coastal ecosystems.

Structural features: margins of dunes, deltas, banks, bluffs, alluvial fans and plains.

Wetlands: Palustrine Emergent Persistent Wetland.

Physical processes: Fluvial and/or groundwater hydrology.

Water regime/hydrology: (Permanently?), seasonally, temporarily, or intermittently saturated; temporarily or intermittently flooded.

Salinity: Freshwater to euryhaline. Due to brackish nature of water, salt spray, or rare storm-tide influences, or even concentration of salts by plants, soil salinity may increase during dry periods and may include formation of surface precipitates.

Dominant/characteristic Plant(s): Alkali Ryegrass (*Leymus triticoides*); Saltgrass (*Distichlis spicata*); Western Goldenrod (*Euthamia occidentalis*); Salt Marsh Baccharis (*Baccharis douglasii*).

Associated plant(s): Alkali Barley (*Hordeum depressum);* Seaside Heliotope (*Heliotropium curassavicum);* Coast Golden Bush (*Isocoma menziesii);* Western Sea-Purslane (*Sesuvium verrucosum);* Common Sedge (*Carex praegracilis*); Yerba Mansa (*Anemopsis californica*); Baltic Rush (*Juncus balticus*); Small-leaved (Petunia parvifolia); Sticky Conyza (*Conyza coulteri*).

Characteristic animals: small mammals including voles, harvest mice, field mice, gophers; herpetofauna.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; hydrology (seasonally saturated, temporarily flooded).

Recovery opportunities: foraging habitat for White-tailed Kite and other raptors; potential habitat for Ventura Marsh Milk-vetch (*Astragalus pycnostachys* var. *lanosissimus* - Fed and State listed endangered plant); Wandering Skipper (butterfly); Southern Salt Marsh Shrew (*Sorex ornatus salicornicus*).

Management issues: invasion by Giant reed (*Arundo donax*) and Myoporum (*Myoporum laetum*).

15. Freshwater Marsh

Narrative: Freshwater marshes occur in saturated, organic rich or sometime mineral soils. The dominant plants are generally emergent monocots such as cattails (*Typha* spp.) and bulrushes [e.g., *Schoenoplectus (Scirpus) californicus*], although aquatic-bed species, such as pondweeds (*Potamegeton* spp.), may also be common. Redwing Blackbirds (*Agelaius phoeniceus*) and Marsh Wrens (*Cistithorus palustris*) commonly breed in the tall, dense vegetation. Common mammals include Raccoon (*Procyon lotor*), Striped Skunk and Opossum. Freshwater marsh habitat may also support the Light-footed Clapper Rail, although this is not considered optimal breeding or foraging habitat. These marshes may provide refugia for rails and other bird species during extreme high tides and rive floods. Creation and maintenance of freshwater marsh habitat is dependent upon a continual source of freshwater. Some coastal wetland restoration plans have incorporated freshwater and brackish marshes due to historical evidence of springs adjacent to intertidal areas

Structural features: river and stream channels; ponds; seeps and springs

Wetlands: Riverine Nonpersistent Emergent Wetland; Palustrine Emergent Persistent Wetland (Permanently or Semi-permanently Flooded, Irregularly Exposed).

Physical processes: Fluvial and/or groundwater.

Water regime/hydrology: Permanently flooded; intermittently flooded; seasonally flooded; permanently and seasonally saturated.

Salinity: fresh water to slightly brackish (groundwater conditions).

Dominant/characteristic Plant(s): Broadleaved Cattail (*Typha latifolia*); Bur-reed (*Sparganium eurycarpum*); California Bulrush (*Schoenoplectus californicus*); Southern Cattail (*Typha domingensis*).

Associated plant(s) - Representative: Basket Rush (*Juncus textilis*); Spiny Rush (*Juncus acutus*); Spike-rush (*Eleocharis spp*.), Hooker's Evening Primrose (*Oenothera elata* ssp. *hookeri*); Horsetails – Common Scouring Rush (*Equisetum hyemale* ssp. *affine*), Smooth Scouring Rush (*E. levigatum*), Giant Horsetail (*E. telmateia*); Western Goldenrod (*Euthamia occidentalis*); Willow Dock (*Rumex salicifolius* vars. *crassus*); Willow Herb (*Epilobium ciliatum* ssp. *ciliatum*); Yerba Mansa (*Anemopsis californica*); American Bulrush (*Schoenoplectus americanus*); Three-square Bulrush (*Schoenoplectus pungens*); Cinquefoil (*Potentilla anserina*); Monkey-flower (*Mimulus guttatus*).

Characteristic animals: Western Pond Turtle, Red-legged Frog; rails, waterfowl, Red-winged Blackbird (*Agelaius phoeniceus*); many passerine birds.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; nutrient cycling/biogeochemistry; N and P removal; C sequestration; sediment accumulation; high rates of primary productivity; habitat for breeding birds.

Recovery opportunities: Western Pond Turtle (*Clemmys marmorata*); California Red-Legged Frog (*Rana aurora draytonii*); Light-footed Clapper Rail and other rail species known to use freshwater marshes adjacent to estuaries in southern California; Least Bittern (*Ixobrychus exilis*); Northern Harrier (*Circus cyaneus*); Spiny Rush (*Juncus acutus*).

Management issues: excessive sedimentation; subject to shrub invasion (e.g., willow invasion). Sites that are less frequently flooded can have substantial problems with non-native grasses such as Rabbitsfoot Grass. Also, Giant Reed and Pampas Grass are large perennial grasses that can be problematic.

16. Seasonal Palustrine Wetlands (including Haline Vernal Wetlands)

Narrative: Seasonal wetlands are non-tidal wetlands and transitional habitats that are flooded to varying degrees by seasonal rainfall and runoff. If there are sufficient salts in the soil, the seasonal wetland may support plant species more typical of coastal salt marsh, such as Pickleweed [*Sarcocornia pacifica* (*Salicornia virginica*)], Saltgrass (*Distichlis spicata*), and Alkali Weed (*Cressa truxillensis*). If the soils do not contain salts or alkaline substances, the seasonal wetlands may support freshwater marsh species and a mixture of weedy opportunists. “Vernal pools” and saline vernal wetlands of transition zones can occur on alluvial and deltaic deposits adjacent to estuarine habitats and are known to support special concern plants and invertebrate animals (e.g., fairy shrimp species).

Seasonal wetlands can be important to a number of bird species that feed on the insects, algae and aquatic invertebrates that develop in these temporary habitats. Amphibians, such as western toad (*Bufo boreas*) and Pacific Tree Frog (*Pseudacris regilla*) have been noted to breed in this habitat. These areas also attract mammals, such as Coyote, Raccoon, Striped Skunk and Opossum. In areas where water pools deeply enough, waterfowl species such as Mallard (*Anas platyrhynchos*), Cinnamon Teal (*Anas cyanoptera*) and American Coot (*Fulica Americana*) have been observed. Seasonal wetlands may also used by shorebirds such as Killdeer (*Charadrius vociferus*) and Black-necked Stilts (*Himantopus mexicanus*).

Structural features: depressions in deltas and fill deposits often associated with other palustrine wetlands adjacent to estuarine wetlands

Wetlands: Palustrine Emergent Wetland, persistent and non-persistent types, seasonally flooded and generally euryhaline

Physical processes: natural examples influenced by fluvial and coastal (storm) processes and anthropogenic effects from disturbances including infilling, dredging, grading, etc.

Water regime/hydrology: Seasonally flooded

Salinity: Fresh water or euryhaline (low salinity when flooded and higher salinity when dry)

Dominant/characteristic Plant(s): Haline vernal wetland examples – Alkali Barley (*Hordeum depressum*); Pickleweed (*Sarcocornia pacifica*); Salt Marsh Daisy (*Lasthenia glabrata* ssp. *coulteri*); Salt Marsh Sand-Sperry (*Spergularia marina*); Toad Rush (*Juncus bufonius* ssp. *halophilus*?). Freshwater examples – Meadow Barley (*Hordeum brachyantherum* ssp. *brachyantherum).*

Associated plant(s): Alkali Mallow (*Malvella leprosa*); Alkali Weed (*Cressa truxillensis*); Sea-Purslane (*Sesuvium verrucosum*); Horned Sea-blite (*Suaeda calceoliformis*); Seaside Heliotrope (*Heliotropium curassavicum*); Slim Aster (*Symphyotrichum subulatum*); Sticky Conyza (*Conyza coulteri*).

Characteristic animals: planktonic (e.g., rotifers, crustaceans including copepods, cladocerans) and macroscopic (e.g., aquatic insect larvae) invertebrates.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; shorebird foraging habitat.

Recovery opportunities: Silver Scale (*Atriplex argentea* var. *mohavensis*) (extirpated?); Hutchinsia (*Hutchinsia procumbens*) (extirpated?); Southern Tarweed (*Centromadia*. *parryi* ssp. *australis*); fairy shrimp species?

Management issues: impacts (e.g., cover and thatch) from introduced annual weeds including Brass Buttons (*Cotula coronopifolia*), Mediterranean Barley (*Hordeum marinum*), Italian Ryegrass (*Lolium multiflorum*), Rabbitsfoot Grass (*Polypogon monspeliensis*), and Sicklegrass (*Parapholis incurva*).

17. Palustrine Scrub/Shrub Wetland (= DFG "Riparian Scrub")

Narrative: Willow scrub is characterized by dense broad-leafed, winter-deciduous riparian thickets dominated by several willow shrub and tree species (*Salix* spp.). Riparian trees also may occur with the association and may include, for example, scattered Fremont's Cottonwood (*Populus fremontii*), and Western Sycamore (*Platanus racemosa*). Riparian woodland also may occur in small groves or in riverine corridors that drain into estuaries. As with other riparian habitats, riparian scrub supports a diverse assemblage of wildlife species, especially passerine bird species. The endangered Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Epidonax traillii extimus*) as well as other sensitive species, such as Yellow Warbler (*Dendroica petechia brewsteri*) and Yellow-breasted Chat (*Icteria virens*) all depend on riparian woodlands for breeding. Mammal assemblages are similar to those found in freshwater marsh habitats as the two often intergrade. In an undisturbed estuarine system, willow scrub habitat would generally occur upstream of tidal influence as willows are very sensitive to salt. Like freshwater marsh, this habitat is dependent upon a constant source of freshwater.

Structural features: bluff and dune seeps or spring, floodplains.

Wetlands: Palustrine Scrub/Shrub Wetland (Broadleaved Deciduous and Evergreen).

Physical processes: fluvial and/or groundwater hydrology; sediment transport.

Water regime/hydrology: seasonally and permanently saturated; temporarily flooded; phreatophytic.

Salinity: fresh water.

Dominant/characteristic Plant(s): Arroyo Willow (*Salix lasiolepis*); Mule Fat (*Baccharis salicifolia*); Sandbar Willow (*Salix exigua*).

Associated plant(s): Basket Rush (*Juncus textlis*); California Rose (*Rosa californica*); Coyote Brush (*Baccharis pilularis*); Salt Marsh Baccharis (*Baccharis douglasii*); American Dogwood (*Cornus sericea* ssp. *occidentalis*)?; Hoary Nettle (*Urtica dioica* ssp. *holosericea*).

Characteristic animals: resident and migratory passerine birds, such as Common Yellowthroat (*Geothlypis trichas*) and Blue grosbeack (*Guiraca caerulea*), and those listed herein (habitat no. 18); herpetofauna and mammals of various guilds.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; refuges for estuarine wildlife species and wildlife corridors linking upland sites with coastal wetlands.

Recovery opportunities: Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Epidonax traillii extimus*) as well as other sensitive species, such as Yellow Warbler (*Dendroica petechia brewsteri*) and Yellow-breasted Chat (*Icteria virens*).

Management issues: Impacts from invasive plant species including Giant reed (*Arundo donax*), Pampas Grass (*Cortaderia selloana*); Myoporum (*Myoporum laetum*).

18. Palustrine Forested Wetland (= DFG "Riparian Woodland"?)

Narrative: Palustrine Forested Wetland as discussed herein is generally characterized by isolated stands of trees or tall shrubs that occur at seeps, toe-of-slopes, ponded areas, along streams and rivers, and at other sites with shallow water tables. Arroyo Willow (*Salix lasiolepis*) is the most common representative but other native species such as additional willow species, Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and Western Sycamore (*Platanus racemosa*) are also represented. Riparian corridors along streams and rivers are no longer well developed due to impacts from urbanization, but portions of the original drainage of Centinela Creek still support riparian vegetation. In the riparian setting, trees in upland and wetland habitats may be included in mapped examples of this vegetation where the distinction among hydric (i.e., wetland), mesic, and xeric (i.e., upland) types of riparian vegetation are often not distinguished. A number of exotic species also may be represented including Myoporum (*Myoporum laetum*) and various species of *Eucalyptus*, especially Blue Gum (*Eucalyptus globulus*).

Structural features: bluff seeps, floodplains, margins of dunes and dune swales.

Wetlands: Palustrine Forested Broadleaved Deciduous Wetland.

Physical processes: fluvial and/or groundwater hydrology; sediment transport.

Water regime/hydrology: permanently, seasonally, temporarily, or intermittently flooded; permanently, seasonally saturated; phreatophytic.

Salinity: freshwater.

Dominant/characteristic Plant(s): Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*); Western Sycamore (*Platanus racemosa*); Arroyo (*Salix lasiolepis*).

Associated plant(s): Blue Elderberry (*Sambucus mexicana*); Coast Live Oak (*Quercus agrifolia*); White Alder (*Alnus rhombifolia*); Red Willow (*Salix laevigata*); Shining Willow (*Salix lucida* ssp. *lasiandra*); Black Willow (*Salix goodingii*); California Walnut (*Juglans californica*); various riparian shrubs and vine species and herbaceous plants including Stinging Nettle (*Urtica dioica* ssp,. *holosericea*).

Characteristic animals: Passerine birds including resident and migratory birds such as those sensitive species listed below; herpetofauna; shelter and corridor for mammals including raccoon, skunk, and coyote.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; breeding bird habitat.

Recovery opportunities: Southwestern Willow Flycatcher (*Empidomax trallii extimus*); Least Bell's Vireo (*Vireo belli pusillus*); Western Yellow Warbler (*Dendroica petechia brewsteri*); Yellow-breasted Chat (*Icteria virens*).

Management issues: vulnerable to invasion by Giant Reed (*Arundo donax*) and various exotic vines (e.g. Cape Ivy), shrubs (Tamarisk), and tree species (e.g., *Eucalytus* spp.); restore connectivity of stands when appropriate and feasible.

Habitat Category V
Upland Habitats:

19. Grasslands (= DFG Non-native Herbaceous Vegetation)

Narrative: Grasslands are illustrated on historic maps of the Ballona region and are likely to have occurred on alluvial deposits on the periphery of the coastal wetland ecosystem, mixed with various forms of coastal scrub. DFG recently used the designation "non-native herbaceous" for the category of vegetation that represents the existing conditions of "grassland", "meadow", or "prairie" vegetation within the Ballona Ecosystem. In a restored state, the vegetation could include native grass species and a diverse number of native herbaceous and sub-shrub species as noted above, with small colonies and scattered individuals of coastal scrub species to provide perches and shelter for animals that characterize grassland and adjacent scrub and wetland habitats.

Structural features: upland alluvial deposits, graded spoil deposits,

Physical processes: potentially a fire-maintained community.

Dominant/characteristic Plant(s): in an upland context - California Barley (*Hordeum brachyantherum* ssp. *californicum*); Purple Needlegrass (*Nassella pulchra*); Salt Grass (*Distichlis spicata*); Alkali Ryegrass (*Leymus triticoides*).

Associated plant(s): Alkali Heath (*Frankenia salina*); Coast Golden Bush (*Isocoma menziesii*); Common Tarweed (*Dienandra fasciculata*); Telegraph Weed (*Heterotheca grandiflora*); Deerweed (*Lotus scoparius*), Spanish Clover (*Lotus purshianus*), Owl's Clover (*Castilleja exerta*); White Cudweed (*Gnaphalium canescens*); Common Verbena (*Verbena lasiostachys*); California Poppy (*Eschschulzia californica*); Pitseed Goosefoot (*Chenopodium berlandieri*); Arroyo Lupine (*Lupinus succulentus*); Bicolor Lupine (*Lupinus bicolor* var. *microphyllus*); Fascicled Milkweed (*Asclepias fasciculata*); Bush Aster (*Lessingia filaginifolia*); Fiddleneck (*Amsinckia menziesii*); Western Ragweed (*Ambrosia psilostachya*); Gum Plant (*Grindelia robusta*); California Goldenrod (*Solidago californica*); Popcorn Flower (*Cryptantha inermedia*); Miniature Sun Cup (*Camissonia micrantha*); Rattlesnake Weed (*Euphorbia albomarginata*); Pygmy Stonecrop (*Crassula connata*).

Characteristic animals: resident and migratory grassland bird species including Horned Lark; herpetofauna including lizards and snakes, such as California King Snake and Gopher Snake; and small mammals including voles, mice, shrews, and moles.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; host plants for butterfly larvae including the Wandering Skipper Monarch (*Danaus plexippus*) butterflies; habitat for native small mammals; foraging habitat for raptors such as White-tailed Kite and Northern Harrier and egrets (Great Egret) and herons (Great Blue Heron).

Recovery opportunities: South Coast Marsh Vole (*Microtus californicus stephensi*); San Diego Black-tailed Jackrabbit (*Lepus californicus bennettii*); California Horned Lark (*Eremophila alpestris*); White-tailed Kite (*Elanus caeruleus*); Northern Harrier (*Circus cyaneus*).

Management issues: Maintenance of grassland habitat to prevent it becoming coastal scrub (using fire, grazing, or mowing techniques?); control of invasive plant species.

20. Coastal Scrub (including Coastal Bluff Scrub)

Narrative: The general category "coastal scrub" includes a number of shrub-dominated plant communities in the context of a variety of land forms. Coyote Brush and California Sage Brush form colonies on alluvial and disturbed soils and can occur within the context of grassland and other herbaceous vegetation. Upland delta scrub can be quite rich in shrub species and occurs in alluvium adjacent to wetland forms of delta scrub often dominated by Mulefat (*Baccharis salicifolia*). Coastal Bluff Scrub is limited to coastal bluffs where salt tolerant species including Wooly Sea-Blite (*Suaeda taxifolia*) and Quail Bush (*Atriplex lentiformis*) are characteristic but occurs in different forms depending on proximity to salt spray. Within the bluff community, sparsely-vegetated areas or areas with low vegetation also can support a wide variety of herbaceous species, some of which are also associated with coastal dunes. Coastal Dune Scrub is treated separately herein. No Maritime Chaparral occurs in the Ballona Ecosystem.

Other forms of upland coastal scrub include, for example, Delta Scrub and Baccharis Scrub, which can be transitional to wetland scrub types.

A variety of terrestrial animals, including amphibians, reptiles, mammals and birds are supported by coastal scrub habitat. For instance, Coastal Sage Scrub is the preferred breeding habitat of the coastal California Gnatcatcher (*Pilioptila californica californica*).

Structural features: alluvial deposits, berms and banks; coastal bluffs.

Physical processes: fluvial, erosional, (and anthropogenic).

Dominant/characteristic Plant(s): Coyote Brush (*Baccharis pilularis*); California Sagebrush (*Artemisia californica*); *Mugwort (Artemisia douglasiana***);** Quail Bush (*Atriplex lentiformis*); Douglas' Nightshade (*Solanum douglasii*); Lemonade Berry (*Rhus integrifolia*); Seacliff or Dune Buckwheat (*Eriogonum parvifolium*).

Associated plant(s): Laurel Sumac (*Malosma laurina*); Cliff Aster (*Malacothris saxatilis*); Deerweed (*Lotus scoparius*); Black Sage (*Salvia mellifera*); Wild Morning-glory (*Calystegia macrostegia*); Melic Grass (*Melica imperfecta*); Foothill Needlegrass (*Nassella lepida*); California Brome (*Bromus carinatus*); Mock Heather (*Ericameria ericoides*); Bladderpod (*Isomeris arboreus)*; Elderberry (*Sambucus mexicanus*); Wild Cucumber (*Marah macrocarpus*); Giant Ryegrass (*Leymus condenstatus*); California Encelia (*Encelia californica*); Suffrutescent Wallflower (*Erysimum insulare* ssp *suffrutescens*); Coastal Prickly Pear (*Opuntia littoralis*); California Buckwheat (*Eriogonum fasciculaum*); Milk Vetch (*Astragalus trichopodus*); Branching Phacelia (*Phacelia ramosissima* var.

austrolittoralis); Bush Mallow (*Malacothamnus fasciculatus*); Lewis' Evening Primrose (*Camissonia lewisii*); Toyon (*Heteromeles arbutifolia*); Chaparral Nightshade (*Solanus xanti*); Wooly Sea-blite (*Suaeda taxifolia*).

Characteristic animals: Loggerhead Shrike (Lanius ludovicianus) perching; California Gnat Catcher (*Polioptila californica californica*) endangered; resident and migratory passerine birds including Luzuli Bunting (*Passerina amoena*) and Blue Grosbeak (*Guiraca caerulea*); small mammals.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; breeding bird habitat; refuge for resident estuarine birds.

Recovery opportunities: Pacific Pocket Mouse (*Perognathus longimembris pacificus*); Loggerhead Shrike (*Lanius ludovicianus*) perching; California Gnat Catcher (*Polioptila californica californica*) breeding habitat; Suffrutescent Wallflower (*Erysimum insulare* ssp. *suffrutescens*); Lewis' Evening Primrose (*Camissonia lewisii*); Coastal Dunes Milkvetch (*Astragalis tener* var. *titi*).

Management issues: plan for connectivity among sites; invasive species such as Pampas Grass.

21. Coastal Dune Scrub and Dune Herbs (including Foredunes)

Narrative: Dune habitat represents a form of transition zone between the land and the sea and includes Coastal Dune Scrub and Dune Herb vegetation. Coastal dune habitats have been largely lost due to development in southern California. Prior to development, plant species such as dune lupine (*Lupinus chamissonis*), Mock Heather (*Ericameria ericoides*), dune primrose *(Camissonia cheiranthifolia)*, sand verbena *(Abronia maritima)* and dune ragweed *(Ambrosia chamissonis)* stabilized the loose sand, and the dunes where thereby anchored. Following human disturbance, many of the native plants were eliminated and exotics, such as sour-fig *(Carporotus edulis)* and sea rocket *(Cakile maritima)* invaded or were planted.

Dunes are important habitats for several species of rare insects including Globose Dune Beetle *(Coelus globosus)*, the Sandy Beach Tiger Beetle *(Coelus hiticollis gravida)*, and Sand Dune Tiger Beetle *(C. latesignata latesignata)*. The San Diego Horned Lizard and Silvery Legless Lizard *(Anniella pulchra pulchra)* were once common; the later still occurs within the Ballona Ecosystem. The endangered California Least Tern *(Sterna antillarum browni)* and Western Snowy Plover *(Charadrius alexandrinus nivosus)* are associated with dune habitat but generally nest in the upper beach environment, which is no longer connected to the dunes.

Structural features: coastal dunes

Physical processes: aeolian transport and deposition of sands; storm influenced.

Dominant/characteristic Plant(s): Dune Lupine **(***Lupinus chamissonis*); Dune Buckwheat **(***Eriogonum parvifolium***)**; Beach Bur (*Ambrosia chamissonis*); Beach Evening Primerose (*Camissonia cheiranthifolia*); Common Sand Verbena (*Abronia umbellata*).

Associated plant(s): California Croton (*Croton californicus*), Tall Stephanomeria (*Stephanomeria virgata*), Mock Heather (*Ericameria ericoides*), Yellow Pincushion (*Chaenactis glabriuscula*), California Sun Cup (*Camissonia bistorta*), Lewis' Evening Primrose (*Camissonia lewisii*), Miniature Sun Cup (*Camissonia micrantha*), Coastal Dunes Milkvetch (*Astragalis tener* var. *titi*).

Characteristic animals: Silvery Legless Lizard (*Anniella pulchra pulchra*); Globose Dune Beetle (*Coelus globosus*); Ciliated Dune Beetle.

Ecosystem functions: maintenance of biodiversity; habitat for rare, endangered, and special interest species; source of freshwater seeps along interface with salt marsh habitat.

Recovery or protection opportunities: Silvery Legless Lizard (*Anniella pulchra pulchra*); El Segundo Blue Butterfly (*Euphilotes battoides allyni*); Dorothy's El Segunda Dune Weevil (*Trigonoscuta dorothea dorothea*); Globose Dune Beetle (*Coelus globosus*); Lande's El Segundo Dune Weevil (*Onychobaris langei*); Suffrutescent Wallflower (*Erysimum insulare* ssp. *suffutescens*); Beach Spectaclepod (*Dithyrea maritima*), Lewis' Evening Primrose (*Camissonia lewisii*)

Management issues: Remnant dunes are disjunct from coastal processes that formed them hence no natural disturbance regime, and beach related habitats are missing from the complex. Vulnerable to introduced invasive plant species.

22. Forests, woodlands, groves, and tree rows (including DFG "Eucalyptus Grove")

Narrative: Oak woodlands, characterized by Coast Live Oak (*Quercus agrifolia*), are characteristic along slopes, bluffs, and banks adjacent to various estuaries in southern California but may not have been located within or in proximity to the Ballona Ecosystem. Nonetheless, Coast Live Oaks may have been in the more xeric portions of riparian forests that included stands of Western Sycamore (*Platanus racemosa*). Current conditions include a number of groves and stands of planted or naturalized, largely exotic trees (e.g., Blue Gum, *Eucalyptus globulus*) within the Ballona Ecosystem. Some of these sites have important ecosystem functions such as nesting areas for great Blue Herons, whereas others (e.g., Myoporum and Acacia) may be less important depending on the site and role in the ecosystem.

Structural features: cultivated areas; roadsides; yards; banks and bluffs.

Physical processes:

Dominant/characteristic Plant(s): *Eucalyptus* spp.; Myoporum (*Myoporum laetum*).

Associated plant(s): numerous species of planted and naturalized trees including Acacia (*Acacia baileyana*); California Walnut (*Juglans californica*); Peruvian and Brazilian Pepper Trees (*Schinus molle* and *S. terebinthifolia*); Canary Island Date Palm (*Phoenix canariensis*); Slender Fan Palm (*Washingtonia robusta*); Carob (*Ceratonia siliquia*); Sweet Gum (*Liquidambar styraciflua*); Olive (*Olea europea*); Velvet Ash (*Fraxinus velutina*); Fremont Cottonwood (*Populus fremontii*); Chinese Elm (*Ulmus parvifolia*).

Characteristic animals: resident and migratory passerine birds; roosting and possibly nesting raptors; roosting and nesting herons.

Ecosystem functions: habitat for rare, endangered, and special interest species; perches for raptors.

Recovery opportunities: Preservation/expansion of Great Blue Heron rookery; potential for Monarch Butterfly over-wintering habitat in groves of Blue Gum (*Eucalyptus globulus*).

Management issues: Monarch Butterflies use exotic Eucalyptus trees as winter roosts. Need to retain butterfly habitat (if Eucalyptus trees are targeted as butterfly habitat at Ballona), while not encouraging spread of exotic tree species.

APPENDIX C.
HYDRODYNAMIC MODELING

APPENDIX C – NUMERICAL MODELING OF BALLONA WETLAND RESTORATION ALTERNATIVES TECHNICAL APPENDIX

Hydrodynamic modeling was conducted in support of the development and evaluation of restoration alternatives for the Ballona Wetlands Restoration Project. The Environmental Fluid Dynamics Code (EFDC) hydrodynamic model was selected because of its capacity to model the relevant physical processes, its compliance with regulatory standards, and its availability in the public domain at no cost.

This appendix documents the development, calibration, and alternative implementation of the EFDC model. It also provides supporting documentation for specific model results discussed in the Feasibility Report. This appendix is not a stand-alone report and should be reviewed in conjunction with Section 3.3 (Hydrology) of the Feasibility Report.

Because the EFDC model uses metric units, some of the model results in this appendix are presented using metric units. However, the discussion in the Feasibility Report uses English units to follow local convention. As a result, this appendix presents some results in metric units and some in English units.

Sections C-1 and C-2 were prepared as stand-alone memos. Section C-1 discusses the EFDC model development and calibration. Section C-2 discusses the representation of marsh channel networks within the model. Section C-3 shows overview plots of model bathymetry for each alternative. Section C-4 provides supporting documentation for model results discussed in Section 3.3 (Hydrology) of the Feasibility Study.

C-1. LOWER BALLONA CREEK MODELING – EFDC MODEL DEVELOPMENT AND CALIBRATION

1. INTRODUCTION

This section presents the calibration process for the Environmental Fluid Dynamics Code (EFDC) hydrodynamic model developed for the Ballona Creek Wetland Restoration Project. The EFDC model was configured such that predicted water levels accurately replicate observed water levels from a two-week calibration period. Typically, predicted water levels agree to within 5 cm of the observed water levels. Having calibrated the EFDC model, it is ready to characterize the hydrologic response of the proposed restoration actions for feasibility assessment purposes.

This section includes details of the model development and calibration. The section on model development describes the EFDC model in general and summarizes how the model was configured to represent the Lower Ballona Wetland system. The section on calibration describes the calibration approach and compares model predictions and field observations.

2. MODEL DEVELOPMENT

The EFDC model was chosen to simulate the Lower Ballona Wetland system after discussion between the Project Management Team, the Science Advisory Committee and the LA District, Corps of Engineers. Benefits of this model include its capacity to model the relevant physical processes, its compliance with regulatory standards, and its availability in the public domain at no cost.

After briefly describing EFDC's general characteristics, this section describes the application of the model to the Lower Ballona Wetland system, including the model's domain, boundary conditions, initial conditions and model execution. The linked Lower Ballona Wetland system includes lower Ballona Creek; Ballona Wetland Restoration Areas A, B, and C; Marina Del Rey; Del Rey Lagoon; Ballona Lagoon; the Grand Canal; and a portion of Santa Monica Bay. The uncertainties with respect to the model predictions are discussed.

2.1. MODEL DESCRIPTION

EFDC is a numerical model designed for simulating flows in open water systems. The model was originally developed at the Virginia Institute of Marine Science and receives continuing support from the U.S. EPA. A complete description of the model assumptions, governing equations and approximations, including the space discretization, time integration, and numerical solution methods is presented in Hamrick (1992). Tetra Tech (2002) provides guidance in using the model as well as references to successful applications of EFDC for a variety of tidally-influenced systems.

The physical processes represented in the model include important aspects of the Lower Ballona Wetland system:

- unsteady tidal flow,

- boundary wetting and drying, and
- hydraulic control structures.

EFDC solves the physical equations for fluid flow on a staggered, finite-difference grid. The modeling domain is defined by a curvilinear flexible mesh, enabling the grid to follow dominant terrain features. At present, the model has been configured to predict two-dimensional (2D) depth-averaged flow. Although not implemented for this study, the model can be extended to simulate three-dimensional (3D) flows and the transport of salt, sediment, and/or contaminants.

2.2. MODEL DOMAIN

The model domain defines the portion of the physical environment that is included in the model. Its extent should include the system's relevant components and processes between these components. Additionally, the boundaries of the system should be sufficiently far from the region of interest such that boundary conditions do not overly constrain flow in the region of interest. When constructing the model's horizontal grid that defines the domain, these factors must be balanced against model execution time. The vertical component of the model domain is defined by the system's bathymetry. Further information about the physical setting within the model domain can be found in PWA (2006).

2.2.1. Model extent

The model domain extends from where Ballona Creek passes under Sawtelle Boulevard to Santa Monica Bay, as shown in Figure 1. The upstream boundary is beyond the range of tidal influence and coincides with a discharge monitoring station. Placing the downstream boundary within Santa Monica Bay provides ample distance and tidal volume between the specified tidal boundary condition and the region of interest. Between the upstream and downstream boundaries, the model domain includes:

- lower Ballona Creek;
- Ballona Wetland Restoration Areas A, B and C;
- Marina Del Rey, including Oxford Basin;
- Del Rey Lagoon;
- Ballona Lagoon, including the Grand Canal downstream of Washington Boulevard; and
- a portion of Santa Monica Bay roughly 1.3 km by 2.5 km.

2.2.2. Horizontal grid generation

EFDC employs a curvilinear orthogonal grid to represent the physical domain. The grid is analogous to a rubber sheet of graph paper. Its curvilinear aspect allows the grid to be stretched and transformed so that it aligns with the major topographic features of the model domain. However, orthogonality requirements dictate that the grid maintains nearly perpendicular intersections at cell boundaries.

The grid generation tools available within the EFDC modeling environment are somewhat limited in their functionality. Instead, DELFT3D's grid generation software (WL | Delft Hydraulics, 2006b) was used to create the grid. DELFT3D's graphical user interface provides robust tools for grid orthogonalization, manipulation, and merging. After creating the grid with the DELFT3D software, the grid files were converted to EFDC format using MatLab programs. The grid cell sizes average 10 m across in most of the model domain, resulting in approximately 42,000 active cells within the domain.

2.2.3. Bathymetry

The bathymetry, or spatial map of surface elevations, is represented in the model as a single elevation value at the center of each grid cell. Multiple sources of bathymetric data were compiled to cover the entire model domain. The sources of bathymetry data for each region are listed below:

- *Ballona Creek:* Channel centerline elevations and width from the channel's design drawings (Los Angeles County Flood Control District, 1959).
- *Ballona Wetland Areas A, B and C*: Ground surface elevations from the R.J. Lung & Associates aerial survey in April 1998, supplemented with spot elevations, marsh channel cross sections, and culvert invert elevations collected by PWA in 2006.
- *Marina Del Rey*: Elevations in the main stem of the marina from unpublished USACE dredging surveys in March 2006 and elevations in the mooring basins extrapolated from the adjacent main channel elevations.
- *Del Rey Lagoon:* Spot elevations from bathymetric survey drawings (City of Los Angeles, 2003) interpolated across the lagoon.
- *Ballona Lagoon and the Grand Canal*: Elevations from cross section surveys (Coastal Frontiers Corporation, 1989) and Ballona Lagoon Enhancement Project design drawings (City of Los Angeles, 1997).
- *Santa Monica Bay*: Bathymetric survey data from the National Oceanic and Atmospheric Administration (1997).

All elevation data were converted to the same horizontal datum (UTM Zone 10N) and vertical datum (NAVD88) using Corpscon software (U.S. Army Corps of Engineers, 2004). The data sets were then imported into the DELFT3D bathymetry generation software (WL | Delft Hydraulics, 2006a) and smoothly interpolated at the boundaries between data sets. The compiled bathymetric surface was converted into EFDC-specific input files using the EFDC_Explorer graphical user interface (Criag, 2004). To refine features such as wetland channels and elevated road bed that have widths on the order of the 10 m grid cell size, a MatLab program was used to inscribe these features into the bathymetry. This procedure ensures that these features are hydraulically contiguous, but yields a stair-step appearance as the features traverse diagonally across the grid. The compiled bathymetry for the model extent is shown in Figure 1. Figure 2 displays a portion of the bathymetry within the western portion of Area B that includes wetland channels and road bed. This figure demonstrates the implementation of these features as contiguous sets of grid cells.

2.3. BOUNDARY AND INITIAL CONDITIONS

Boundary and initial conditions describe the external forcing applied to the model and starting values for the predicted variables, respectively. Boundary conditions consist of:

- the tidal boundary within Santa Monica Bay,
- the freshwater inflows from the Ballona Creek watershed,
- culvert discharges, and
- bed roughness.

Initial conditions must be specified for the water surface elevation and velocity field when the model begins a simulation.

2.3.1. Tidal boundary

Comparison between the NOAA continuous tide gauge station at the Port of Los Angeles (Station ID 9410660) and water surface measurements in Ballona Creek collected by Nearshore and Wetland Surveys (2006) show good agreement with minimal amplitude differences or phase lag. For example, observations in Ballona Creek (Nearshore and Wetland Surveys, 2006) and at the Port of Los Angeles are shown in Figure 3. Because of the agreement between the two data sets, the Port of Los Angeles water surface elevation data was applied as the open tidal boundary condition at the model's western edge in Santa Monica Bay. This tide station is well established and it can provide boundary condition data for a wide range of time periods. The northern and southern boundaries of the model grid in Santa Monica Bay are linked by a periodic boundary condition. This type of boundary condition minimizes the influence of these boundaries on model results.

2.3.2. Freshwater inflow

The primary freshwater inflow into the Lower Ballona system comes from Ballona Creek itself. The upstream model boundary coincides with the County of Los Angeles, Department of Public Work's discharge station at Sawtelle Blvd (Station ID F38C-R). Observations from this station were used as a discharge boundary condition into the model.

2.3.3. Culvert and gate discharges

Culverts and gates regulate flow into and out of the Area B wetland, Fiji Ditch, Del Rey Lagoon, and Ballona Lagoon. Culvert flow is represented in the model as water-level-dependent discharge between a pair of grid cells. Discharges through all but one culvert are implemented in the EFDC model through an input file that specifies the discharge as a function of the difference in water levels at the ends of each culvert.

A slightly more complex specification was used for the gate that conveys water from Ballona Creek to the Area B wetland. Flow through this gate is governed by a self-regulating tide gate that closes automatically once the water level in Ballona Creek reaches a predetermined level. For this culvert, the discharge was modeled as a function of both the upstream and downstream water levels and the discharge was set to zero when the upstream water level in Ballona Creek equal or exceeds the water level which triggers gate closure.

Observed water levels within the Area B wetland (Nearshore and Wetland Surveys, 2006) slowly increase even after the self-regulating tide gate has closed. This increase may result from leakage through either of the tide gates and/or seepage from the headlands to the south of the wetland. The exact source remains a point of discussion. To replicate these slowly increasing water levels, a constant discharge of 0.16 m^3/s was added as a source to the wetland. This rate was estimated from the observed rate of water level increase after the self-regulating tide gate has closed (Figure 5) and the area of inundated wetland during higher high water. If future investigation clarifies and quantifies the source of this water level increase, it can be more explicitly included in the model.

2.3.4. Bed roughness

Bed roughness relates the flow velocity to the frictional loss of momentum as the flow moves over the bed. EFDC parameterizes the bed friction's effect on flow through a roughness height, z_0, based on the assumption of a logarithmic velocity profile. A typical, constant z_0 value of 0.002 m was applied across the entire domain (Blumberg and Mellor, 1987). Sensitivity analysis of water levels to variations in z_0 confirms that water levels are relatively insensitive to this parameter.

2.3.5. Initial conditions

Model start times were selected to coincide with slack tide when current speeds can be initialized to zero. Initial water levels throughout the model domain were set to a uniform value equal to the open boundary condition. The model was spun up for four days of simulation time to remove initial transients from the model results and enable water levels and velocities to equilibrate to the prescribed boundary conditions.

2.4. MODEL EXECUTION

For the model configuration described above, model testing indicates that stable and accurate predictions are achieved with a time step of two seconds. With this time step, simulations execute on a 3.6 GHz PC workstation at speeds approximately eight times faster than real time.

2.5. MODEL UNCERTAINTY

EFDC is a widely used modeling tool for estuarine simulations and has been validated in numerous studies (Tetra Tech, 2002). However, numerical models inherently rely on approximations that introduce sources of uncertainty in the model results. Uncertainties may be present both spatially and temporally, and may result from a variety of factors, including:

- physical characteristics of the model domain,
- specification of boundary conditions, or
- limitations in the model's numerical formulation.

For the specific application of a hydrodynamic model of the Lower Ballona system, it is important to assess the modeling uncertainties and assumptions made in applying the model to understand the extent to which these uncertainties affect model predictions.

The largest uncertainties affecting model performance for the Lower Ballona model are the accuracy and resolution of available bathymetry and the grid resolution used in the model to resolve this bathymetry. To the extent possible, the model has made use of the most recent and best available bathymetric data and datum conversion tools (Section 2.2.3). However, when the bathymetric data is sampled onto the model grid, additional filtering of the bathymetric data occurs which limits the capacity of the model to resolve small-scale bathymetric features. The grid resolution for the model was selected to be as fine as possible, subject to the computation time restraints. The nominal grid cell size of 10 m prevents the model from accurately resolving the bathymetry in the smallest channels. However, since the volume of these small channels represents a small fraction of the overall domain, their exclusion is not likely to significantly alter the model's predictions.

The model solves the 2D depth-averaged approximation of the hydrodynamic flow equations. The use of 2D simulations significantly reduces the computational time required for the model simulations but also introduces additional model uncertainty in the hydrodynamic predictions. This uncertainty is constrained because the wetland's shallow depths and limited freshwater inputs minimize the impact of 3D flow effects.

Model uncertainties are also introduced through the specification of boundary conditions and model parameterizations, such as bed roughness. Additionally, any field data used either to force the model or to calibrate the model has some associated uncertainty due to instrument calibration and errors, instrument location, field corrections, and data noise.

3. MODEL CALIBRATION

The model was calibrated to observed water levels, primarily by adjustment of culverts and gate discharge rates. As presently calibrated, the model predicts water levels to within 5 cm of observations for nearly all of the calibration period. The sections below describe the calibration approach, summarize the observation data, compare predicted and observed water levels, and outline future refinements to the model.

3.1. CALIBRATION APPROACH

Calibrating a model involves adjusting model parameters or model formulation in order to match model predictions and field observations at known locations. Initially, the calibration process can verify that each of the specified model inputs and boundary conditions are working properly. Subsequent iterations of the calibration process enhance agreement between model predictions and observations. The model is run for a known set of input conditions, and its output is compared to a known set of observations. The discrepancies between the model predictions and the observation data help determine which aspects of the model are not adequately capturing the physical processes. This may lead to adjusting some model parameters to improve agreement between predictions and observations.

Adjustments to model parameters are made until the model's response to the specified inputs replicates the field measurements as closely as possible. The goal of the calibration process is to identify the areas and processes of highest interest, and maximize the model's predictive capability in those areas, while ensuring reasonable behavior in the rest of the model predictions.

The model was calibrated to optimize agreement between observations and predictions of water levels. Calibration to water levels indicates that the model is correctly predicting the volumes of water that are exchanged between each region of the model. Calibration of Ballona Creek water levels required no adjustments to model parameters beyond the model setup described above in Section 0. To calibrate water levels at the other four observation stations, all of which are upstream of culverts, a coefficient scaling the discharge through the culverts was adjusted. Comparison between this calibrated discharge and the discharge estimated by the U.S. Geological Survey Culvert Analysis Program (CAP; Fulford, 1998) exhibit good agreement.

3.2. OBSERVATION DATA

The water level observations used for calibration were collected by PWA and Nearshore and Wetland Surveys (2006) in July and August, 2006. A representative spring-neap cycle from July 5 to July 20 was selected from this observation record as the calibration period to simulate. The five locations at which water levels were observed are shown in Figure 1. In addition to water levels in Ballona Creek, which is directly exposed to the tidal action, the other four stations are located in regions where the tidal flows are controlled by flow through gates and culverts.

3.3. WATER LEVEL COMPARISON

Time series of predicted water levels at five stations and the corresponding observed water levels are plotted in Figure 4 to Figure 8. For most of the two-week simulation period, these time series demonstrate agreement within 5 cm between the model predictions and observations. Differences larger than 5 cm between predictions and observations are typically caused by mechanisms beyond the scope of the model that are insignificant in comparison to the changes expected from restoration. Explanation for these larger differences between observations and predictions are discussed below:

- During several of the lowest tides in the middle of the simulation period, the observations bottom out at constant values that are above the predicted values (Figure 4 to Figure 7). This is because the instruments were mounted such that water levels during these lowest tides fell below their sensors and exposed the sensors to the atmosphere during these periods.
- As discussed above in Section 2.3.3, an unknown water source causes water levels to rise in the Area B wetland after the tide gates between Ballona Creek and the wetland close. The observed water levels consist of a rapidly rising section while the tide gate is open and then a slowly rising section once the tide gate closes (Figure 5). In the absence of data, the unknown source was modeled as a constant discharge to the wetland. This approximation of the source is sufficient to

reproduce the typical rising water levels during high tides. However, the source's actual discharge rate probably varies in time, causing the differences between the observed and the modeled water levels.

- In Fiji Ditch (Figure 6), high frequency oscillations in the water level observations are consistent with the 6 to 8 second water level oscillations observed visually during instrument installation. It is hypothesized that these water level oscillations result from ocean swell that propagates through the marina and culvert. The model does not include the physical processes which create this type of water level oscillation since this process does not transport significant amounts of water.
- Below 0.25 m NAVD, predicted water levels in Del Rey Lagoon fall more rapidly than observed water levels (Figure 7). This difference may be the result of the representation of the lagoon's bathymetry in the model, which was created by interpolation from relatively few spot elevations. Since the predictions at all other times and locations otherwise demonstrate good agreement with the observed water levels and the lagoon is only a small feature located outside the project area, the current implementation is sufficient for assessment of the restoration alternatives. If specific questions regarding circulation within the lagoon are of interest, the model's representation of the lagoon's bathymetry should be improved.
- The tide gates regulating flow into Ballona Lagoon (Figure 8) are manually adjusted to restrict flow during spring tides, e.g. from July 7 to July 14. This operational practice prevents flooding upstream of the gates. Since records of the actual gate settings are not maintained (Mariposa Landscaping, personal communication), no attempt was made to model the Lagoon's water levels during this period. Hence, during the spring tides, the predicted water level continues to span nearly the full range of water levels in Ballona Creek while the observed water level within Ballona Lagoon was muted.

3.4. FUTURE WORK

Although the model is sufficiently calibrated to provide a feasibility assessment of the proposed restoration alternatives, additional calibration should be conducted for future stages of alternative design or evaluation of more complex processes, such as sediment transport or water quality. These additional steps include:

- Calibration to observed current velocity data
- Calibration to observed salinity data
- Validation to water levels during high Ballona Creek discharge

4. REFERENCES

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5. FIGURES

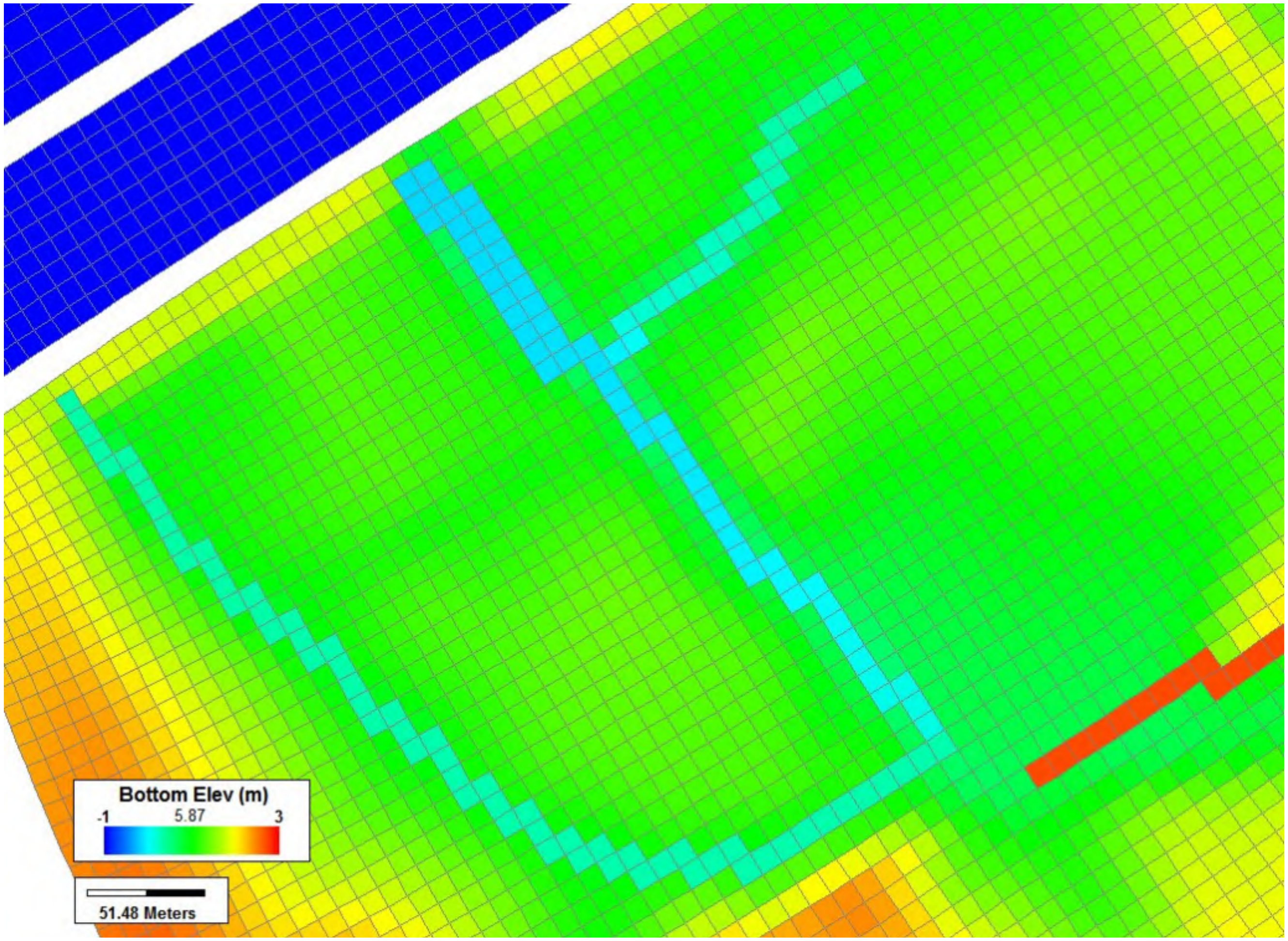
Source: R.J. Lung & Associates aerial survey (1998) and PWA (2006) channel cross sections

figure 1
Lower Ballona Modeling

Model Bathymetry, Full Extent

PWA Ref# 1793.01

PWA

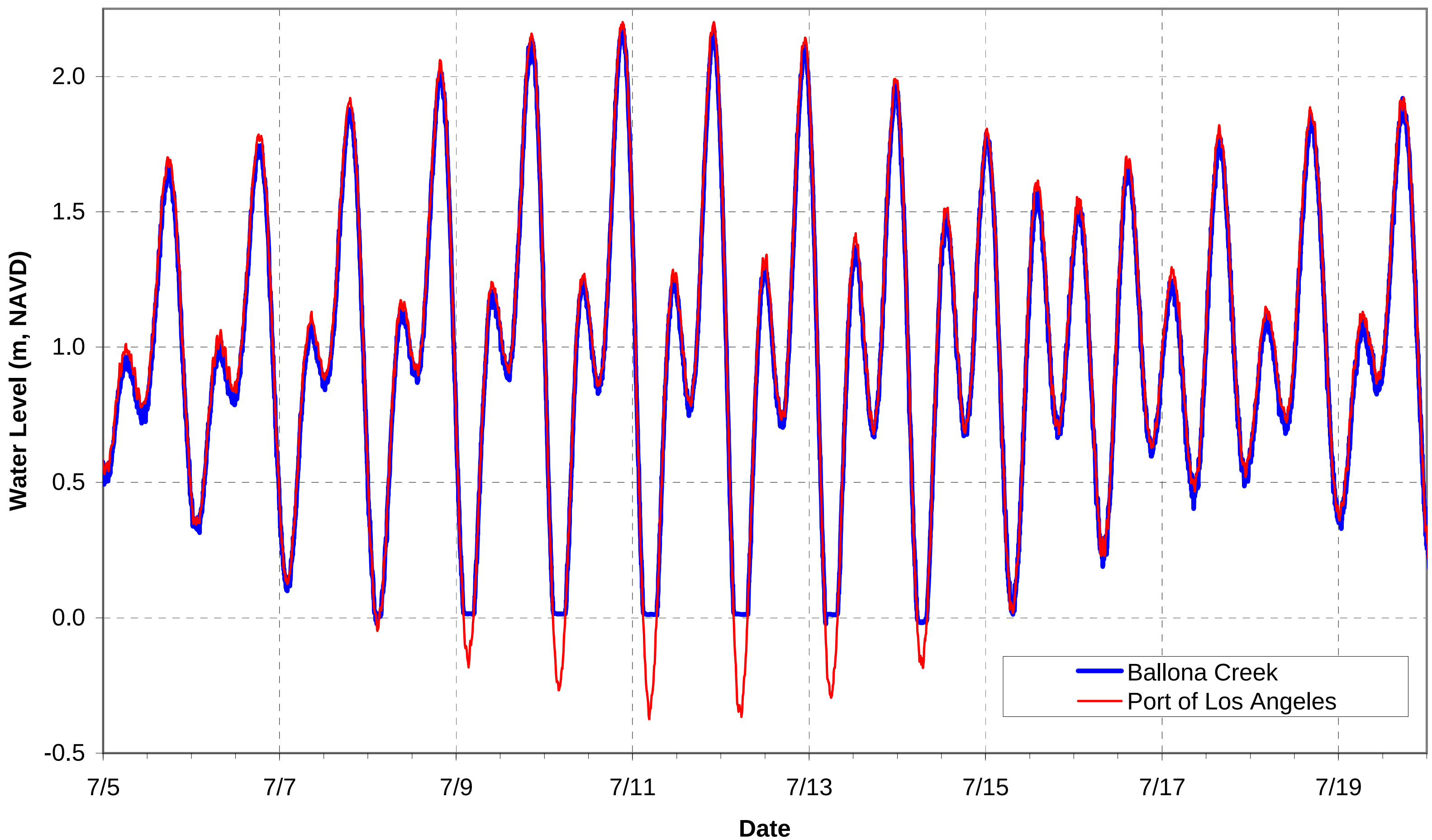


Source: R.J. Lung & Associates aerial survey (1998) and PWA (2006) channel cross sections

figure 2
Lower Ballona Modeling

Model Bathymetry, Area B Wetland

PWA Ref# 1793.01



Source: NOAA (Station ID 9410660) and Nearshore and Wetland Surveys (2006)

figure 3

Lower Ballona Modeling

Port of Los Angeles and Ballona Creek Observed Water Levels

PWA

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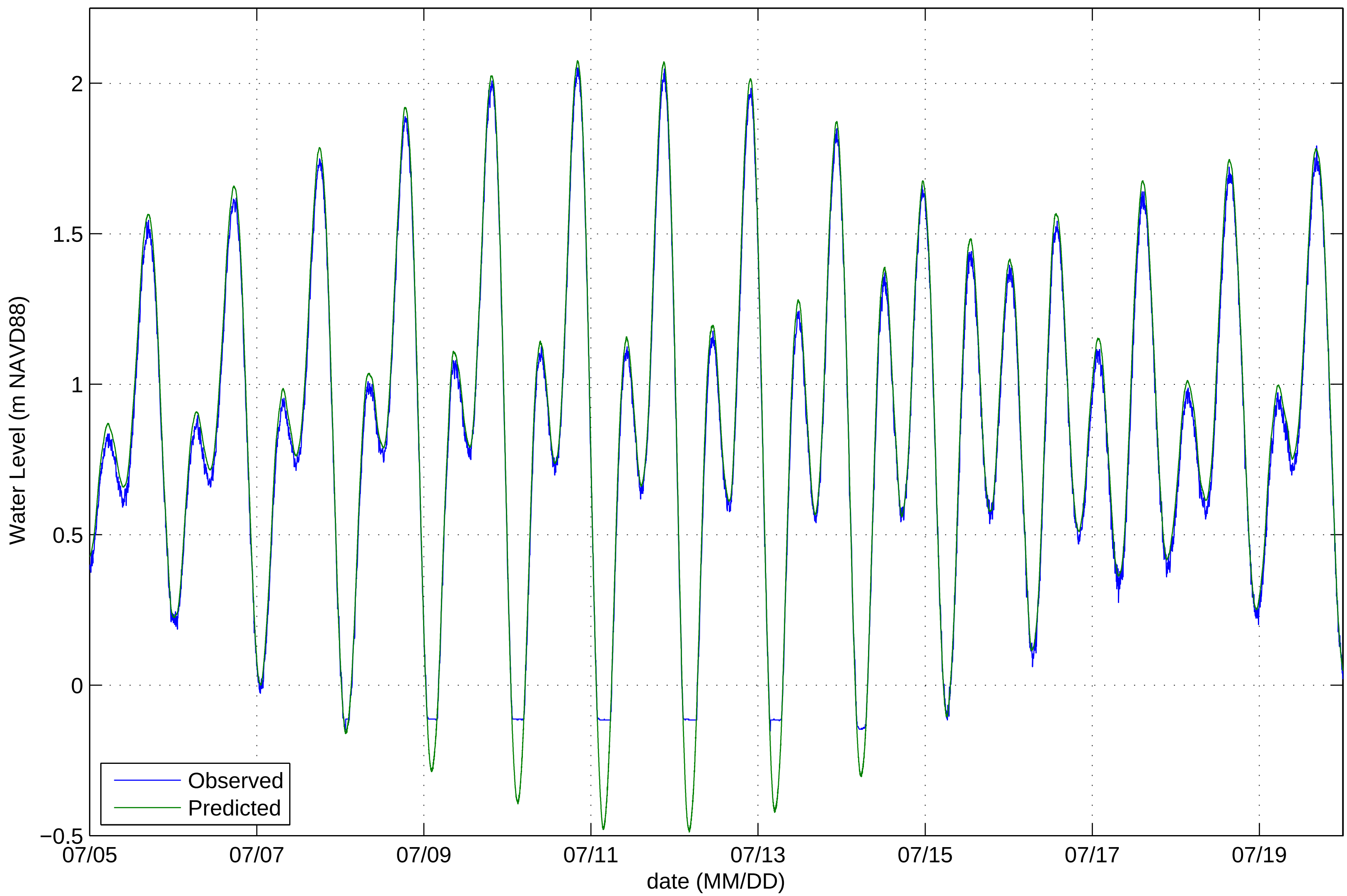


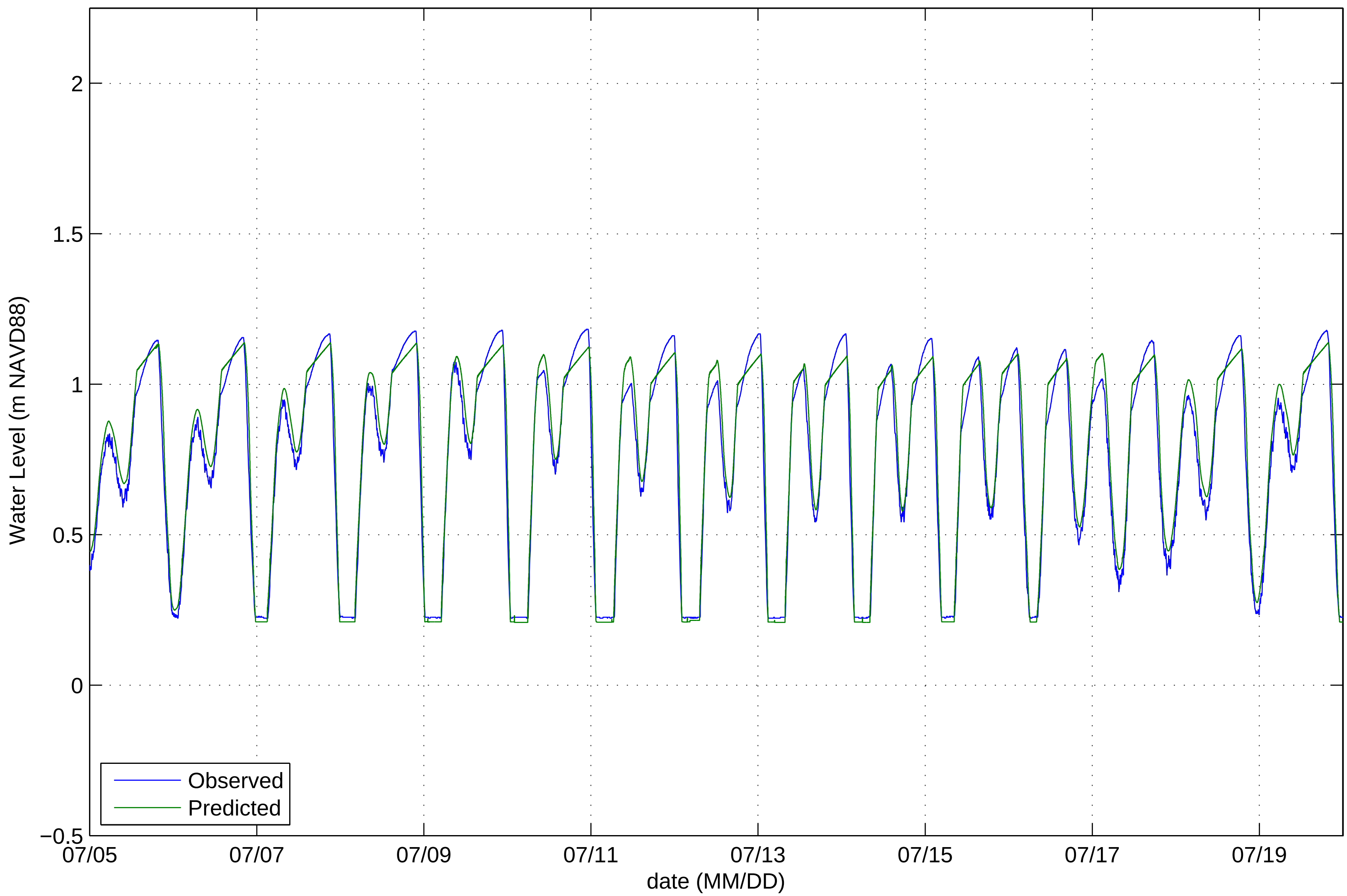
Source: USACE field observations and EFDC model predictions

Figure 4
Lower Ballona Modeling

Predicted vs. Observed Water levels, 2006 – Ballona Creek

PWA Ref# 1793.1

PWA



Source: USACE field observations and EFDC model predictions

Figure 5
Lower Ballona Modeling

Predicted vs. Observed Water levels, 2006 – Area B Wetland

PWA Ref# 1793.1

PWA

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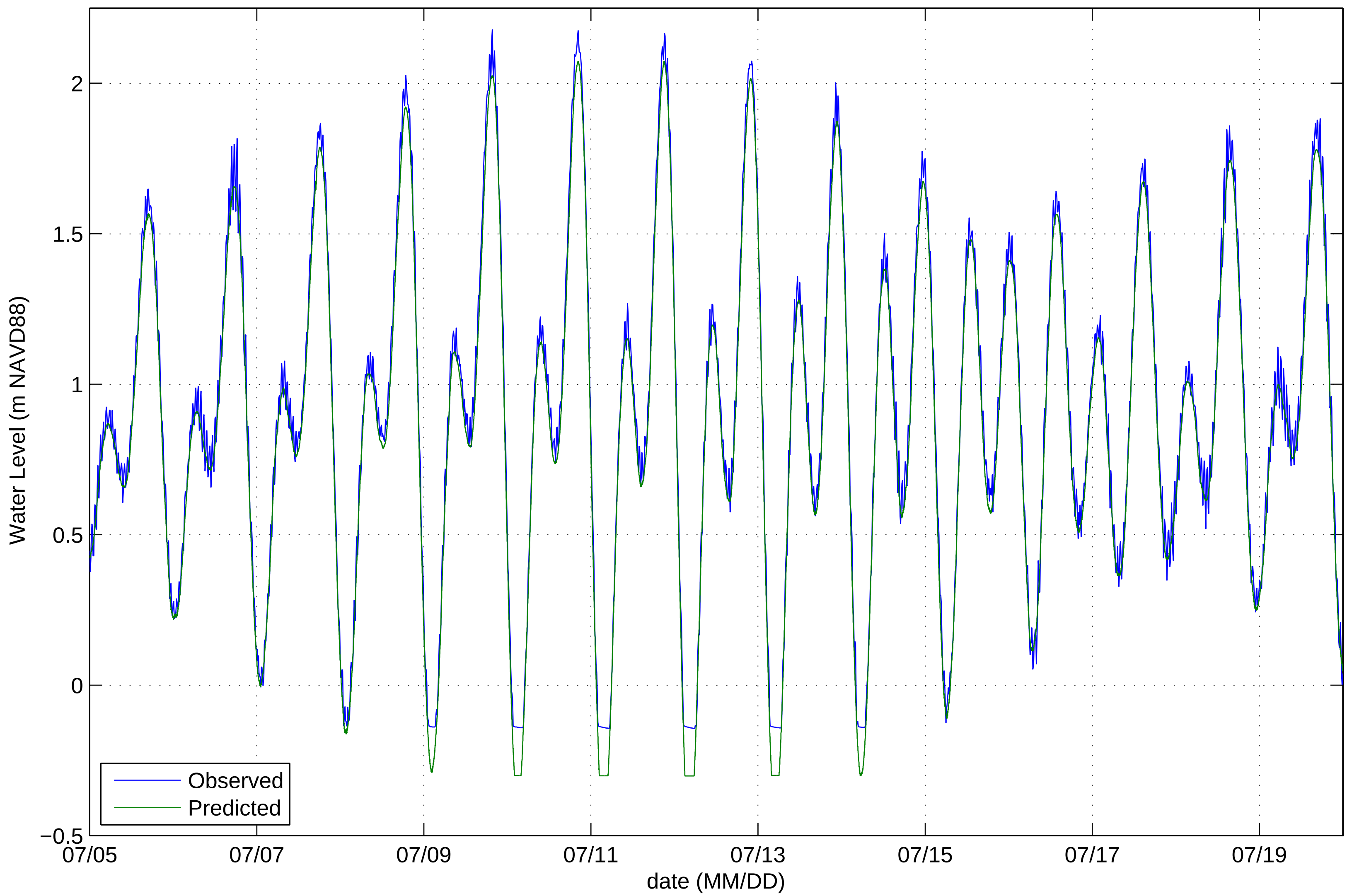

Source: PWA field observations and EFDC model predictions

Figure 6
Lower Ballona Modeling

Predicted vs. Observed Water levels, 2006 – Fiji Ditch

PWA Ref# 1793.1

PWA

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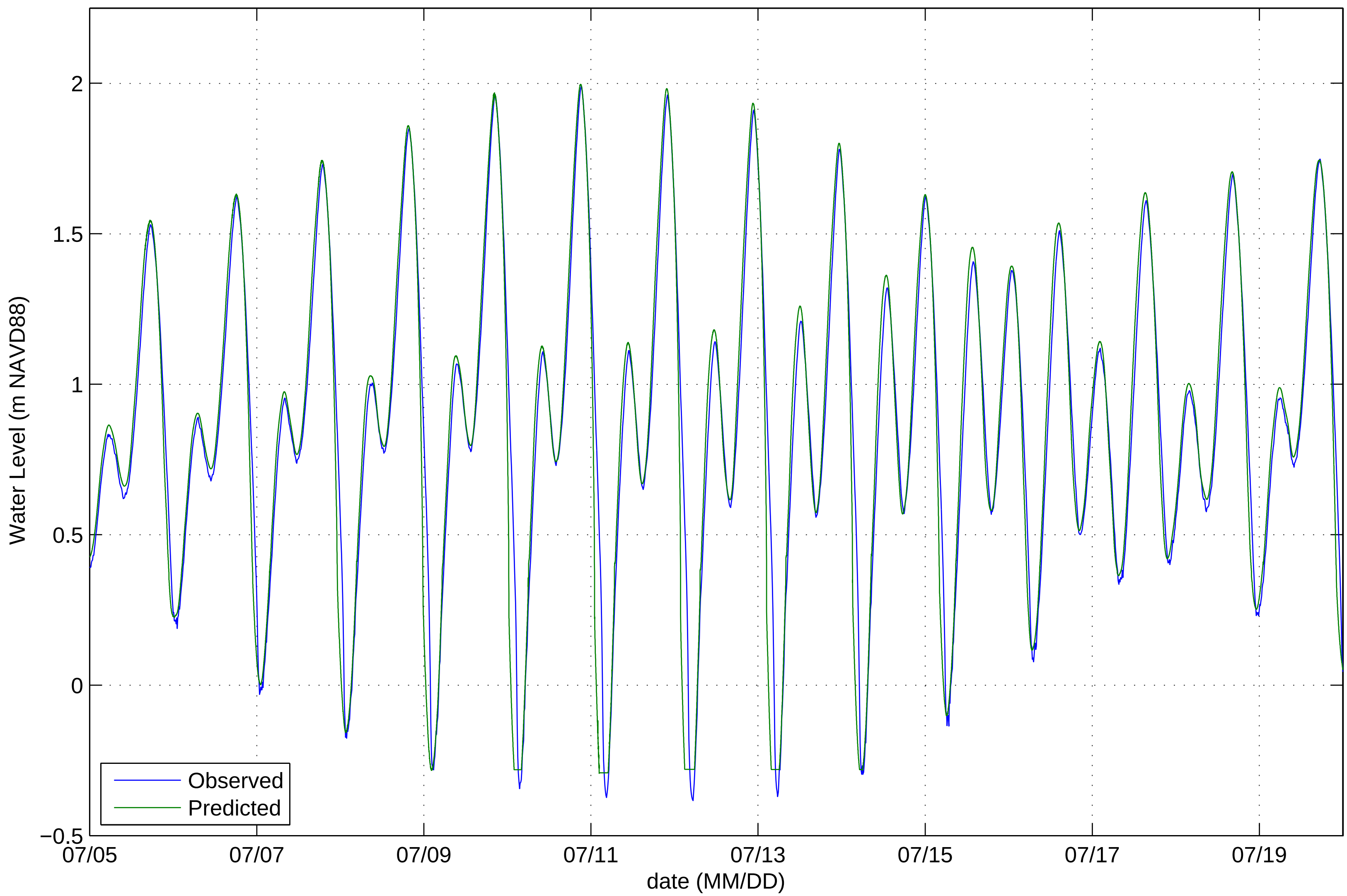

Source: PWA field observations and EFDC model predictions

Figure 7
Lower Ballona Modeling

Predicted vs. Observed Water levels, 2006 – Del Rey Lagoon

PWA Ref# 1793.1

PWA

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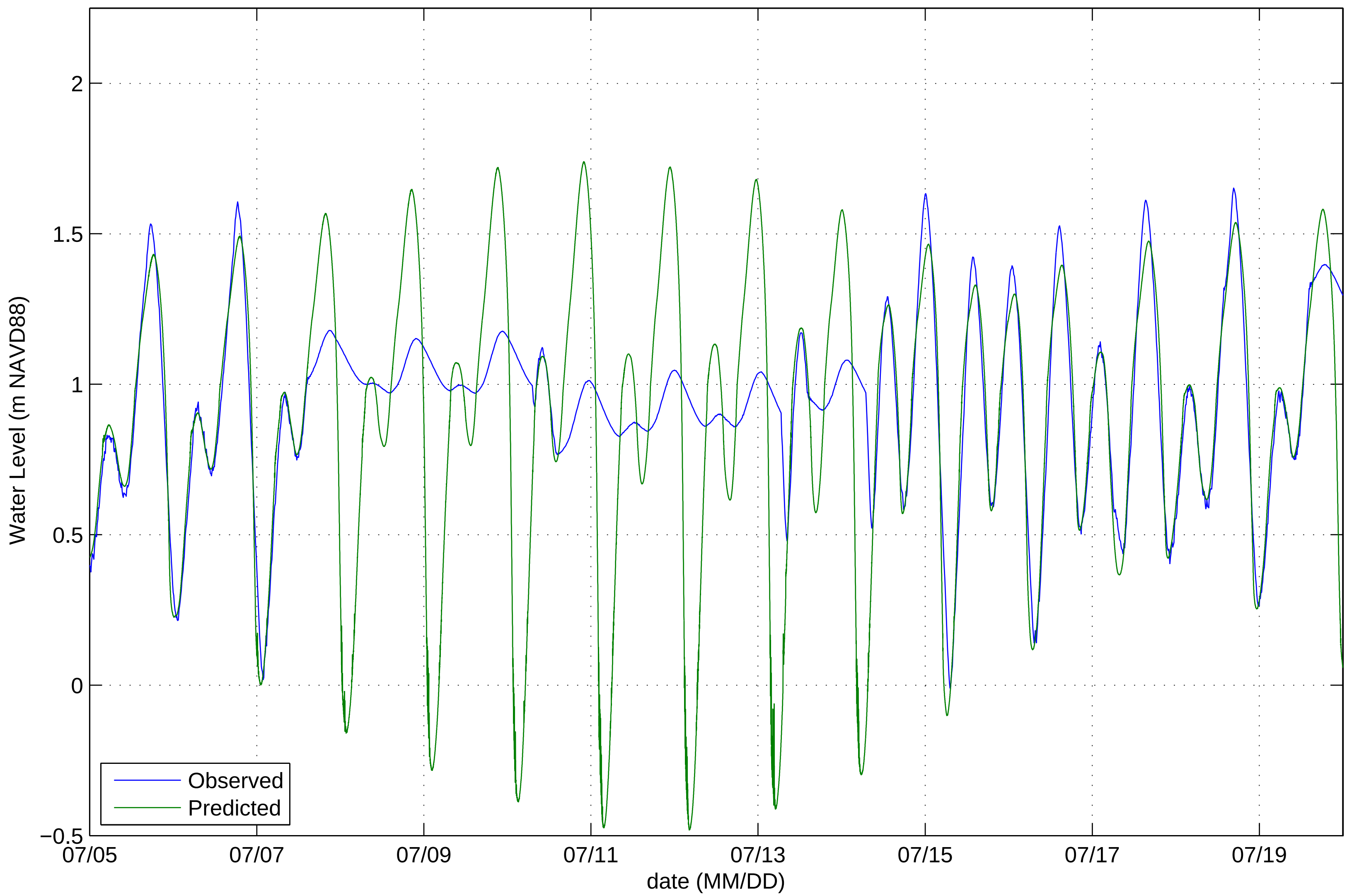

Source: PWA field observations and EFDC model predictions

Figure 8
Lower Ballona Modeling

Predicted vs. Observed Water levels, 2006 – Ballona Lagoon

PWA Ref# 1793.1

PWA

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C-2. MARSH CHANNEL REPRESENTATION IN LOWER BALLONA EFDC MODEL

1. INTRODUCTION

This section outlines the methodology implemented to represent tidal channel morphology and layout in the Lower Ballona Wetlands EFDC numerical model. The purpose of the numerical model is not to model fine scale hydrodynamics or velocities in the tidal channels (existing or future), but to describe the hydraulic characteristics and flushing of each restoration parcel. The procedure is based on the methods presented in the "Design Guidelines for Tidal Channels in Coastal Wetlands," prepared by PWA in January 1995 for the U.S. Army Corps of Engineers. The guidelines present empirical relationships between morphologic characteristics of marsh channels (channel top width, depth, and cross sectional area) and diurnal tidal prism. Characteristics of marsh morphometry (channel order, length, sinuosity, drainage density, etc.) are also tabulated. The tidal prism dataset includes sites from San Diego Bay (Chula Vista) and San Francisco Bay (Novato, Corte Madera, and Newark Slough). The marsh morphometry dataset includes a more extensive analysis of sites from southern California, north San Francisco Bay, and south San Francisco Bay.

The approach taken to implement the appropriate channel characteristics in the model was to first determine what the detailed tidal channel characteristics would be, and then to aggregate these for inclusion into the model, given the grid cell size limitations. A general outline of the procedure is presented below:

1. Approximate channel order, length, and number of channels based on channel morphometry relationships with marsh area (Section 2).
2. Approximate channel geometry (width and thalweg depth) based on tidal prism using hydraulic geometry relationships (Section 3).
3. Aggregate channel morphology and morphometry for inclusion into the model (Section 4).

2. CHANNEL MORPHOMETRY

Marsh morphometry refers to the plan view features of tidal marshes, such as channel length, sinuosity, channel order, and density of channels. The general outline presented in the Design Guidelines is reproduced below:

1. Determine the order of the drainage system that can be accommodated within the site based on the marsh area.
2. Calculate the total channel length based on an assumed drainage density (typically 0.01-0.02 ft/ft^2).
3. Estimate the number of channels of each order.
4. Partition the length among the different order channels.

The results for Area B East Wetland are presented below as an example of the methodology and assumptions used in the analysis.

1. For a given marsh area of approximately 35 acres, Figure 7.1-4 of the design guidelines was used to select a maximum channel order of 4 for the parcel.
2. Drainage densities at numerous California marshes tend to fall between 0.01-0.02 ft/ft^2. A drainage density of 0.01 ft/ft^2 was selected to minimize construction costs and allow for natural evolution of the site. From this drainage density, a total length of channels of 15,250 ft was determined.
3. The number of channels of each order was determined assuming a bifurcation ratio of 3.5. This ratio predicts 1 fourth-order channel, 4 third-order channels, 12 second-order channels, and 43 first-order channels, although not all orders can be represented in the model due to grid cell size limitations.
4. Table 7-6 and Figure 7.3-1 of the Design Guidelines give typical channel distributions for California marshes. The following distribution of channel length was assumed for the 4th through 1st order channels: 10%, 15%, 30%, and 45%. The total length of channels was used with the channel order distributions to determine the length of each order channel.

3. HYDRAULIC GEOMETRY

The term hydraulic geometry refers the empirical relationships between channel discharge and channel geometry. The hydraulic geometry relationships presented in the Design Guidelines relate diurnal tidal prism with channel width, depth, and cross sectional area. A predicted tidal prism of 25 acre-ft was determined to represent the diurnal tidal prism for the 35-acre Area B East Wetland parcel using Figure 5.2-1. The top width and depth of the 4th order channel were determined assuming this tidal prism. For the lower order channels, the total tidal prism was distributed incrementally based on the bifurcation ratio, after subtracting out the intertidal storage volume of the next higher order channel. The partitioned tidal prism was used in the hydraulic geometry relationships for each channel order.

4. IMPLEMENTATION OF CHANNEL MORPHOLOGY IN MODEL BATHYMETRY

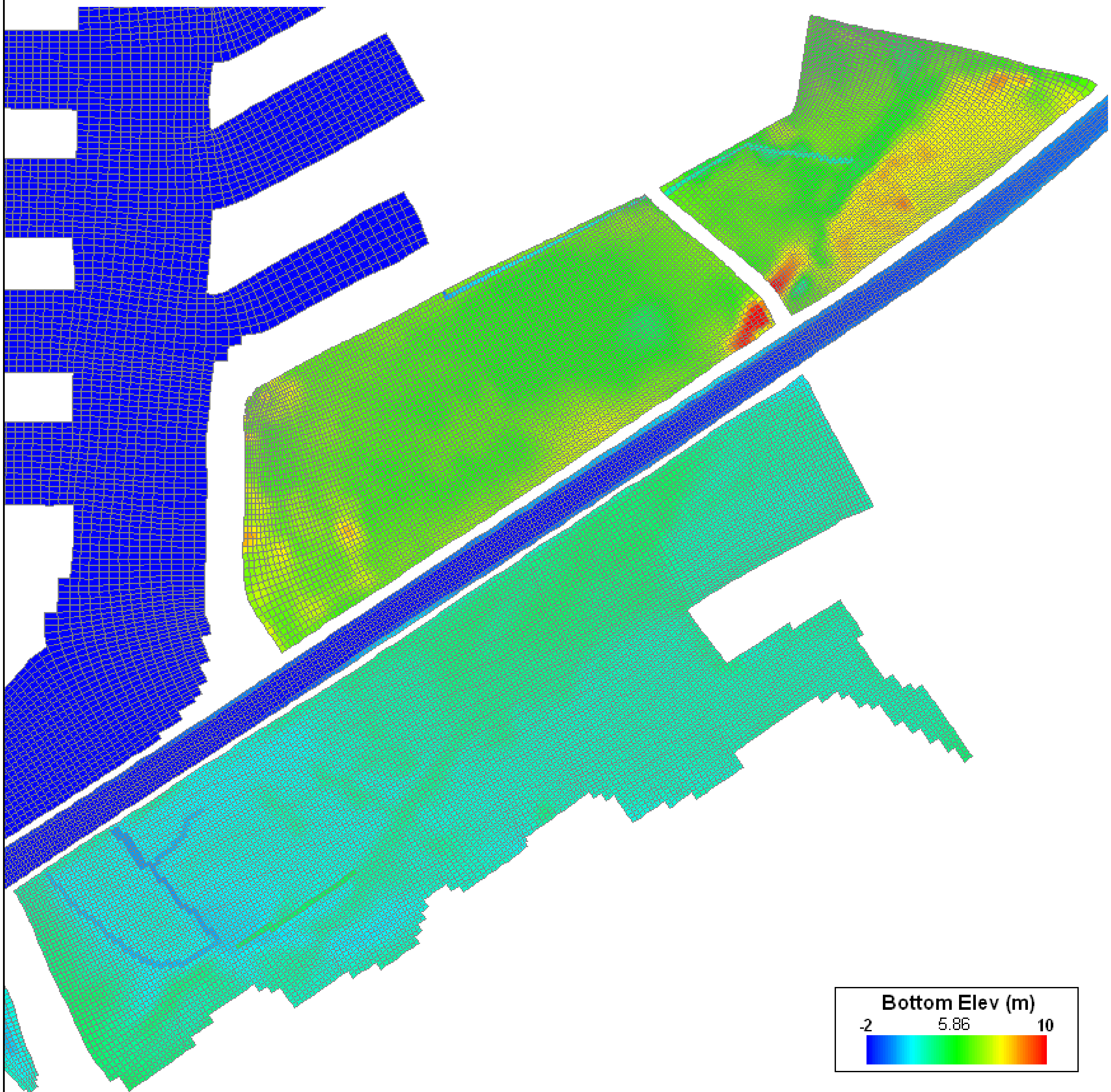
For each channel order, the predicted top width was compared to the grid cell size of the EFDC model grid, nominally equal to 9 m (29.5 ft). The predicted top widths of the 3rd and 4th order channels were 28 ft and 54 ft, roughly equivalent to one and two cell widths, respectively. The model tidal prism was calculated as the total intertidal channel storage volume for a diurnal tide range of 5.49 ft (LA tide gage, #9410660). The resulting tidal prism was 19 acre-ft, 24% less than the predicted tidal prism of 25 acre-ft. This is due to the lack of first and second order channels in the model. To account for the remaining 6 acre-ft, 4 of the 12 second-order channels were implemented at a width of one grid cell. The number of grid cells for each channel order was determined by dividing the length per channel by the nominal grid size. An idealized channel layout was then overlaid on the existing topography grid based on the widths, depths, and lengths determined from the Design Guidelines. The bed elevation of the highest-order channel is constant along its length. Along-channel bed elevations of lower-order channels were linearly interpolated from the channel junction to the channel end (i.e., from the predicted elevation of the higher-order channel to the predicted elevation of the lower-order channel). Elevations of the future marshplain (non-channel regions within the wetland footprint) were set at MHHW (1.61 m NAVD).

The channel layout was adjusted iteratively to correctly reproduce the expected future tidal prism for the marsh restoration parcel. The model tidal prism was confirmed by comparing the total intertidal channel storage volume to the predicted diurnal tidal prism for the given marsh area. Future model refinement could be to develop a more detailed bathymetry grid in the region of tidal channels.

C-3. LOWER BALLONA EFDC MODEL – ALTERNATIVES BATHYMETRY

Sections C-1 and C-2 above describe the model development and calibration procedures. Figure 9 through Figure 14 show the model bathymetries for each alternative.

Figures



Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 9
Ballona Wetlands Restoration Project

Existing Conditions (No Action) Bathymetry

PWA Ref# 1793

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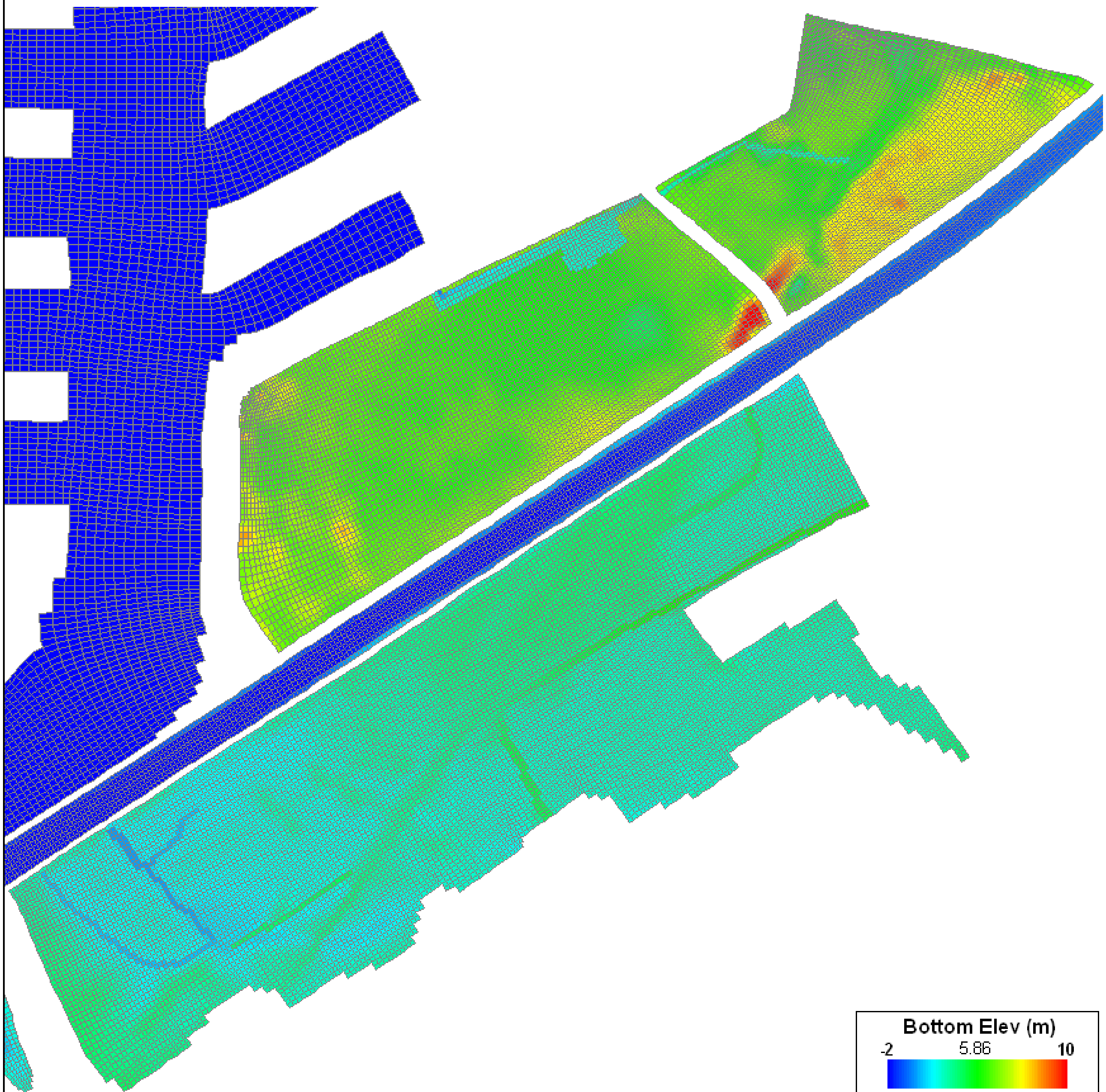
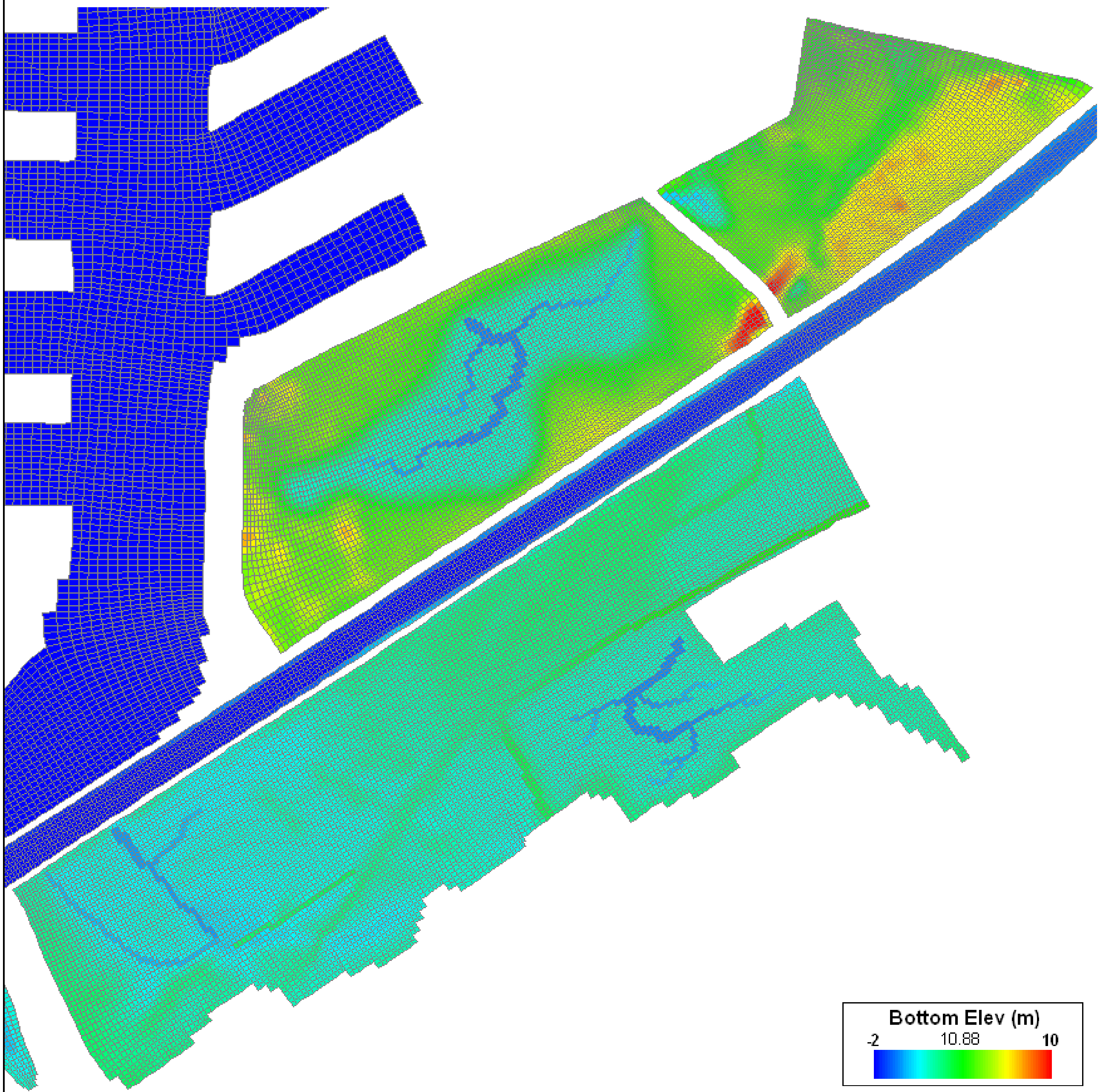


Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 10
Ballona Wetlands Restoration Project

Alt 1 – Muted Tidal Bathymetry

PWA Ref# 1793



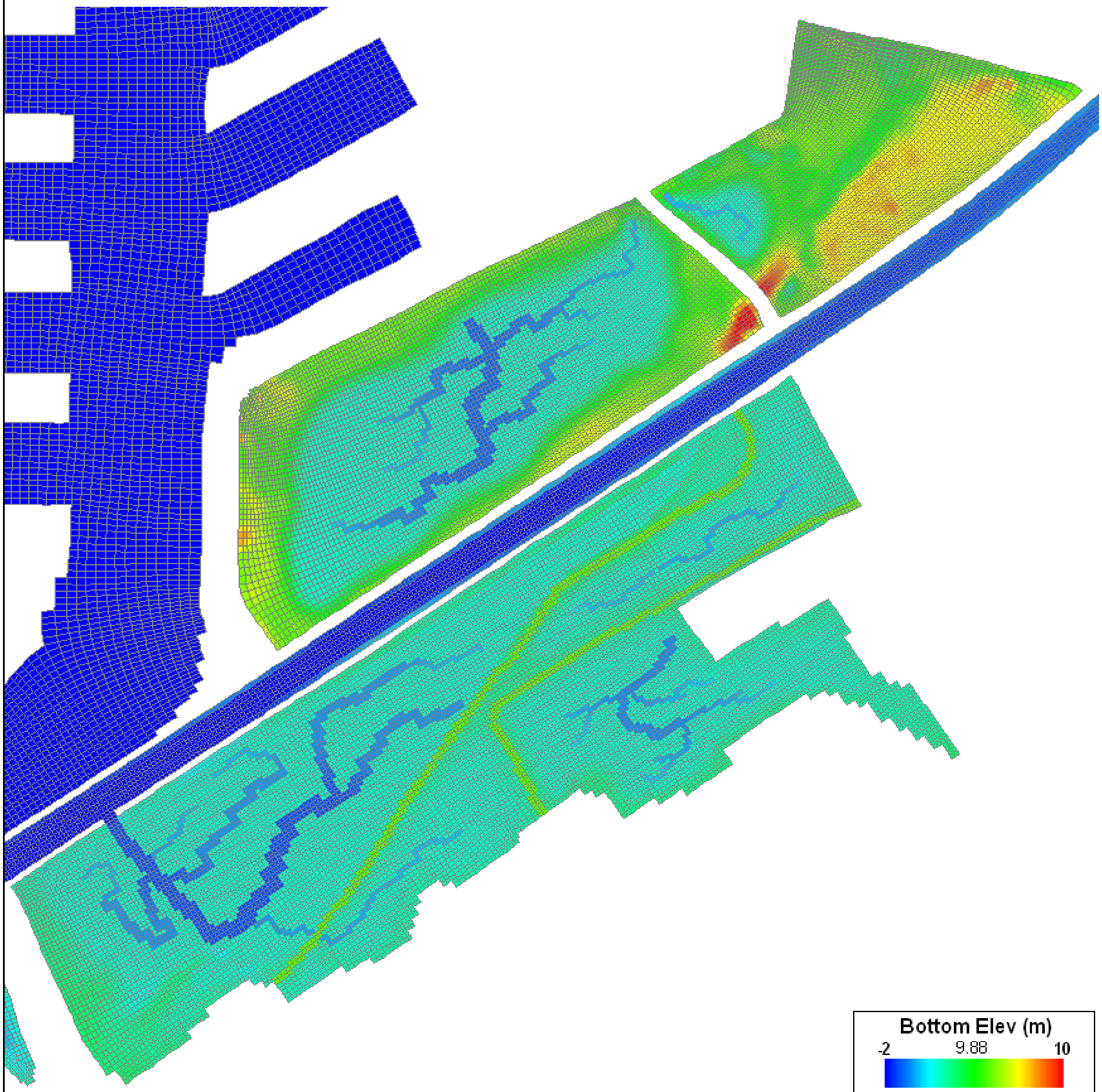
Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 11
Ballona Wetlands Restoration Project

Alt 2 – Partial Tidal Bathymetry

PWA Ref# 1793

PWA



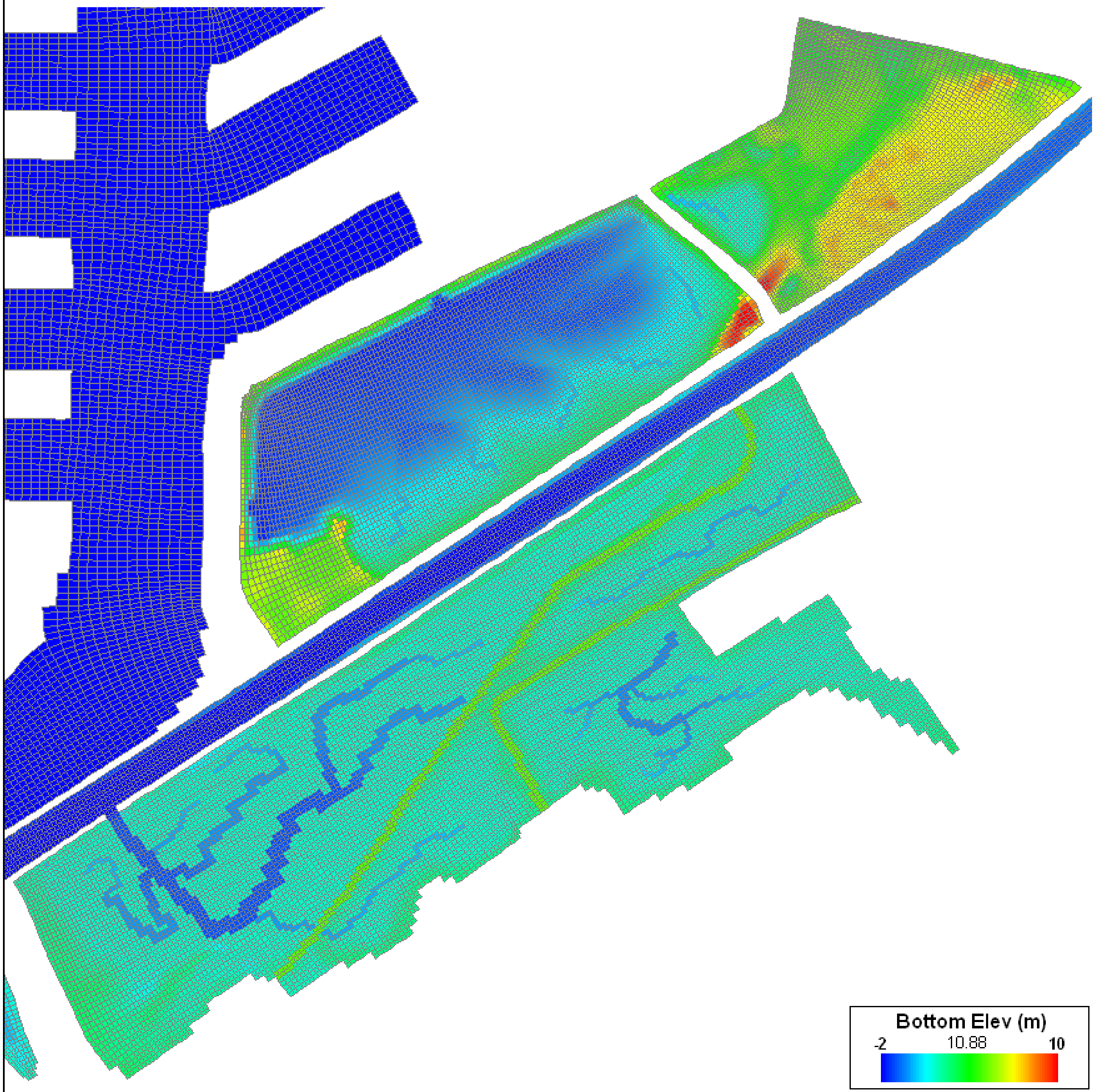
Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 12
Ballona Wetlands Restoration Project

Alt 3 – Full Tidal Bathymetry

PWA Ref# 1793

PWA



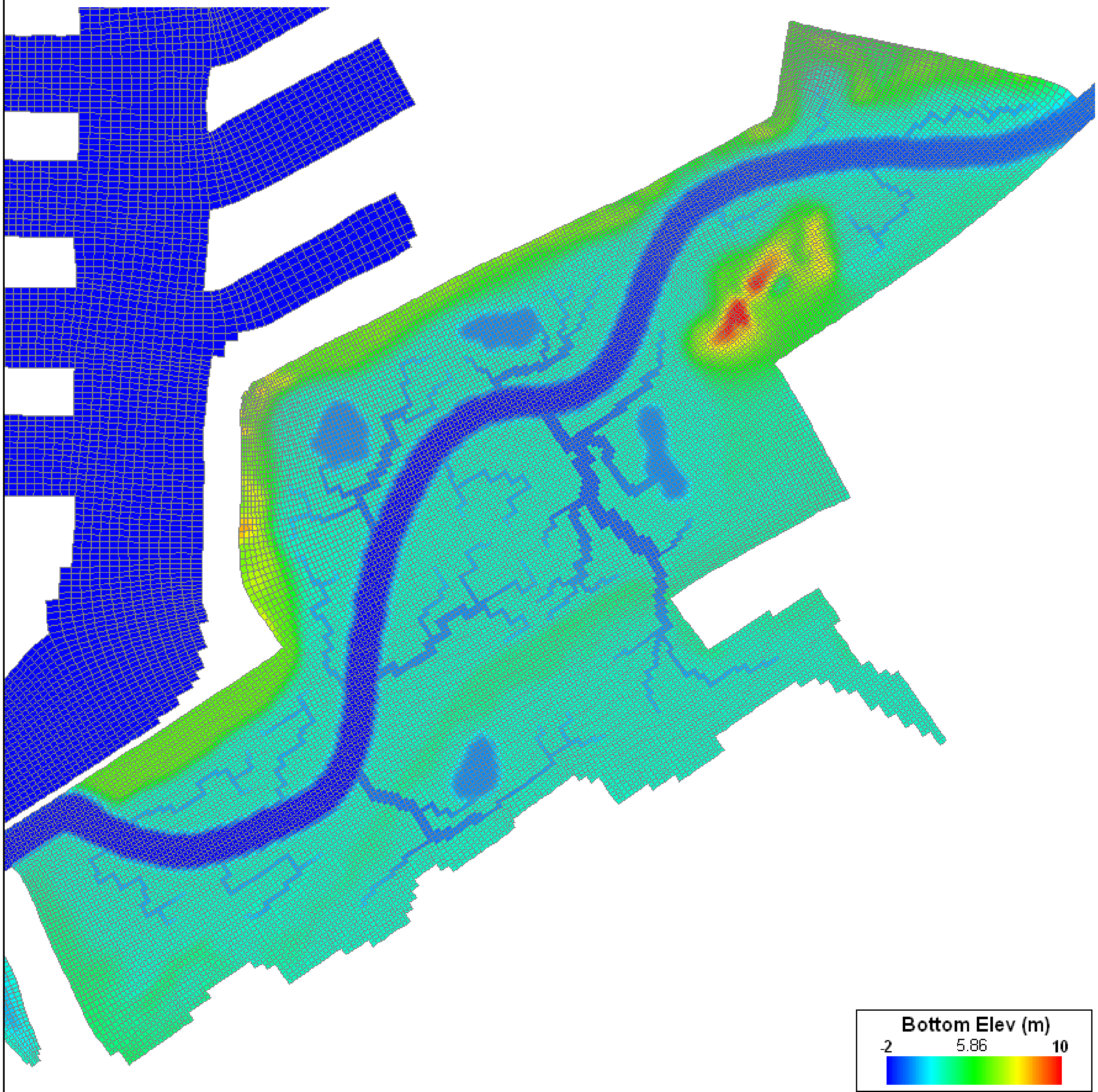
Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 13
Ballona Wetlands Restoration Project

Alt 4 – Area A Subtidal Bathymetry

PWA Ref# 1793

PWA



Source: EFDC model setup.
Notes: Bottom elevations shown in meters NAVD.

figure 14
Ballona Wetlands Restoration Project

Alt 5 – New Creek Bathymetry

PWA Ref# 1793

PWA

C-4. SUPPORTING DOCUMENTATION FOR SECTION 3.3 HYDROLOGY

Section 3.3 of the Lower Ballona Creek Restoration Feasibility Study discusses the expected hydrology for each proposed alternative. The text and figures below provide supporting documentation for the specific model results discussed in the report as well as related model results not explicitly discussed in the Feasibility Study. The section numbers below correspond to the relevant subsections of Section 3.3 (Hydrology).

Section 3.3.1 - Muted Tidal System versus Full Tidal System

Inundation regime is the percentage of time that a given water level is exceeded during a neap-spring tidal cycle. It is a useful parameter for characterizing the tidal inundation at a particular location with a specific elevation. The inundation frequency curves corresponding to Table 3-7 are shown in Figure 15.

Section 3.3.2 - Tidal prism

Tidal prism is the volume of water passing through a channel cross section on each tide (ebb or flood). Tidal prism was evaluated for each restoration area at four cross sections: (1) mouth of Ballona Creek, (2) mouth of Marina Del Rey, (3) Basin H entrance, and (4) Marina del Rey above Basin H. Tidal prism was estimated by integrating the discharge time series at each cross section for each tide (flood or ebb). The mean tidal prism of all floods and all ebbs was estimated for all runs that spanned the full spring-neap cycle. The results are shown in Table 1.

Section 3.3.3 – Connections

Area B southwest wetland SRT and culvert connection

Figure 16 shows a sample water level comparison for the culvert sizing and SRT optimization for the Area B southwest wetland. Two culvert geometries are tested: (1) 2 x 5 ft culverts and (2) 3 x 5 ft culverts. Three elevations are tested for the SRT: 3.6 ft, 4.9 ft, and 6.6 ft NAVD. Increasing the culvert area increases the tide range within the wetland and improves drainage from the wetland to Ballona Creek. The effect of the SRT in limiting high water within the site is seen once the Ballona Creek water levels reach the closure elevation.

Area B southeast wetland, Area A small marsh, Area A large marsh, Area A subtidal

Figure 17 illustrates the procedure adopted to size the culvert connections to each wetland. The number of culverts was increased until the tide range within the wetland approximately matched that of Ballona Creek. As can be seen in Figure 17, once the number of culverts increases beyond six 5-ft culverts, there are very small incremental gains in tide range for relatively large increases in culvert cross sectional area. The same procedure was followed to size the culverts for the small and large marshes and subtidal portion of Area A, shown in Figure 18, Figure 19, and Figure 20, respectively.

Area B southwest breach

The Area B breach was sized with a similar objective to the culvert sizing described above. The breach was sized to allow full conveyance of the tidal signal to the wetland (i.e. no tidal damping or muting). A sample water level comparison is shown in Figure 21.

Section 3.3.4 - Channel Network

Section 3.3.4 of the Feasibility Report discusses the expected channel network characteristics for each alternative. See Appendix C-2 (Marsh channel representation in Lower Ballona EFDC model) for a more detailed explanation of the methodology used to develop the channel networks.

Section 3.3.6 - Excursion Length

Section 3.3.6 of the Feasibility Report provides a qualitative discussion of tidal excursion lengths and implications for hydraulic connectivity and mixing in Ballona Creek. Excursion length was examined at the same cross sections locations as for the tidal prism analysis: (1) mouth of Ballona Creek, (2) mouth of Marina del Rey, and (3) Entrance to Basin H. For this application, excursion length was calculated by integrating the velocity time series over each tidal cycle to obtain the tidal excursion for each flood or ebb tide. The median tidal excursion lengths for flood and ebb were then tabulated for each model run. The results are shown in Table 2.

Section 3.3.7 – Flooding

50-yr hydrograph

The Ballona Creek Ecosystem Restoration Feasibility Study Hydrology Appendix (USACE 2008) presents results of a flood frequency analysis and rainfall-runoff model for the Ballona Creek watershed. A discharge-frequency relationship for Ballona Creek at Sawtelle Boulevard for the period 1928-2005 was developed to predict the hydrograph for the 50-yr discharge event (Figure 22). Ballona Creek hydrographs for the 50-year event were provided to PWA by the USACE. PWA then used these hydrographs to estimate the discharge from Sepulveda Channel and from Centinela Channel. These estimates were used as boundary conditions for the model.

50-yr flood water levels

The restoration alternatives were evaluated under flood conditions by using the EFDC model to predict water levels resulting from the 50-yr flood. The predicted peak water levels near the SRT for existing conditions (Figure 23) compare well with the USACE predictions at the same location. Overall changes to the system under Alternative 1 and Alternative 2 are minimal, resulting in nearly identical water level predictions in Ballona Creek as for Existing Conditions (Figure 24, Figure 25). Because of flow through the culverts is limited, water levels within the southeast wetlands peak at lower values than within Ballona Creek and also take longer to drain off with the falling flood water levels (Figure 25). Alternative 3's peak water levels in Ballona Creek were lower than the Existing Conditions peak because the large expanse of wetlands in this alternative provides storage for the flood waters (Figure 26). For floods under Alternatives 1-3, predicted water levels in Area A are not altered since these wetlands are not connected to Ballona Creek. Therefore, Alternative 4, which is identical to Alternative 3 except for the subtidal region of Area A, was not modeled with flood conditions. For Alternative 5, water levels were assessed both upstream near Area C and at the SRT. While the upstream water levels are higher as a consequence of the channel and water surface slope, Alternative 5's upstream water levels are below that of existing conditions (Figure 27). This suggests that flood hazard is unlikely to increase with restoration.

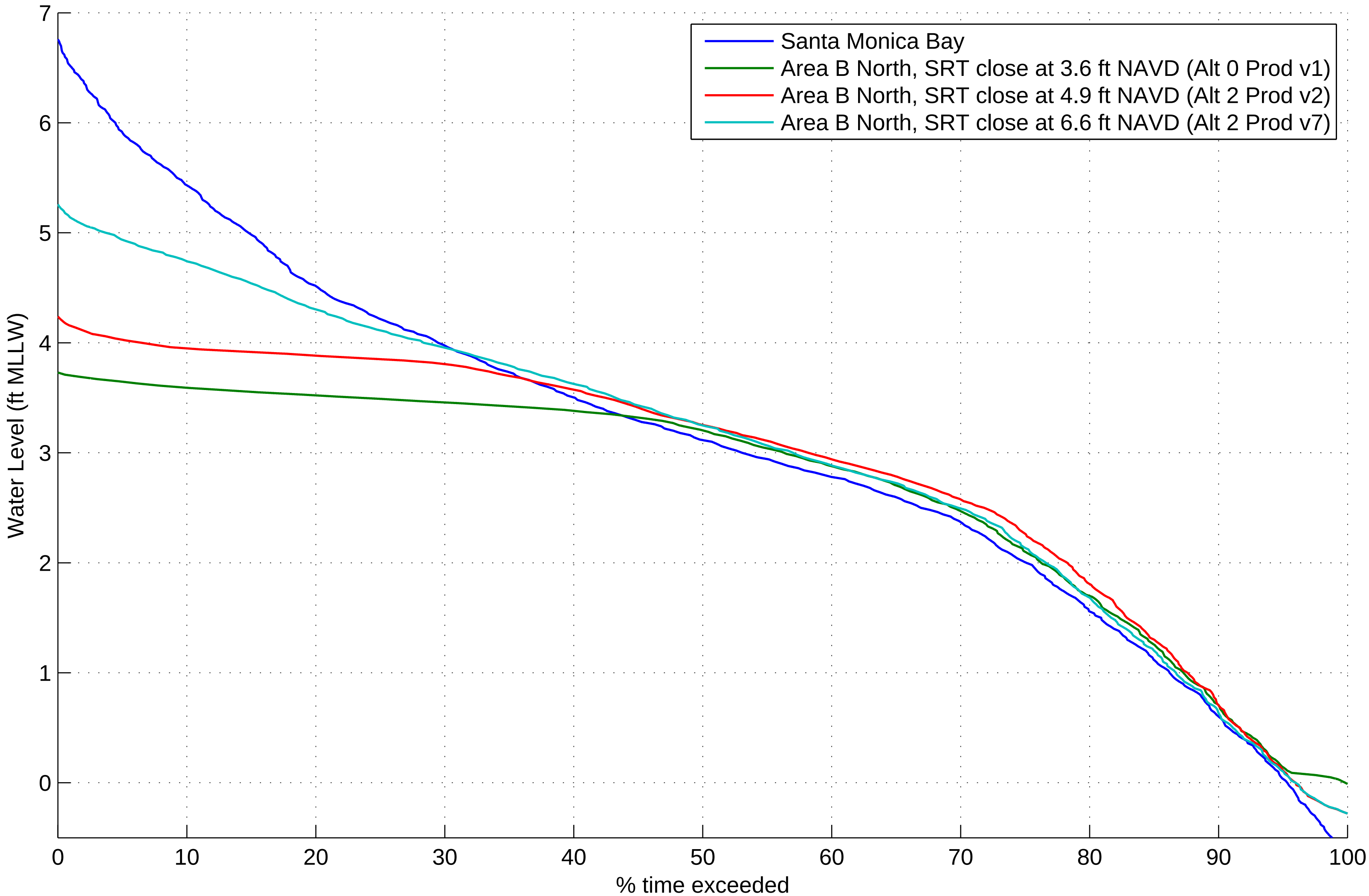
Storm Surge Analysis

Water levels at the Port of Los Angeles were examined using an event selection approach to identify typical storm surge events (super-elevation of water levels above astronomical tides). Events were selected based on events identified in the Ballona Creek Ecosystem Restoration Feasibility Study Hydrology Appendix (USACE 2008), since coastal storms often exhibit high precipitation and storm surge. Typical surges ranged from 0.5 to 1.5 ft above astronomical tides, with a maximum of 1.65 ft during the 1997-1998 El Niño winter. Storm surge events lasted approximately 3-7 days. Table 3 shows a summary of the event-based analysis.

Additional Model Runs

Additional model runs were conducted for each alternative to inform the culvert sizing, SRT closure elevations, and other aspects of the model setup. The full run catalog is shown in Table 4.

Figures



Source: EFDC model predictions

Figure 15
Lower Ballona Wetlands

Inundation frequency, Area B southwest SRT

PWA Ref# 1793.1

PWA

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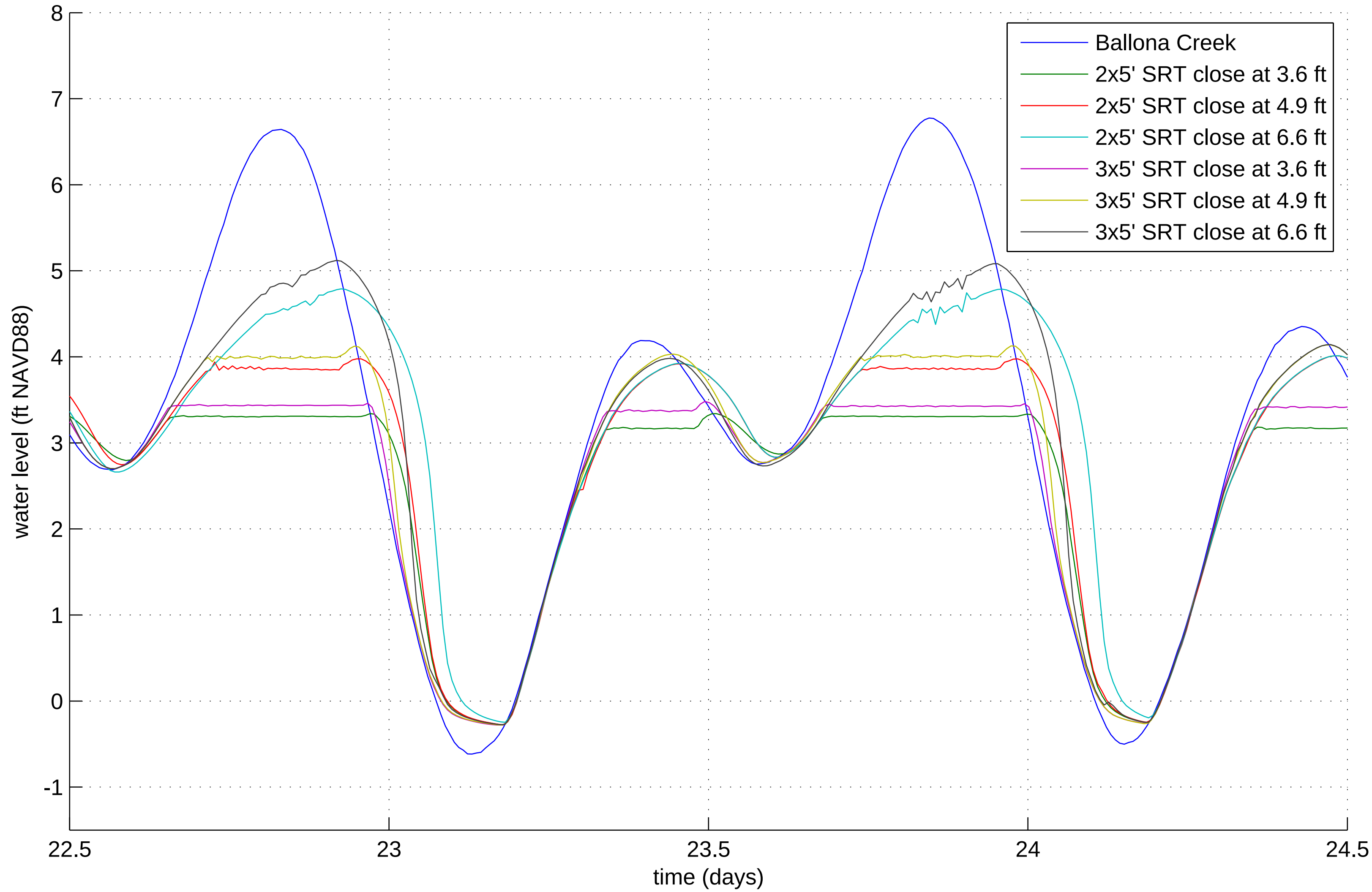


Source: EFDC model predictions

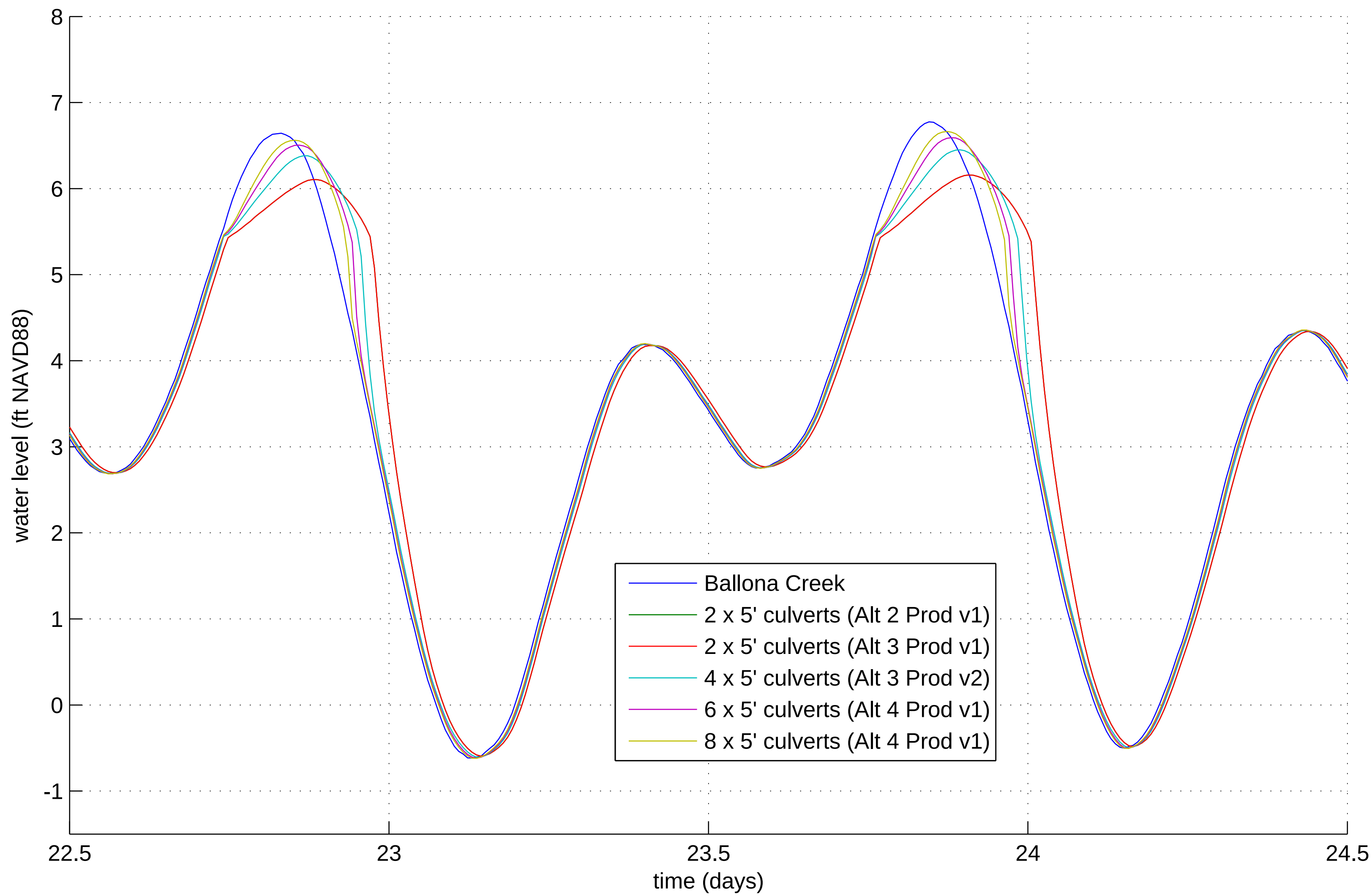
Figure 16
Lower Ballona Wetlands

Culvert sizing and SRT optimization, Area B southwest

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaB_north_SRT.m



Source: EFDC model predictions

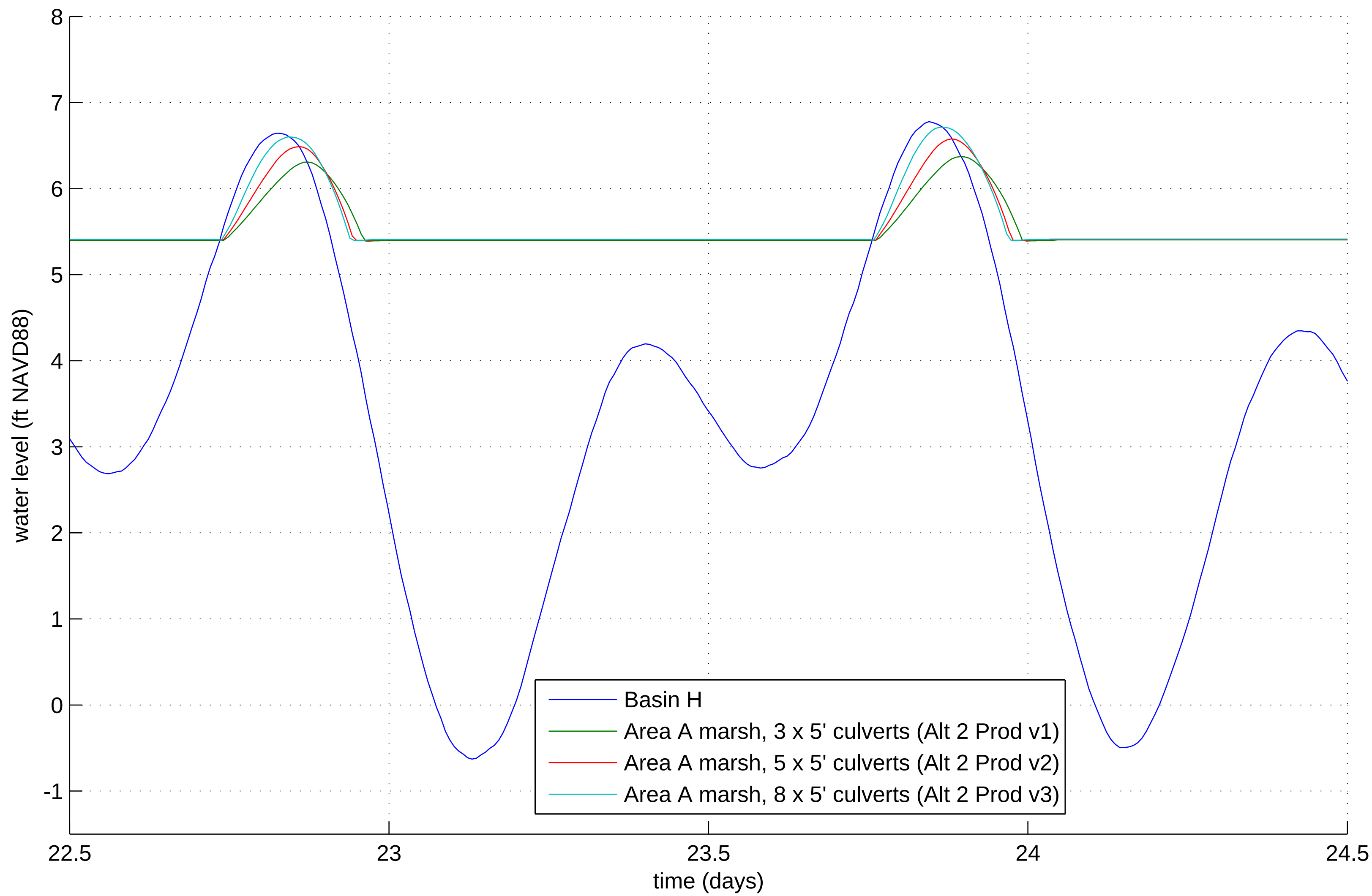
Figure 17
Lower Ballona Wetlands

Culvert Sizing, Area B SE Marsh

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaB_SE.m



Source: EFDC model predictions

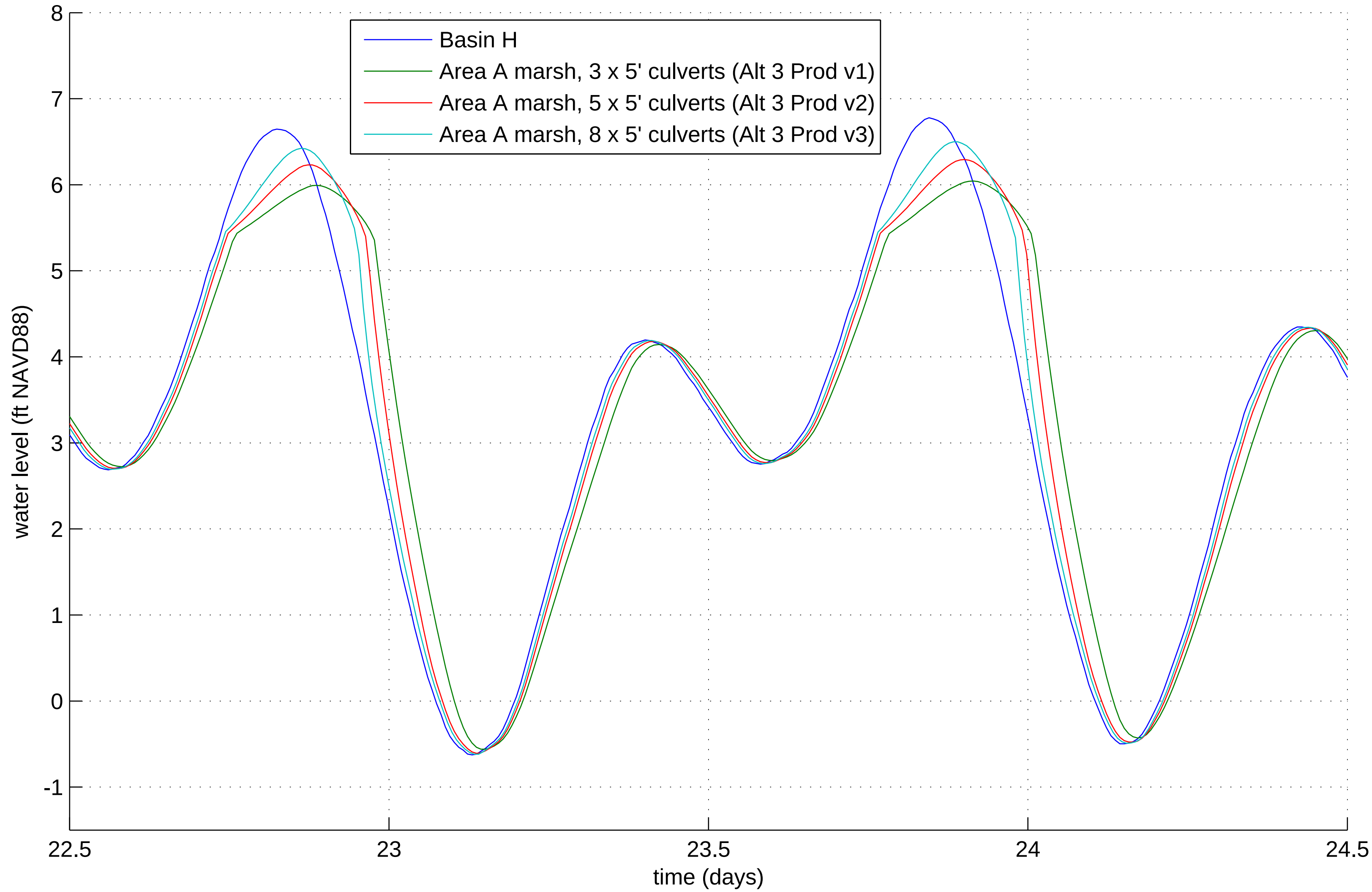
Figure 18
Lower Ballona Wetlands

Culvert Sizing, Area A Small Marsh

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaA_small_marsh.m



Source: EFDC model predictions

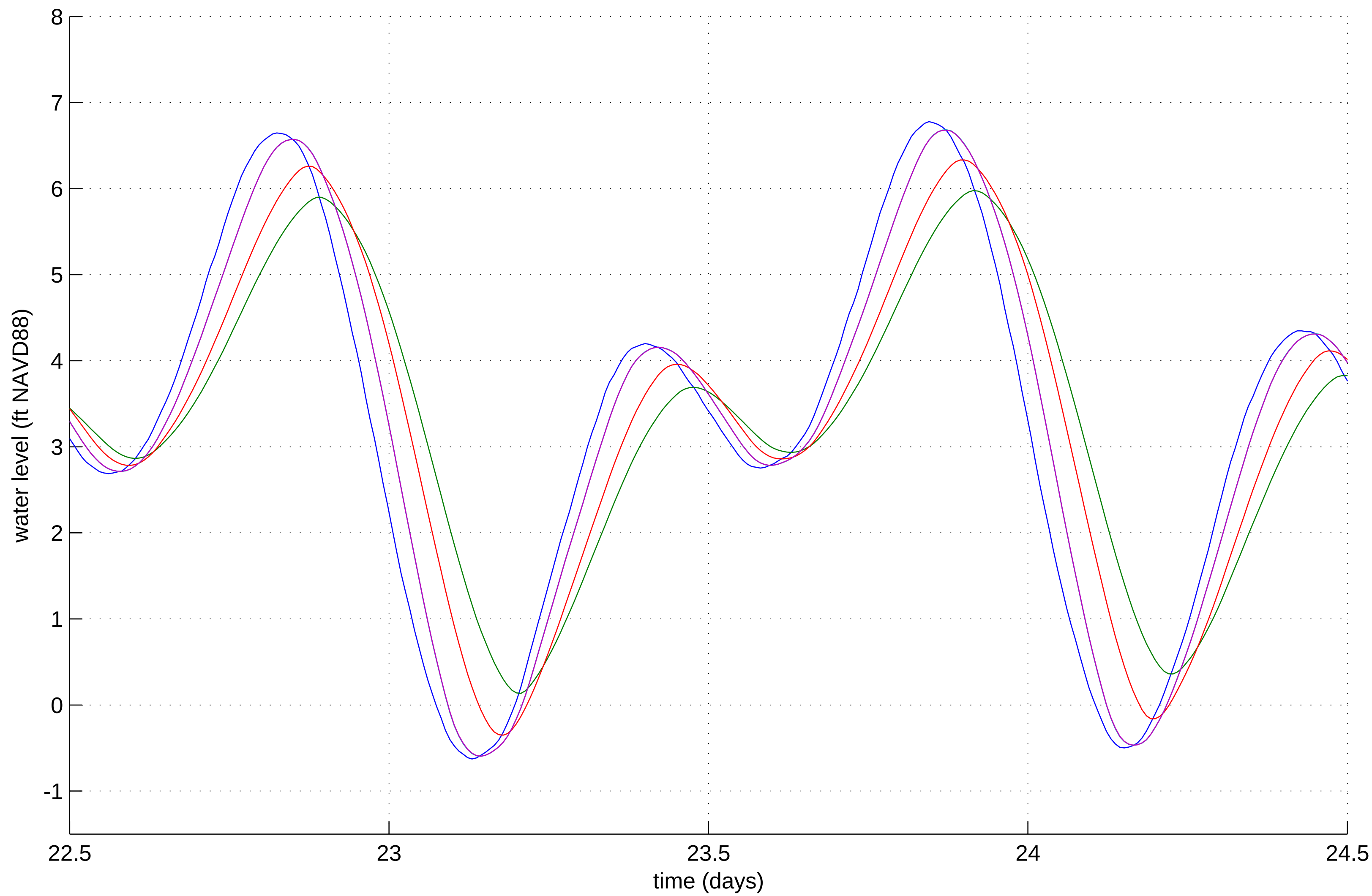
Figure 19
Lower Ballona Wetlands

Culvert Sizing, Area A Large Marsh

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaA_large_marsh.m



Source: EFDC model predictions

- Basin H
- Area A subtidal, 8 x 5' culverts (Alt 4 Prod v1)
- Area A subtidal, 12 x 5' culverts (Alt 4 Prod v2)
- Area A subtidal, 2x(12 x 5') culverts (Alt 4 Prod v5)
- Area A subtidal, 2x(12 x 5') culverts @ Via Venetia (Alt 4 Prod v6)

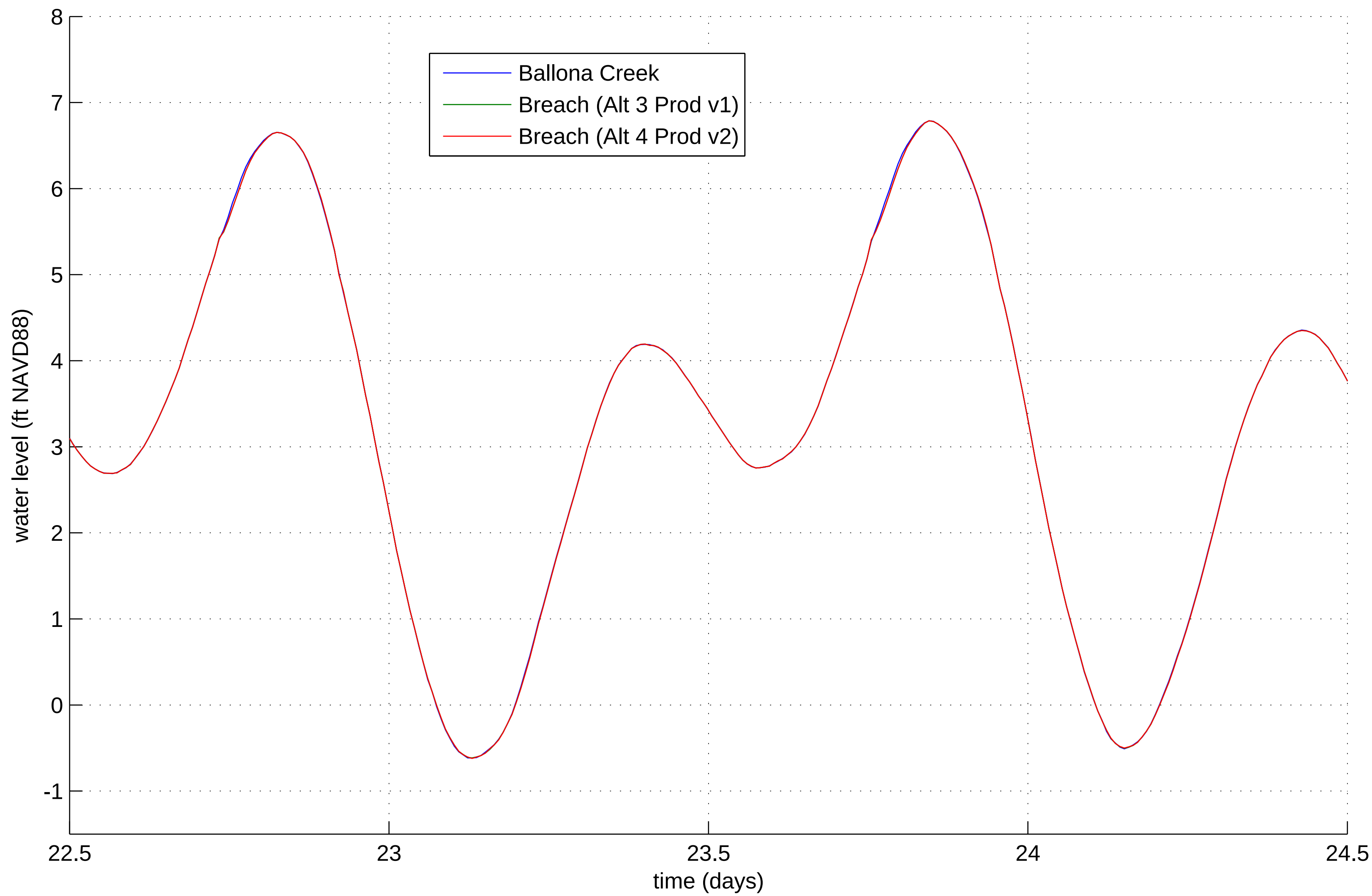
Figure 20
Lower Ballona Wetlands

Culvert Sizing, Area A Subtidal

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaA_subtidal.m



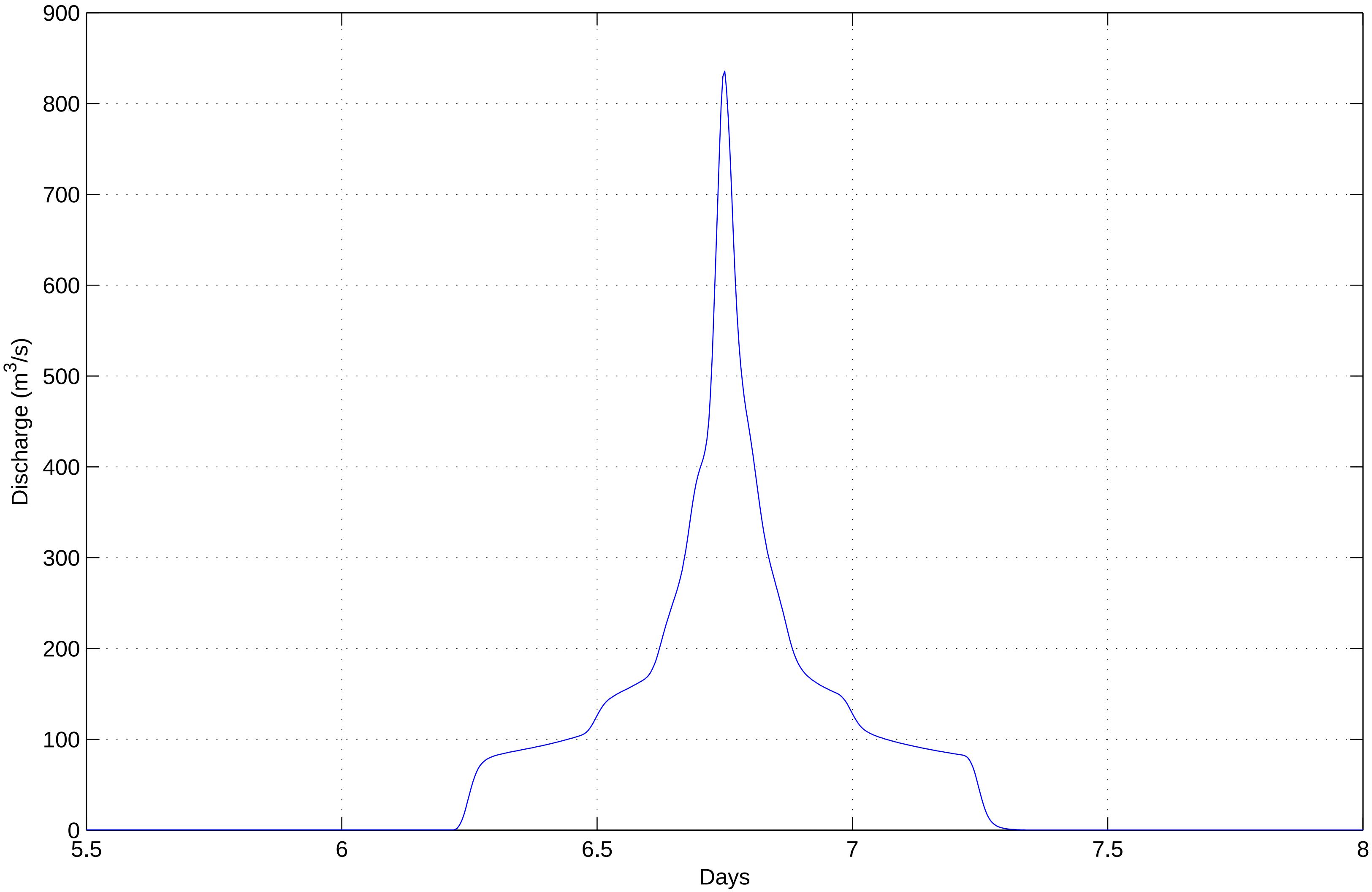
Source: EFDC model predictions

Figure 21
Lower Ballona Wetlands

Culvert Sizing, Area B Southwest Breach

PWA Ref# 1793.1

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Culvert sizing\compare_culverts_AreaB_north_breach.m



Source: Ballona Creek Ecosystem Restoration Feasibility Study Hydrology Appendix F3 - Without Project Hydrologic Analysis. January 2008. U.S. Army Corps of Engineers, South Pacific Division, Los Angeles District

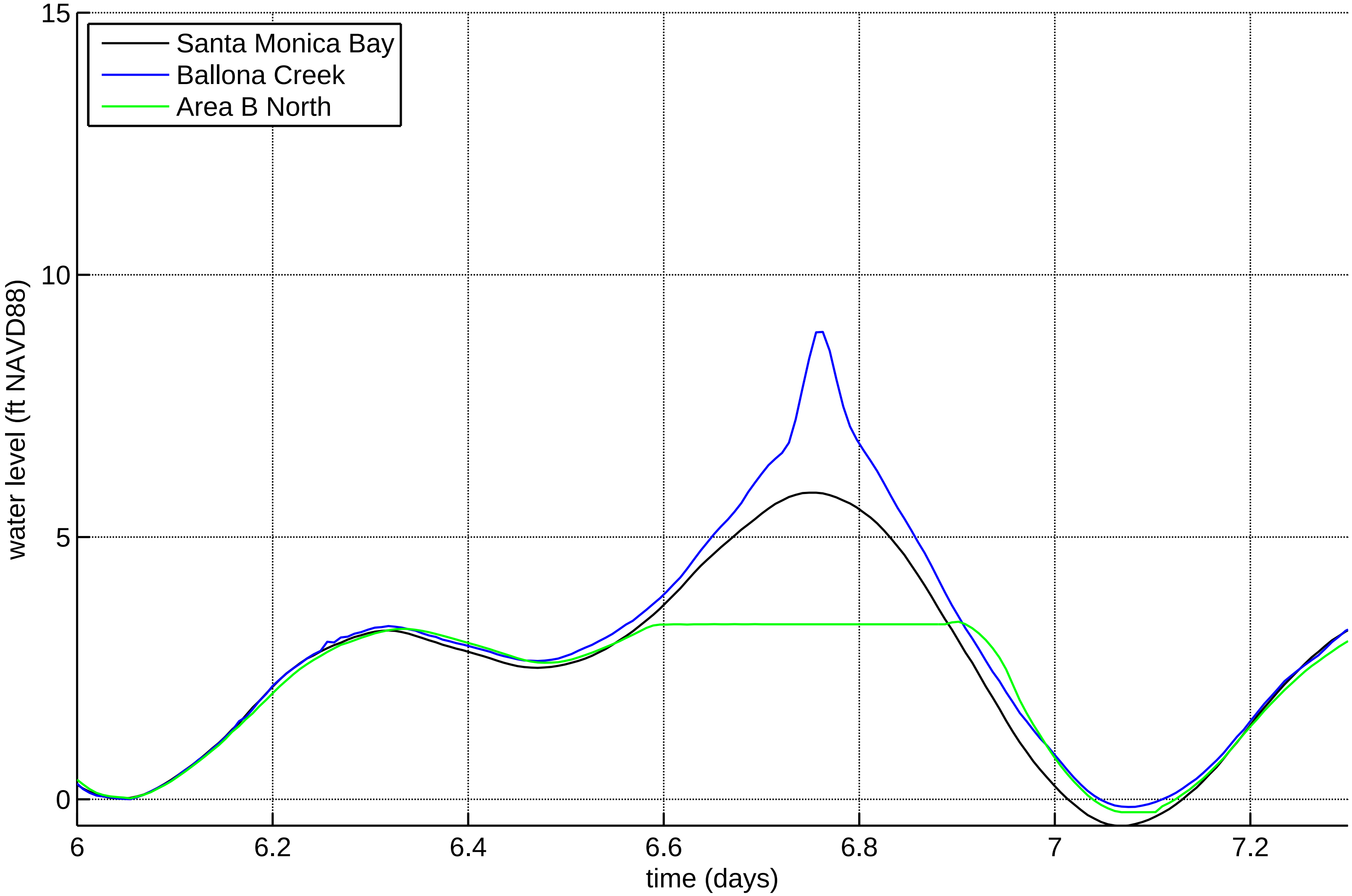
Figure 22
Ballona Wetlands Restoration Project

Ballona Creek 50-yr hydrograph at Sawtelle Blvd

PWA Ref# 1793

PWA

J:\1793_Ballona_Wetlands\1793.01_Modeling\Reporting\Modeling appendix\Flooding\plot_50yr_hydrograph.m



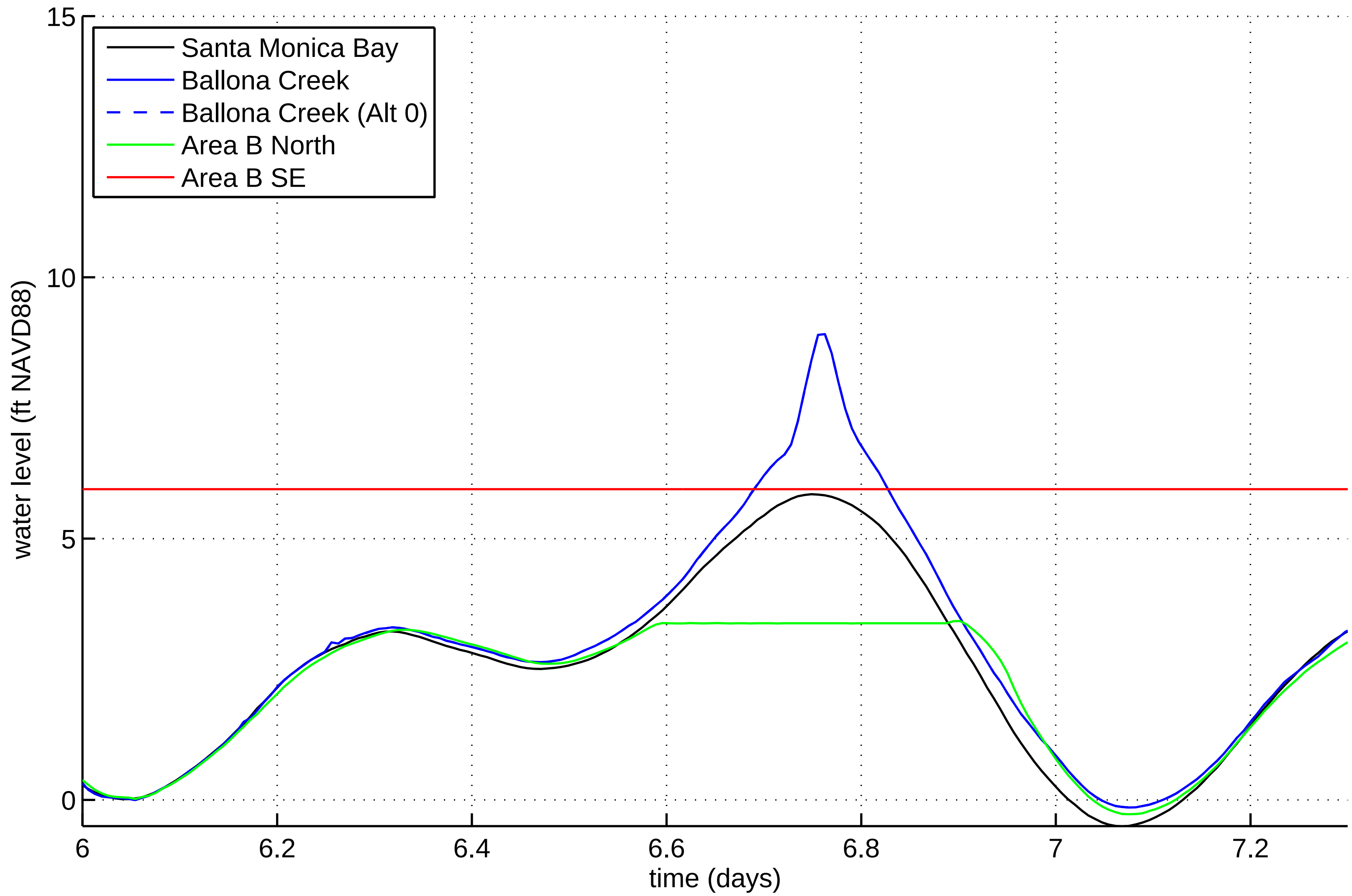
Source: EFDC model predictions

Figure 23
Lower Ballona Wetlands

Existing Conditions: Water Levels, 50-yr Flood

PWA Ref# 1793.1

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Flooding\plot_alt0_flood.m



Source: EFDC model predictions

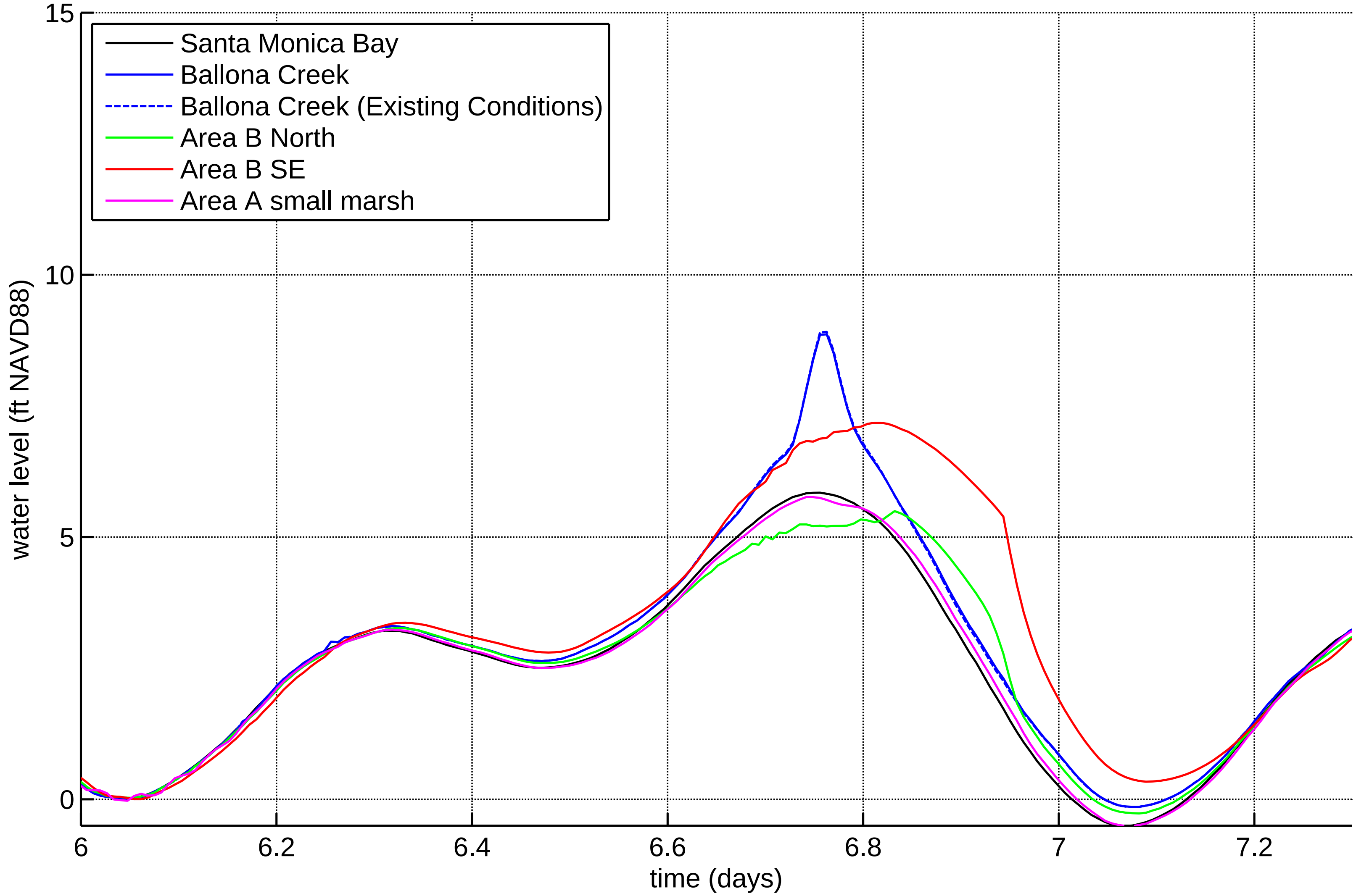
Figure 24
Lower Ballona Wetlands

Alt. 1: Water Levels, 50−yr Flood

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Flooding\plot_alt1_flood.m



Source: EFDC model predictions

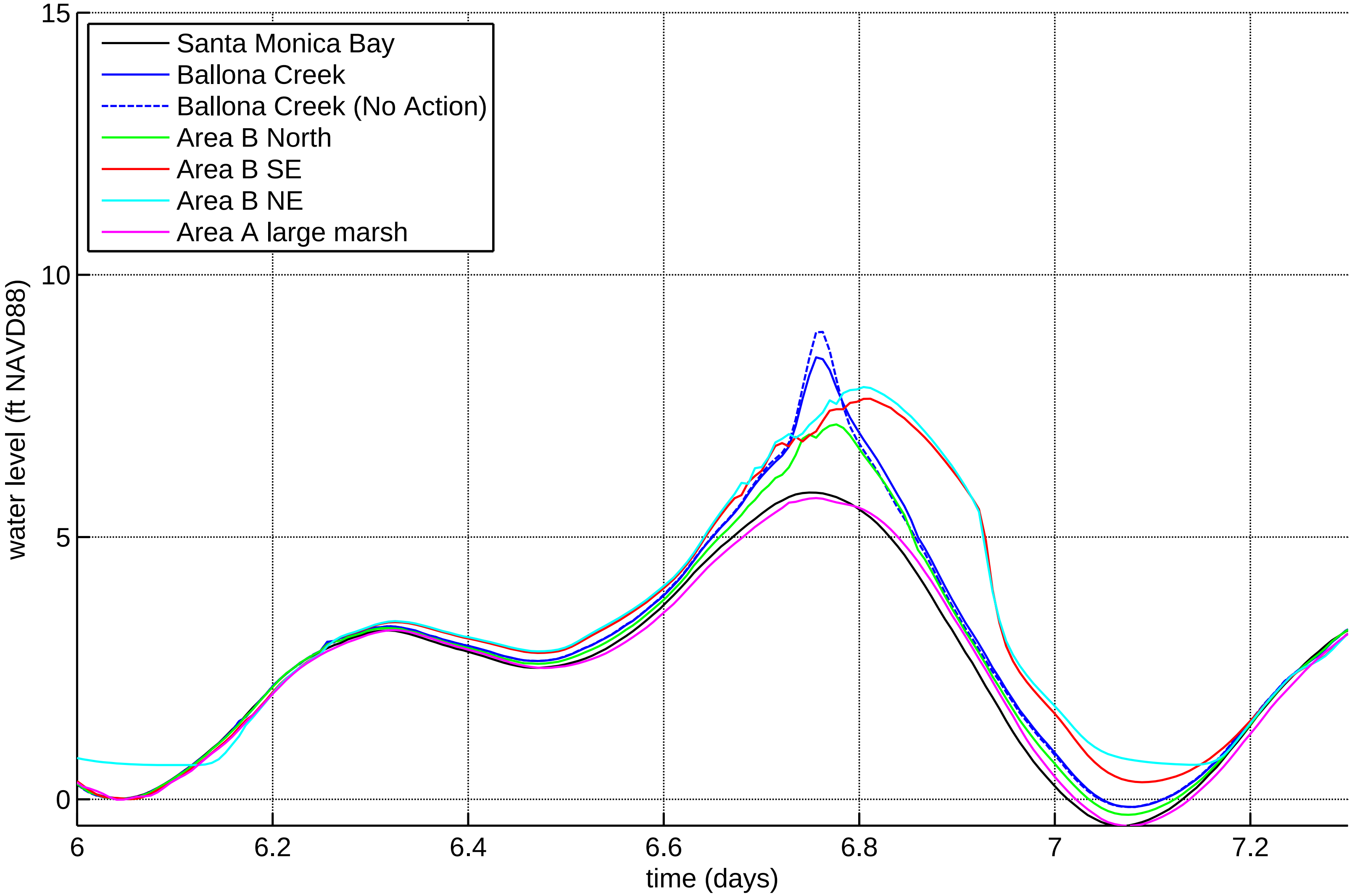
Figure 25
Lower Ballona Wetlands

Alt. 2: Water Levels, 50-yr Flood

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Flooding\plot_alt2_flood.m



Source: EFDC model predictions

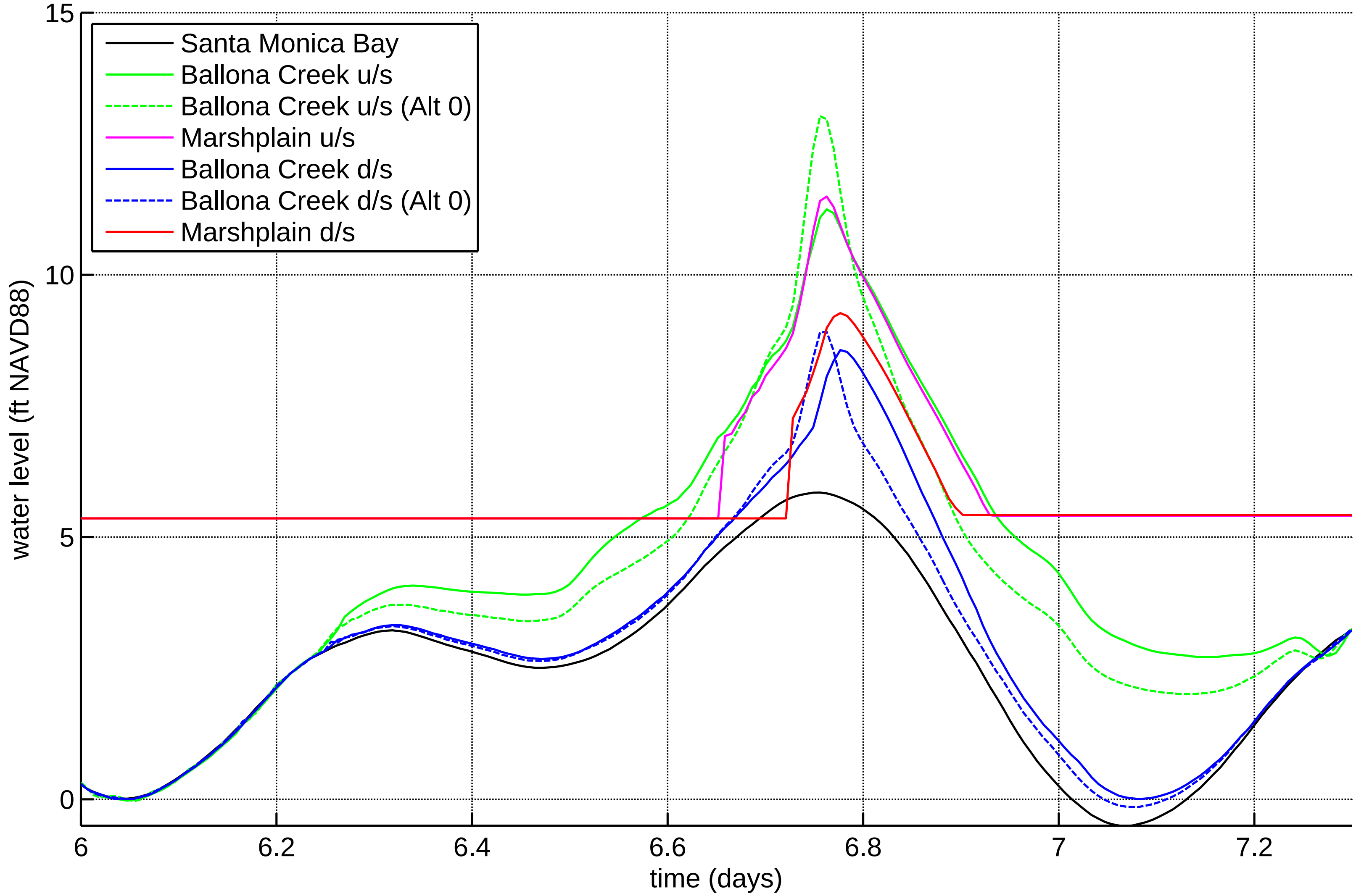
Figure 26
Lower Ballona Wetlands

Alt. 3: Water Levels, 50-yr Flood

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Flooding\plot_alt3_flood_2.m



Source: EFDC model predictions

Figure 27
Lower Ballona Wetlands

Alt. 5: Water Levels, 50-yr Flood

PWA Ref# 1793.1

PWA

C:\m.brennan\Projects\1793_Ballona\Modeling\Alternatives\Analysis\Flooding\plot_alt5_flood.m

Table 1. Modeled Tidal Prism at Selected Cross Sections
1793.01 Ballona Wetlands Restoration Project
Tidal prism in ac-ft

	Mouth of Ballona Creek		**Mouth of Marina del Rey**		**Entrance to Basin H**		**Marina del Rey above Basin H**	
Model Run*	mean flood	mean ebb	mean flood	mean ebb	mean flood	mean ebb	mean flood	mean ebb
Alt 0 Prod v1	231	-243	1291	-1400	9	-10	382	-350
Alt 1 Prod v1	235	-279	1402	-1287	12	-14	364	-416
Alt 2 Prod v1	267	-314	1384	-1343	31	-35	376	-432
Alt 2 Prod v2	274	-306	1348	-1383	36	-44	382	-440
Alt 2 Prod v3	277	-405	1221	-1418	48	-53	464	-529
Alt 2 Prod v7	284	-331	1281	-1385	43	-47	394	-424
Alt 3 Prod v1	386	-416	1404	-1362	54	-55	388	-431
Alt 3 Prod v2	390	-419	1409	-1367	60	-68	382	-409
Alt 3 Prod v4	396	-427	1477	-1438	69	-70	380	-456
Alt 4 Prod v1	391	-421	1625	-1488	294	-298	376	-448
Alt 4 Prod v2	392	-421	1701	-1651	345	-348	414	-448
Alt 4 Prod v5	392	-421	1765	-1714	381	-371	461	-466
Alt 4 Prod v6	392	-421	1764	-1713	10	-10	509	-516
Alt 5 Prod v1	599	-627	1400	-1284	11	-12	381	-409

* See run catalog for more detailed description of model setup for each run.

Table 2. Median tidal excursions lengths
1793.01 Ballona Wetlands Restoration Project

	Ballona Creek		Marina del Rey		Basin H Entrance	
Model Run*	flood (mi)	ebb (mi)	flood (mi)	ebb (mi)	flood (mi)	ebb (mi)
Alt 0 - No action\Prod v1	0.63	-0.71	0.75	-0.52	0.01	-0.01
Alt 1 - Muted tidal\Prod v1	0.64	-0.72	0.67	-0.57	0.01	-0.02
Alt 2 - Partial tidal\Prod v1	0.69	-0.76	0.69	-0.58	0.04	-0.03
Alt 2 - Partial tidal\Prod v2	0.71	-0.82	0.69	-0.58	0.06	-0.02
Alt 2 - Partial tidal\Prod v7	0.79	-0.83	0.69	-0.58	0.04	-0.02
Alt 3 - Full tidal\Prod v1	1.03	-0.95	0.70	-0.59	0.07	-0.05
Alt 3 - Full tidal\Prod v2	1.03	-0.95	0.70	-0.59	0.12	-0.04
Alt 3 - Full tidal\Prod v4	1.03	-0.95	0.70	-0.59	0.11	-0.04
Alt 4 - Area A subtidal\Prod v1	1.03	-0.95	0.78	-0.65	0.37	-0.10
Alt 4 - Area A subtidal\Prod v2	1.03	-0.95	0.81	-0.69	0.41	-0.18
Alt 4 - Area A subtidal\Prod v5	1.03	-0.95	0.85	-0.72	0.47	-0.20
Alt 4 - Area A subtidal\Prod v6	1.03	-0.95	0.84	-0.72	0.01	-0.01
Alt 5 - New creek\Prod v1	1.52	-1.43	0.67	-0.57	0.01	-0.02

* See run catalog for more detailed description of model setup for each run.
Note: mi = miles

Table 3. Storm Surge Event-based Analysis for Ballona Creek Mouth
1793.01 Ballona Wetlands Modeling
J. Vandever (PWA)
Date: April 10, 2008

Event*	Description	Storm Dates	Peak Surge (ft)**	Date/Time***	Approx. Duration (days)****
1	Series of winter storms tracked eastward from North Pacific	27 February - 3 March 1938	0.76	3/2/38 15:40	3
2	Winter storm, combination of warm Pacific cyclone and cold coastal storm	21-23 January 1943	1.35	1/22/43 21:10	3.5
3a	Low-latitude north Pacific cyclone	3-4 March 1943	0.54	3/3/43 18:00	2.5
3b			0.75	2/22/43 20:00	4
4	Combination of cold low pressure system moving down coast and subtropical cyclone	19-21 November 1967	0.64	11/21/67 19:10	4
5a	Series of unusually intense low latitude Pacific storms	18-26 January 1969	0.86	1/21/69 5:00	4.5
5b	Series of unusually intense low latitude Pacific storms	18-26 January 1969	0.80	1/25/69 7:00	5.5
6	Pacific cyclone cold front	3-4 December 1974	-	-	-
7	Persistent series of warm, subtropical Pacific storms from SW	5-13 February 1978	1.58	2/10/78 1:30	6
8	Persistent series of warm, subtropical Pacific storms from SW	27 February - 5 March 1978	1.32	3/1/78 2:00	7
9a	1982-83 El Nino Winter	1982-83 Winter	1.64	3/2/83 1:20	7
9b	1982-83 El Nino Winter		1.23	2/2/83 15:30	7
10	High storm event in SF Bay	3 December 1983	-	-	-
11	1997-1998 El Nino Winter	1997-98 Winter	1.65	2/3/1998 9:30	3

Average Surge	**1.1**

* Events were selected based on the COE Ballona Creek Ecosystem Study Appendix F3 Hydrology.
* Peak surge determined from the max residual between observed and predicted water level at NOAA Station #9410660 Los Angeles
** Dates and times are given in local standard time (LST)
*** Approximate storm durations were determined by visually examining the residual time series for each event

Table 4. Ballona Wetlands Modeling Run Catalog					
Restoration alternatives	**Run name**	**Status P=planned S=setup R=running C=complete A=analyzed**	**Tide or Flood**	**Run period, days**	**Project area configuration**
No Action					
	Calibration v1	C	Tide	0.1-19.1	Area B N: Existing SRT (2x5' culverts)
	Alt 0 - Prod v1	C	Tide	10.88-28.88	Area B N: Existing SRT (2x5' culverts)
	Alt 0 - Prod fld v6	C	Flood	5.86-7.36	Area B N: Existing SRT (2x5' culverts)
Alt 1- Muted tidal					
	Alt 1 - Prod v1	A	Tide	10.88-28.88	Area B N: Existing SRT (2x5' culverts, cutoff at 1.1 m NAVD) Area B SE: 2x5' culverts, cutoff at 2 m NAVD
	Alt 1 - Prod v2	A	Tide	10.88-21.1	Area B N: Modified SRT (4x5' culverts, cutoff at 1.5 m NAVD) Area B SE: 4x5' culverts, cutoff at 2.25 m NAVD
	Alt 1 - Prod fld v2	R	Flood	5.28-6.78	Area B N: Existing SRT (2x5' culverts, cutoff at 1.1 m NAVD) Area B SE: 2x5' culverts, cutoff at 2 m NAVD
	Alt 1 - Prod fld v3	R	Flood	5.86-7.36	Area B N: Existing SRT (2x5' culverts, cutoff at 1.1 m NAVD) Area B SE: 2x5' culverts, cutoff at 2 m NAVD
Alt 2 - Partial tidal					
	Alt 2 - Prod v1	A	Tide	10.88-28.88	Area B N: Existing SRT (2x5' culverts, cutoff at 1.1 m NAVD) Area B SE: 2x5' culverts Area A: 3x5' culverts, Dock 52
	Alt 2 - Prod v2	A	Tide	10.88-28.88	Area B N: Modified SRT (2x5' culverts, cutoff at 1.5 m NAVD) Area B SE: 2x5' culverts Area A: 5x5' culverts, Dock 52
	Alt 2 - Prod v3	A	Tide	21.8-24.8	Area B N: Modified SRT (2x5' culverts, cutoff at 2.0 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod v4	A	Tide	21.8-24.8	Area B N: Modified SRT (3x5' culverts, cutoff at 2.0 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod v5	A	Tide	21.8-24.8	Area B N: Modified SRT (3x5' culverts, cutoff at 1.5 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod v6	A	Tide	21.8-24.7	Area B N: Modified SRT (3x5' culverts, cutoff at 1.1 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod v7	A	Tide	10.88-28.88	Area B N: Modified SRT (3x5' culverts, cutoff at 2.0 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod fld v2	C	Flood	5.28-6.78	Area B N: Modified SRT (2x5' culverts, cutoff at 2.0 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 2 - Prod fld v3	C	Flood	5.86-7.36	Area B N: Modified SRT (2x5' culverts, cutoff at 2.0 m NAVD) Area B SE: 2x5' culverts Area A: 8x5' culverts, Dock 52
Alt 3 - Fully tidal					
	Alt 3 - Prod v1	A	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 2x5' culverts Area A: 3x5' culverts, Dock 52
	Alt 3 - Prod v2	A	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 4x5' culverts Area A: 5x5' culverts, Dock 52
	Alt 3 - Prod v3	A	Tide	21.8-24.7	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 4x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 3 - Prod v4	A	Tide	9.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 4x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 3 - Prod fld v4	C	Flood	5.86-7.36	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 2x5' culverts Area A: 3x5' culverts, Dock 52

Alt 4 - Subtidal					
	Alt 4 - Prod v1	A	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 6x5' culverts Area A: 8x5' culverts, Dock 52
	Alt 4 - Prod v2	A	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 8x5' culverts Area A: 12x5' culverts, Dock 52
	Alt 4 - Prod v3	A	Tide	10.88-11.2	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 8x5' culverts Area A: 8*(12x5' culverts), Dock 52
	Alt 4 - Prod v4	A	Tide	10.88-11.2	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 8x5' culverts Area A: 4*(12x5' culverts), Dock 52
	Alt 4 - Prod v5	A	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 8x5' culverts Area A: 2*(12x5' culverts), Dock 52
	Alt 4 - Prod v6	C	Tide	10.88-28.88	Area B N: Breach to Creek Area B NE: 2x5' culverts Area B SE: 8x5' culverts Area A: 2*(12x5' culverts), Via Venetia
Alt 5 - New creek					
	Alt 5 - Prod v1	C	Tide	10.88-28.88	Phase 3
	Alt 5 - Prod fld v4	P	Flood	5.86-7.36	Phase 3
SLR / Storm surge					

APPENDIX D.
DETAILED COST ESTIMATES AND SUPPORTING INFORMATION

Table D-1. Summary of Engineer's Estimates[1] for Alternatives 1 to 5. Costs in Millions of Dollars

Alternative	Area A	Area B	Area C	Total
1	$4.0	$2.6	--	**$6.6**
2	$42.6	$16.0	$3.3	**$61.8**
3	$69.3	$55.5	$5.2	**$130.0**
4	$108.4	$55.5	$5.2	**$169.0**
5	$99.8	$59.0	$50.4	**$209.3**
	Phase 1	**Phase 2**	**Phase 3**	
5 [2]	$110.4	$48.8	$50.5	**$209.7**

Notes

1 - Estimated construction costs include a 35% contingency

2 - The cost estimate for phasing Alternative 5 is higher due to the construction of a temporary levee

Table D-2. Estimated Volumes of Excess Material to Be Stockpiled and Rough Calcuation of Possible Stockpile Areas and Number of Truck Loads.

	Stockpile Volume (CY)				Stockpile Volume (ac-ft)				5-ft High Stockpile Areas (ac) [1]				10-ft High Stockpile Areas (ac) [1]				No. Truck Loads [2]
	Area A	**Area B**	**Area C**	**Total**	**Area A**	**Area B**	**Area C**	**Total**	**Area A**	**Area B**	**Area C**	**Total**	**Area A**	**Area B**	**Area C**	**Total**	**Total**
Alternative 1	86,400	-	-	86,400	50	-	-	**50**	11	-	-	**11**	6	-	-	**6**	**8,640**
Alternative 2	955,900	196,040	89,500	1,241,440	590	120	60	**770**	120	25	13	**158**	62	14	7	**83**	**124,144**
Alternative 3	1,684,880	963,700	141,000	2,789,580	1,040	600	90	**1,730**	211	122	19	**352**	108	63	10	**182**	**278,958**
Alternative 4	2,748,440	963,700	141,000	3,853,140	1,700	600	90	**2,390**	344	122	19	**485**	176	63	10	**249**	**385,314**
Alternative 5	2,665,700	1,218,100	1,347,800	5,231,600	1,650	760	840	**3,250**	334	155	171	**659**	170	80	88	**338**	**523,160**
	Phase 1	**Phase 2**	**Phase 3**		**Phase 1**	**Phase 2**	**Phase 3**		**Phase 1**	**Phase 2**	**Phase 3**		**Phase 1**	**Phase 2**	**Phase 3**		
Alternative 5	2,889,960	923,500	1,344,600	5,158,060	1,790	570	830	**3,190**	362	116	169	**647**	185	60	87	**332**	**515,806**

Notes

1- Assumes circular stockpile with 5:1 (h:v) side slopes. Area calculation uses insitu volume and does not account for losses, bulking, or compaction.

2- Assumes 10 CY per truck load as an order of magnitude index

Table D-3. Summary of Estimated Costs[1] for Disposal Options. Costs in Millions of Dollars

		Alt 1				Alt 2				Alt 3				Alt 4				Alt 5				Alt 5 with Phasing [2]			
		Area A	Area B	Area C	Total	Area A	Area B	Area C	Total	Area A	Area B	Area C	Total	Area A	Area B	Area C	Total	Area A	Area B	Area C	Total	Phase 1	Phase 2	Phase 3	Total [2]
On-Site Work		$4.0	$2.6	--	**$6.6**	$42.6	$16.0	$3.3	**$61.8**	$69.3	$55.5	$5.2	**$130.0**	$108.4	$55.5	$5.2	**$169.0**	$99.8	$59.0	$50.4	**$209.3**	$110.4	$48.8	$50.5	**$209.7**
Disposal Volume (CY)		86,400	0	0	**86,400**	955,900	196,040	89,500	**1,241,440**	1,684,880	963,700	141,000	**2,789,580**	2,748,440	963,700	141,000	**3,853,140**	2,665,700	1,218,100	1,347,800	**5,231,600**	2,889,960	923,500	1,344,600	**5,158,060**
Off-Site Disposal Options																									
Option 1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**	$1.3	--	--	**$1.3**	$14.7	$3.0	$1.4	**$19.1**	$26.0	$14.8	$2.2	**$43.0**	$42.3	$14.8	$2.2	**$59.4**	$41.1	$18.8	$20.8	**$81.0**	$44.5	$14.2	$20.7	**$81.0**
Option 3	**Beneficial Use - Landfill Cover**	$4.2	--	--	**$4.2**	$45.9	$9.4	$4.3	**$59.7**	$81.0	$46.3	$6.8	**$134.1**	$132.1	$46.3	$6.8	**$185.2**	$128.1	$58.5	$64.8	**$252.6**	$138.9	$44.4	$64.6	**$252.6**
Option 4	**Disposal at Hazardous Waste Landfill [3]**																								
Option 5	**Offshore Disposal (low end of range)**	$1.3	--	--	**$1.3**	$14.7	$3.0	$1.4	**$19.1**	$26.0	$14.8	$2.2	**$43.0**	$42.3	$14.8	$2.2	**$59.4**	$41.1	$18.8	$20.8	**$81.0**	$44.5	$14.2	$20.7	**$81.0**
	Offshore Disposal (high end of range)	$3.6	--	--	**$3.6**	$39.3	$8.1	$3.7	**$51.0**	$69.2	$39.6	$5.8	**$114.6**	$112.9	$39.6	$5.8	**$158.3**	$109.5	$50.0	$55.4	**$216.0**	$118.7	$37.9	$55.2	**$216.0**
Option 6	**Beach Disposal (low end of range)**	$1.3	--	--	**$1.3**	$14.7	$3.0	$1.4	**$19.1**	$26.0	$14.8	$2.2	**$43.0**	$42.3	$14.8	$2.2	**$59.4**	$41.1	$18.8	$20.8	**$81.0**	$44.5	$14.2	$20.7	**$81.0**
	Beach Disposal (high end of range)	$2.7	--	--	**$2.7**	$29.5	$6.0	$2.8	**$38.3**	$51.9	$29.7	$4.3	**$86.0**	$84.7	$29.7	$4.3	**$118.7**	$82.1	$37.5	$41.5	**$162.0**	$89.1	$28.5	$41.4	**$162.0**
Grand Totals for Disposal Options																									
Option 1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**	$5.4	--	--	**$5.4**	$57.3	$19.0	$4.7	**$81.0**	$95.3	$70.4	$7.4	**$173.0**	$150.7	$70.4	$7.4	**$228.4**	$140.9	$77.8	$71.2	**$290.3**	$155.0	$63.1	$71.2	**$290.7**
Option 3	**Beneficial Use - Landfill Cover**	$8.2	--	--	**$8.2**	$88.5	$25.4	$7.6	**$121.5**	$150.3	$101.8	$12.0	**$264.1**	$240.4	$101.8	$12.0	**$354.2**	$227.9	$117.6	$115.2	**$461.9**	$249.3	$93.2	$115.1	**$462.3**
Option 4	**Disposal at Hazardous Waste Landfill [3]**																								
Option 5	**Offshore Disposal (low end of range)**	$5.4	--	--	**$5.4**	$57.3	$19.0	$4.7	**$81.0**	$95.3	$70.4	$7.4	**$173.0**	$150.7	$70.4	$7.4	**$228.4**	$140.9	$77.8	$71.2	**$290.3**	$155.0	$63.1	$71.2	**$290.7**
	Offshore Disposal (high end of range)	$7.6	--	--	**$7.6**	$81.9	$24.0	$7.0	**$112.9**	$138.6	$95.1	$11.0	**$244.6**	$221.3	$95.1	$11.0	**$327.4**	$209.3	$109.1	$105.8	**$425.2**	$229.2	$86.8	$105.7	**$425.7**
Option 6	**Beach Disposal (low end of range)**	$5.4	--	--	**$5.4**	$57.3	$19.0	$4.7	**$81.0**	$95.3	$70.4	$7.4	**$173.0**	$150.7	$70.4	$7.4	**$228.4**	$140.9	$77.8	$71.2	**$290.3**	$155.0	$63.1	$71.2	**$290.7**
	Beach Disposal (high end of range)	$6.7	--	--	**$6.7**	$72.1	$22.0	$6.0	**$100.1**	$121.3	$85.2	$9.5	**$216.0**	$193.1	$85.2	$9.5	**$287.8**	$181.9	$96.6	$92.0	**$371.2**	$199.5	$77.3	$91.9	**$371.7**

Notes

1 - Estimated construction costs include a 35% contingency

2 - The cost estimate for phasing Alternative 5 is higher due to the construction of a temporary levee

3 - Estimate not included for Beneficial Use - Landfill Cover, contamintant report pending

Table D-4. Summary of Unit Costs and Cost Estimate Assuptions

Item	Description	Unit	Unit Cost	Notes
	Unit Costs			
	Mobilization			
1	Mobilization	LS		8% of subtotal used as a typical value. This value may be high.
	Demolition			
2	Demo culvert, daylight channel	LF	$1,000	
	Excavation	CY		Excavation of material only. Transportation included in Item 9.
3	Excavate to Marshplain	CY	$15	Excavate material from existing grade to marshplain elevation.
4	New Ballona Creek	CY	$15	Excavate material to create new Ballona Creek channel.
5	Channels Order 5	CY	$15	Excavate material to create large channels
6	Channels Order 4	CY	$15	Excavate material to create medium channels
7	Channels Order 3	CY	$15	Excavate material to create small channels
8	Breach	CY	$15	Excavate material to create breach
	Transportation	CY		Transportation of excavated material only. Placement of material in stockpile included in Item 12.
9	Onsite trucking	CY	$5	Truck transportation of excavated material to locations of fill and stockpile in each sub-area. Does not include transportation between sub-areas.
	New Levees	CY		
10	Levee Fill - no road	CY	$10	Levee construction using earth fill from material excavated onsite in each sub-area
11	Levee Fill - with road	CY	$17	Levee construction per above and paved roadway.
	Stockpile	CY		
12	Place material at stockpile	CY	$5	Placement of excavated material in excess of fill material in a stockpile in each sub-area. Excavation (Items 3-8) and transporation (Item 9) included separately.
	Levee Lowering and Ballona Creek Fill			
13	Levee Lowering	CY	$5	Excavation of earth material from existing levees along Ballona Creek. Removal and salvage of rip rap included in Item 15.
14	Ballona Creek Fill	CY	$5	Fill placement in existing Ballona Creek channel by sidecasting excavated material from levee lowering to fill Ballona Creek and using some excavated material (Items 2-8)
15	Salvage Rip Rap	CY	$10	Removal of rip-rap from existing levees
16	Buried rock protection	CY	$20	Assumes half the salvaged volume is used for protection and remainder is taken off-site for use by contractor
	Water Control Structures			
17	Culvert	SF	$2,010	New culvert
18	Tide Gate	LS	$100,000	New tide gate for culvert
	Subtotal			
	Contingency			35% contingency included for concept-level cost estimate.
	Total			

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Unit	Unit Cost	Notes
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**			
	Mobilization	LS		8% of subtotal used as a typical value. This value may be high.
	Sediment Removal	CY	$3	From POLA / Weston
	Barge Sediment (approx. 30 NM)	CY	$4.50	From POLA / Weston
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	CY	$3	From POLA / Weston
	Subtotal			
	Contingency			35% contingency included for concept-level cost estimate.
	Total for Option 1			
3	**Beneficial Use - Landfill Cover**			
	Mobilization	LS		8% of subtotal used as a typical value. This value may be high.
	Sediment Removal	CY	$3	From POLA / Weston
	Barge Sediment (approx. 30 NM)	CY	$5	From POLA / Weston
	Stockpiling & Staging Material at POLA	CY	$1	From POLA / Weston
	Truck Material to Site (100 mi at $0.20/cy)	CY	$20	From POLA / Weston
	Placement, grading, compaction at Site	CY	$4.25	From POLA / Weston
	Subtotal			
	Contingency			35% contingency included for concept-level cost estimate.
	Total for Option 2			
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**			
5	**Offshore Disposal [1]**			
	Mobilization	LS		8% of subtotal used as a typical value. This value may be high.
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	CY	$28	Based on $28 per cubic meter cost from Upper Newport Bay project for dredging and disposal about three miles offshore provide by SCC
	Subtotal			
	Contingency			35% contingency included for concept-level cost estimate.
	Total for Option 3			
6	**Beach Disposal [1]**			
	Mobilization	LS		
	Sediment Removal and Beach Disposal	CY	$21	Based on cost for Option 1 / 2 with additional $10/CY premium for beach disposal
	Subtotal			
	Contingency			
	Total for Option 4			

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 1 Area A

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$240,000**
1	Mobilization	1	LS	$240,000	$240,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**109,500**	CY		**$1,642,500**
3	Excavate to Marshplain	109,500	CY	$15	$1,642,500
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	0	CY	$15	$0
8	Breach	0	CY	$15	$0
	Transportation	**109,500**	CY		**$547,500**
9	Onsite trucking	109,500	CY	$5	$547,500
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**86,400**	CY		**$547,500**
12	Place material at stockpile	109,500	CY	$5	$547,500
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$2,977,500**
	Contingency	35%			**$1,042,200**
	Total				**$4,019,700**

Disposal Options - Cost Estimates from POLA / Weston and SCC

1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$79,000	$79,000
	Sediment Removal	86,400	CY	$3	$259,200
	Barge Sediment (approx. 30 NM)	86,400	CY	$4.50	$388,800
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	86,400	CY	$3	$259,200
	Subtotal				**$986,200**
	Contingency	35%			**$345,200**
	Total for Option 1				**$1,331,400**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$247,000	$247,000
	Sediment Removal	86,400	CY	$3	$259,200
	Barge Sediment (approx. 30 NM)	86,400	CY	$4.50	$388,800
	Stockpiling & Staging Material at POLA	86,400	CY	$1	$86,400
	Truck Material to Site (100 mi at $0.20/cy)	86,400	CY	$20	$1,728,000
	Placement, grading, compaction at Site	86,400	CY	$4.25	$367,200
	Subtotal				**$3,076,600**
	Contingency	35%			**$1,076,900**
	Total for Option 2				**$4,153,500**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$211,000	$211,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	86,400	CY	$28	$2,419,200
	Subtotal				**$2,630,200**
	Contingency	35%			**$920,600**
	Total for Option 3				**$3,550,800**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$158,000	$158,000
	Sediment Removal and Beach Disposal	86,400	CY	$21	$1,814,400
	Subtotal				**$1,972,400**
	Contingency	35%			**$690,300**
	Total for Option 4				**$2,662,700**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$5,351,100**
3	**Upland Disposal**	**$8,173,200**
5	**Offshore Disposal [1]**	**$7,570,500**
6	**Beach Disposal [1]**	**$6,682,400**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 1 Area B

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$160,000**
1	Mobilization	1	LS	$160,000	$160,000
	Demolition				**$1,400,000**
2	Demo culvert, daylight chan	1,400	LF	$1,000	$1,400,000
	Excavation	**0**	CY		**$0**
3	Excavate to Marshplain	0	CY	$15	$0
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	0	CY	$15	$0
8	Breach	0	CY	$15	$0
	Transportation	**23,100**	CY		**$115,500**
9	Onsite trucking	23,100	CY	$5	$115,500
	New Levees	**23,100**	CY		**$231,000**
10	Levee Fill - no road	23,100	CY	$10	$231,000
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**0**	CY		**$0**
12	Place material at stockpile	0	CY	$5	$0
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$1,906,500**
	Contingency	35%			**$667,300**
	Total				**$2,573,800**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$0	$0
	Sediment Removal	0	CY	$3	$0
	Barge Sediment (approx. 30 NM)	0	CY	$4.50	$0
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	0	CY	$3	$0
	Subtotal				**$0**
	Contingency	35%			**$0**
	Total for Option 1				**$0**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$0	$0
	Sediment Removal	0	CY	$3	$0
	Barge Sediment (approx. 30 NM)	0	CY	$4.50	$0
	Stockpiling & Staging Material at POLA	0	CY	$1	$0
	Truck Material to Site (100 mi at $0.20/cy)	0	CY	$20	$0
	Placement, grading, compaction at Site	0	CY	$4.25	$0
	Subtotal				**$0**
	Contingency	35%			**$0**
	Total for Option 2				**$0**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$0	$0
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	0	CY	$28	$0
	Subtotal				**$0**
	Contingency	35%			**$0**
	Total for Option 3				**$0**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$0	$0
	Sediment Removal and Beach Disposal	0	CY	$21	$0
	Subtotal				**$0**
	Contingency	35%			**$0**
	Total for Option 4				**$0**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$2,573,800**
3	**Upland Disposal**	**$2,573,800**
5	**Offshore Disposal [1]**	**$2,573,800**
6	**Beach Disposal [1]**	**$2,573,800**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 2 Area A

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$2,530,000**
1	Mobilization	1	LS	$2,530,000	$2,530,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**955,900**	CY		**$14,338,500**
3	Excavate to Marshplain	951,700	CY	$15	$14,275,500
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	2,430	CY	$15	$36,450
7	Channels Order 3	1,770	CY	$15	$26,550
8	Breach	0	CY	$15	$0
	Transportation	**955,900**	CY		**$4,779,500**
9	Onsite trucking	955,900	CY	$5	$4,779,500
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**955,900**	CY		**$4,779,500**
12	Place material at stockpile	955,900	CY	$5	$4,779,500
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$5,125,000**
17	Culvert	2,500	SF	$2,010	$5,025,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$31,552,500**
	Contingency	35%			**$11,043,400**
	Total				**$42,595,900**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$873,000	$873,000
	Sediment Removal	955,900	CY	$3	$2,867,700
	Barge Sediment (approx. 30 NM)	955,900	CY	$4.50	$4,301,550
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	955,900	CY	$3	$2,867,700
	Subtotal				**$10,909,950**
	Contingency	35%			**$3,818,500**
	Total for Option 1				**$14,728,450**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$2,723,000	$2,723,000
	Sediment Removal	955,900	CY	$3	$2,867,700
	Barge Sediment (approx. 30 NM)	955,900	CY	$4.50	$4,301,550
	Stockpiling & Staging Material at POLA	955,900	CY	$1	$955,900
	Truck Material to Site (100 mi at $0.20/cy)	955,900	CY	$20	$19,118,000
	Placement, grading, compaction at Site	955,900	CY	$4.25	$4,062,575
	Subtotal				**$34,028,725**
	Contingency	35%			**$11,910,100**
	Total for Option 2				**$45,938,825**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$2,328,000	$2,328,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	955,900	CY	$28	$26,765,200
	Subtotal				**$29,093,200**
	Contingency	35%			**$10,182,700**
	Total for Option 3				**$39,275,900**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$1,746,000	$1,746,000
	Sediment Removal and Beach Disposal	955,900	CY	$21	$20,073,900
	Subtotal				**$21,819,900**
	Contingency	35%			**$7,637,000**
	Total for Option 4				**$29,456,900**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$57,324,350**
3	**Upland Disposal**	**$88,534,725**
5	**Offshore Disposal [1]**	**$81,871,800**
6	**Beach Disposal [1]**	**$72,052,800**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 2 Area B

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$950,000**
1	Mobilization	1	LS	$950,000	$950,000
	Demolition				**$1,400,000**
2	Demo culvert, daylight chan	1,400	LF	$1,000	$1,400,000
	Excavation	**277,970**	CY		**$4,169,550**
3	Excavate to Marshplain	274,400	CY	$15	$4,116,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	2,040	CY	$15	$30,600
7	Channels Order 3	1,530	CY	$15	$22,950
8	Breach	0	CY	$15	$0
	Transportation	**277,970**	CY		**$1,389,850**
9	Onsite trucking	277,970	CY	$5	$1,389,850
	New Levees	**81,930**	CY		**$819,300**
10	Levee Fill - no road	81,930	CY	$10	$819,300
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**196,040**	CY		**$980,200**
12	Place material at stockpile	196,040	CY	$5	$980,200
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$2,110,000**
17	Culvert	1,000	SF	$2,010	$2,010,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$11,818,900**
	Contingency	35%			**$4,136,700**
	Total				**$15,955,600**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$179,000	$179,000
	Sediment Removal	196,040	CY	$3	$588,120
	Barge Sediment (approx. 30 NM)	196,040	CY	$4.50	$882,180
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	196,040	CY	$3	$588,120
	Subtotal				**$2,237,420**
	Contingency	35%			**$783,100**
	Total for Option 1				**$3,020,520**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$559,000	$559,000
	Sediment Removal	196,040	CY	$3	$588,120
	Barge Sediment (approx. 30 NM)	196,040	CY	$4.50	$882,180
	Stockpiling & Staging Material at POLA	196,040	CY	$1	$196,040
	Truck Material to Site (100 mi at $0.20/cy)	196,040	CY	$20	$3,920,800
	Placement, grading, compaction at Site	196,040	CY	$4.25	$833,170
	Subtotal				**$6,979,310**
	Contingency	35%			**$2,442,800**
	Total for Option 2				**$9,422,110**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$478,000	$478,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	196,040	CY	$28	$5,489,120
	Subtotal				**$5,967,120**
	Contingency	35%			**$2,088,500**
	Total for Option 3				**$8,055,620**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$358,000	$358,000
	Sediment Removal and Beach Disposal	196,040	CY	$21	$4,116,840
	Subtotal				**$4,474,840**
	Contingency	35%			**$1,566,200**
	Total for Option 4				**$6,041,040**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$18,976,120**
3	**Upland Disposal**	**$25,377,710**
5	**Offshore Disposal [1]**	**$24,011,220**
6	**Beach Disposal [1]**	**$21,996,640**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 2 Area C

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$200,000**
1	Mobilization	1	LS	$200,000	$200,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**89,500**	CY		**$1,342,500**
3	Excavate to Marshplain	89,500	CY	$15	$1,342,500
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	0	CY	$15	$0
8	Breach	0	CY	$15	$0
	Transportation	**89,500**	CY		**$447,500**
9	Onsite trucking	89,500	CY	$5	$447,500
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**89,500**	CY		**$447,500**
12	Place material at stockpile	89,500	CY	$5	$447,500
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$2,437,500**
	Contingency	35%			**$853,200**
	Total				**$3,290,700**

Disposal Options - Cost Estimates from POLA / Weston and SCC

1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$82,000	$82,000
	Sediment Removal	89,500	CY	$3	$268,500
	Barge Sediment (approx. 30 NM)	89,500	CY	$4.50	$402,750
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	89,500	CY	$3	$268,500
	Subtotal				**$1,021,750**
	Contingency	35%			**$357,700**
	Total for Option 1				**$1,379,450**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$255,000	$255,000
	Sediment Removal	89,500	CY	$3	$268,500
	Barge Sediment (approx. 30 NM)	89,500	CY	$4.50	$402,750
	Stockpiling & Staging Material at POLA	89,500	CY	$1	$89,500
	Truck Material to Site (100 mi at $0.20/cy)	89,500	CY	$20	$1,790,000
	Placement, grading, compaction at Site	89,500	CY	$4.25	$380,375
	Subtotal				**$3,186,125**
	Contingency	35%			**$1,115,200**
	Total for Option 2				**$4,301,325**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$218,000	$218,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	89,500	CY	$28	$2,506,000
	Subtotal				**$2,724,000**
	Contingency	35%			**$953,400**
	Total for Option 3				**$3,677,400**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$164,000	$164,000
	Sediment Removal and Beach Disposal	89,500	CY	$21	$1,879,500
	Subtotal				**$2,043,500**
	Contingency	35%			**$715,200**
	Total for Option 4				**$2,758,700**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$4,670,150**
3	**Upland Disposal**	**$7,592,025**
5	**Offshore Disposal [1]**	**$6,968,100**
6	**Beach Disposal [1]**	**$6,049,400**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 3 Area A

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$4,110,000**
1	Mobilization	1	LS	$4,110,000	$4,110,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**1,684,880**	CY		**$25,273,200**
3	Excavate to Marshplain	1,673,700	CY	$15	$25,105,500
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	3,540	CY	$15	$53,100
6	Channels Order 4	4,240	CY	$15	$63,600
7	Channels Order 3	3,400	CY	$15	$51,000
8	Breach	0	CY	$15	$0
	Transportation	**1,684,880**	CY		**$8,424,400**
9	Onsite trucking	1,684,880	CY	$5	$8,424,400
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**1,684,880**	CY		**$8,424,400**
12	Stockpile	1,684,880	CY	$5	$8,424,400
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$5,125,000**
17	Culvert	2,500	SF	$2,010	$5,025,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$51,357,000**
	Contingency	35%			**$17,975,000**
	Total				**$69,332,000**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$1,539,000	$1,539,000
	Sediment Removal	1,684,880	CY	$3	$5,054,640
	Barge Sediment (approx. 30 NM)	1,684,880	CY	$4.50	$7,581,960
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	1,684,880	CY	$3	$5,054,640
	Subtotal				**$19,230,240**
	Contingency	35%			**$6,730,600**
	Total for Option 1				**$25,960,840**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$4,799,000	$4,799,000
	Sediment Removal	1,684,880	CY	$3	$5,054,640
	Barge Sediment (approx. 30 NM)	1,684,880	CY	$4.50	$7,581,960
	Stockpiling & Staging Material at POLA	1,684,880	CY	$1	$1,684,880
	Truck Material to Site (100 mi at $0.20/cy)	1,684,880	CY	$20	$33,697,600
	Placement, grading, compaction at Site	1,684,880	CY	$4.25	$7,160,740
	Subtotal				**$59,978,820**
	Contingency	35%			**$20,992,600**
	Total for Option 2				**$80,971,420**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$4,103,000	$4,103,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	1,684,880	CY	$28	$47,176,640
	Subtotal				**$51,279,640**
	Contingency	35%			**$17,947,900**
	Total for Option 3				**$69,227,540**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$3,077,000	$3,077,000
	Sediment Removal and Beach Disposal	1,684,880	CY	$21	$35,382,480
	Subtotal				**$38,459,480**
	Contingency	35%			**$13,460,800**
	Total for Option 4				**$51,920,280**

Grand Totals with Disposal Options

Item	Description	Total Cost
1 / 2	**Disposal at POLA**	**$95,292,840**
3	**Upland Disposal**	**$150,303,420**
5	**Offshore Disposal [1]**	**$138,559,540**
6	**Beach Disposal [1]**	**$121,252,280**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 3 Area B

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$3,290,000**
1	Mobilization	1	LS	$3,290,000	$3,290,000
	Demolition				**$1,400,000**
2	Demo culvert, daylight chan	1,400	LF	$1,000	$1,400,000
	Excavation	**1,259,910**	CY		**$18,898,650**
3	Excavate to Marshplain	1,229,400	CY	$15	$18,441,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	5,560	CY	$15	$83,400
6	Channels Order 4	9,390	CY	$15	$140,850
7	Channels Order 3	8,180	CY	$15	$122,700
8	Breach	7,380	CY	$15	$110,700
	Transportation	**1,252,530**	CY		**$6,262,650**
9	Onsite trucking	1,252,530	CY	$5	$6,262,650
	New Levees	**288,830**	CY		**$4,336,600**
10	Levee Fill - no road	81,930	CY	$10	$819,300
11	Levee Fill - with road	206,900	CY	$17	$3,517,300
	Stockpile	**963,700**	CY		**$4,818,500**
12	Stockpile	963,700	CY	$5	$4,818,500
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$2,110,000**
17	Culvert	1,000	SF	$2,010	$2,010,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$41,116,400**
	Contingency	35%			**$14,390,800**
	Total				**$55,507,200**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$880,000	$880,000
	Sediment Removal	963,700	CY	$3	$2,891,100
	Barge Sediment (approx. 30 NM)	963,700	CY	$4.50	$4,336,650
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	963,700	CY	$3	$2,891,100
	Subtotal				**$10,998,850**
	Contingency	35%			**$3,849,600**
	Total for Option 1				**$14,848,450**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$2,745,000	$2,745,000
	Sediment Removal	963,700	CY	$3	$2,891,100
	Barge Sediment (approx. 30 NM)	963,700	CY	$4.50	$4,336,650
	Stockpiling & Staging Material at POLA	963,700	CY	$1	$963,700
	Truck Material to Site (100 mi at $0.20/cy)	963,700	CY	$20	$19,274,000
	Placement, grading, compaction at Site	963,700	CY	$4.25	$4,095,725
	Subtotal				**$34,306,175**
	Contingency	35%			**$12,007,200**
	Total for Option 2				**$46,313,375**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$2,347,000	$2,347,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	963,700	CY	$28	$26,983,600
	Subtotal				**$29,330,600**
	Contingency	35%			**$10,265,800**
	Total for Option 3				**$39,596,400**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$1,760,000	$1,760,000
	Sediment Removal and Beach Disposal	963,700	CY	$21	$20,237,700
	Subtotal				**$21,997,700**
	Contingency	35%			**$7,699,200**
	Total for Option 4				**$29,696,900**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$70,355,650**
3	**Upland Disposal**	**$101,820,575**
5	**Offshore Disposal [1]**	**$95,103,600**
6	**Beach Disposal [1]**	**$85,204,100**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 3 Area C

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$310,000**
1	Mobilization	1	LS	$310,000	$310,000
	Demolition				**$0**
2	Demo culvert, daylight ch	0	LF	$1,000	$0
	Excavation	**141,000**	CY		**$2,115,000**
3	Excavate to Marshplain	141,000	CY	$15	$2,115,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	0	CY	$15	$0
8	Breach	0	CY	$15	$0
	Transportation	**141,000**	CY		**$705,000**
9	Onsite trucking	141,000	CY	$5	$705,000
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**141,000**	CY		**$705,000**
12	Stockpile	141,000	CY	$5	$705,000
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$3,835,000**
	Contingency	35%			**$1,342,300**
	Total				**$5,177,300**
Disposal Options - Cost Estimates from POLA / Weston and SCC					
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$129,000	$129,000
	Sediment Removal	141,000	CY	$3	$423,000
	Barge Sediment (approx. 30 NM)	141,000	CY	$4.50	$634,500
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	141,000	CY	$3	$423,000
	Subtotal				**$1,609,500**
	Contingency	35%			**$563,400**
	Total for Option 1				**$2,172,900**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$402,000	$402,000
	Sediment Removal	141,000	CY	$3	$423,000
	Barge Sediment (approx. 30 NM)	141,000	CY	$4.50	$634,500
	Stockpiling & Staging Material at POLA	141,000	CY	$1	$141,000
	Truck Material to Site (100 mi at $0.20/cy)	141,000	CY	$20	$2,820,000
	Placement, grading, compaction at Site	141,000	CY	$4.25	$599,250
	Subtotal				**$5,019,750**
	Contingency	35%			**$1,757,000**
	Total for Option 2				**$6,776,750**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$344,000	$344,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	141,000	CY	$28	$3,948,000
	Subtotal				**$4,292,000**
	Contingency	35%			**$1,502,200**
	Total for Option 3				**$5,794,200**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$258,000	$258,000
	Sediment Removal and Beach Disposal	141,000	CY	$21	$2,961,000
	Subtotal				**$3,219,000**
	Contingency	35%			**$1,126,700**
	Total for Option 4				**$4,345,700**
Grand Totals with Disposal Options					
1 / 2	**Disposal at POLA**				**$7,350,200**
3	**Upland Disposal**				**$11,954,050**
5	**Offshore Disposal [1]**				**$10,971,500**
6	**Beach Disposal [1]**				**$9,523,000**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 4 Area A

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$6,430,000**
1	Mobilization	1	LS	$6,430,000	$6,430,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**2,748,440**	CY		**$41,226,600**
3	Excavate to Marshplain	2,748,000	CY	$15	$41,220,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	440	CY	$15	$6,600
8	Breach	0	CY	$15	$0
	Transportation	**2,748,440**	CY		**$13,742,200**
9	Onsite trucking	2,748,440	CY	$5	$13,742,200
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**2,748,440**	CY		**$13,742,200**
12	Stockpile	2,748,440	CY	$5	$13,742,200
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$5,125,000**
17	Culvert	2,500	SF	$2,010	$5,025,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$80,266,000**
	Contingency	35%			**$28,093,100**
	Total				**$108,359,100**

Disposal Options - Cost Estimates from POLA / Weston and SCC

1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$2,510,000	$2,510,000
	Sediment Removal	2,748,440	CY	$3	$8,245,320
	Barge Sediment (approx. 30 NM)	2,748,440	CY	$4.50	$12,367,980
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	2,748,440	CY	$3	$8,245,320
	Subtotal				**$31,368,620**
	Contingency	35%			**$10,979,100**
	Total for Option 1				**$42,347,720**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$7,828,000	$7,828,000
	Sediment Removal	2,748,440	CY	$3	$8,245,320
	Barge Sediment (approx. 30 NM)	2,748,440	CY	$4.50	$12,367,980
	Stockpiling & Staging Material at POLA	2,748,440	CY	$1	$2,748,440
	Truck Material to Site (100 mi at $0.20/cy)	2,748,440	CY	$20	$54,968,800
	Placement, grading, compaction at Site	2,748,440	CY	$4.25	$11,680,870
	Subtotal				**$97,839,410**
	Contingency	35%			**$34,243,800**
	Total for Option 2				**$132,083,210**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$6,692,000	$6,692,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	2,748,440	CY	$28	$76,956,320
	Subtotal				**$83,648,320**
	Contingency	35%			**$29,277,000**
	Total for Option 3				**$112,925,320**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$5,019,000	$5,019,000
	Sediment Removal and Beach Disposal	2,748,440	CY	$21	$57,717,240
	Subtotal				**$62,736,240**
	Contingency	35%			**$21,957,700**
	Total for Option 4				**$84,693,940**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$150,706,820**
3	**Upland Disposal**	**$240,442,310**
5	**Offshore Disposal [1]**	**$221,284,420**
6	**Beach Disposal [1]**	**$193,053,040**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 4 Area B

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$3,290,000**
1	Mobilization	1	LS	$3,290,000	$3,290,000
	Demolition				**$1,400,000**
2	Demo culvert, daylight chan	1,400	LF	$1,000	$1,400,000
	Excavation	**1,259,910**	CY		**$18,898,650**
3	Excavate to Marshplain	1,229,400	CY	$15	$18,441,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	5,560	CY	$15	$83,400
6	Channels Order 4	9,390	CY	$15	$140,850
7	Channels Order 3	8,180	CY	$15	$122,700
8	Breach	7,380	CY	$15	$110,700
	Transportation	**1,252,530**	CY		**$6,262,650**
9	Onsite trucking	1,252,530	CY	$5	$6,262,650
	New Levees	**288,830**	CY		**$4,336,600**
10	Levee Fill - no road	81,930	CY	$10	$819,300
11	Levee Fill - with road	206,900	CY	$17	$3,517,300
	Stockpile	**963,700**	CY		**$4,818,500**
12	Stockpile	963,700	CY	$5	$4,818,500
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$2,110,000**
17	Culvert	1,000	SF	$2,010	$2,010,000
18	Tide Gate	1	LS	$100,000	$100,000
	Subtotal				**$41,116,400**
	Contingency	35%			**$14,390,800**
	Total				**$55,507,200**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$880,000	$880,000
	Sediment Removal	963,700	CY	$3	$2,891,100
	Barge Sediment (approx. 30 NM)	963,700	CY	$4.50	$4,336,650
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	963,700	CY	$3	$2,891,100
	Subtotal				**$10,998,850**
	Contingency	35%			**$3,849,600**
	Total for Option 1				**$14,848,450**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$2,745,000	$2,745,000
	Sediment Removal	963,700	CY	$3	$2,891,100
	Barge Sediment (approx. 30 NM)	963,700	CY	$4.50	$4,336,650
	Stockpiling & Staging Material at POLA	963,700	CY	$1	$963,700
	Truck Material to Site (100 mi at $0.20/cy)	963,700	CY	$20	$19,274,000
	Placement, grading, compaction at Site	963,700	CY	$4.25	$4,095,725
	Subtotal				**$34,306,175**
	Contingency	35%			**$12,007,200**
	Total for Option 2				**$46,313,375**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$2,347,000	$2,347,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	963,700	CY	$28	$26,983,600
	Subtotal				**$29,330,600**
	Contingency	35%			**$10,265,800**
	Total for Option 3				**$39,596,400**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$1,760,000	$1,760,000
	Sediment Removal and Beach Disposal	963,700	CY	$21	$20,237,700
	Subtotal				**$21,997,700**
	Contingency	35%			**$7,699,200**
	Total for Option 4				**$29,696,900**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$70,355,650**
3	**Upland Disposal**	**$101,820,575**
5	**Offshore Disposal [1]**	**$95,103,600**
6	**Beach Disposal [1]**	**$85,204,100**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 4 Area C

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$310,000**
1	Mobilization	1	LS	$310,000	$310,000
	Demolition				**$0**
2	Demo culvert, daylight cl	0	LF	$1,000	$0
	Excavation	**141,000**	CY		**$2,115,000**
3	Excavate to Marshplain	141,000	CY	$15	$2,115,000
4	New Ballona Creek	0	CY	$15	$0
5	Channels Order 5	0	CY	$15	$0
6	Channels Order 4	0	CY	$15	$0
7	Channels Order 3	0	CY	$15	$0
8	Breach	0	CY	$15	$0
	Transportation	**141,000**	CY		**$705,000**
9	Onsite trucking	141,000	CY	$5	$705,000
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**141,000**	CY		**$705,000**
12	Stockpile	141,000	CY	$5	$705,000
	Levee Lowering and Ballona Creek Fill				**$0**
13	Levee Lowering	0	CY	$5	$0
14	Ballona Creek Fill	0	CY	$5	$0
15	Salvage Rip Rap	0	CY	$10	$0
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$3,835,000**
	Contingency	35%			**$1,342,300**
	Total				**$5,177,300**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$129,000	$129,000
	Sediment Removal	141,000	CY	$3	$423,000
	Barge Sediment (approx. 30 NM)	141,000	CY	$4.50	$634,500
	Material (hydraulic unloader) or Disposal at CDF	141,000	CY	$3	$423,000
	Subtotal				**$1,609,500**
	Contingency	35%			**$563,400**
	Total for Option 1				**$2,172,900**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$402,000	$402,000
	Sediment Removal	141,000	CY	$3	$423,000
	Barge Sediment (approx. 30 NM)	141,000	CY	$4.50	$634,500
	Stockpiling & Staging Material at POLA	141,000	CY	$1	$141,000
	Truck Material to Site (100 mi at $0.20/cy)	141,000	CY	$20	$2,820,000
	Placement, grading, compaction at Site	141,000	CY	$4.25	$599,250
	Subtotal				**$5,019,750**
	Contingency	35%			**$1,757,000**
	Total for Option 2				**$6,776,750**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$344,000	$344,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	141,000	CY	$28	$3,948,000
	Subtotal				**$4,292,000**
	Contingency	35%			**$1,502,200**
	Total for Option 3				**$5,794,200**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$258,000	$258,000
	Sediment Removal and Beach Disposal	141,000	CY	$21	$2,961,000
	Subtotal				**$3,219,000**
	Contingency	35%			**$1,126,700**
	Total for Option 4				**$4,345,700**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$7,350,200**
3	**Upland Disposal**	**$11,954,050**
5	**Offshore Disposal [1]**	**$10,971,500**
6	**Beach Disposal [1]**	**$9,523,000**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Area A

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$5,920,000**
1	Mobilization	1	LS	$5,920,000	$5,920,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**2,674,100**	CY		**$40,111,500**
3	Excavate to Marshplain	2,649,400	CY	$15	$39,741,000
4	New Ballona Creek	16,500	CY	$15	$247,500
5	Channels Order 5	1,200	CY	$15	$18,000
6	Channels Order 4	3,300	CY	$15	$49,500
7	Channels Order 3	3,700	CY	$15	$55,500
8	Breach	0	CY	$15	$0
	Transportation	**2,674,100**	CY		**$13,370,500**
9	Onsite trucking	2,674,100	CY	$5	$13,370,500
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**2,665,700**	CY		**$13,328,500**
12	Stockpile	2,665,700	CY	$5	$13,328,500
	Levee Lowering and Ballona Creek Fill				**$1,189,400**
13	Levee Lowering	85,700	CY	$5	$428,500
14	Ballona Creek Fill	94,100	CY	$5	$470,500
15	Salvage Rip Rap	14,520	CY	$10	$145,200
16	Buried rock protection	7,260	CY	$20	$145,200
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$73,919,900**
	Contingency	35%			**$25,872,000**
	Total				**$99,791,900**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$2,434,000	$2,434,000
	Sediment Removal	2,665,700	CY	$3	$7,997,100
	Barge Sediment (approx. 30 NM)	2,665,700	CY	$4.50	$11,995,650
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	2,665,700	CY	$3	$7,997,100
	Subtotal				**$30,423,850**
	Contingency	35%			**$10,648,400**
	Total for Option 1				**$41,072,250**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$7,592,000	$7,592,000
	Sediment Removal	2,665,700	CY	$3	$7,997,100
	Barge Sediment (approx. 30 NM)	2,665,700	CY	$4.50	$11,995,650
	Stockpiling & Staging Material at POLA	2,665,700	CY	$1	$2,665,700
	Truck Material to Site (100 mi at $0.20/cy)	2,665,700	CY	$20	$53,314,000
	Placement, grading, compaction at Site	2,665,700	CY	$4.25	$11,329,225
	Subtotal				**$94,893,675**
	Contingency	35%			**$33,212,800**
	Total for Option 2				**$128,106,475**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$6,491,000	$6,491,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	2,665,700	CY	$28	$74,639,600
	Subtotal				**$81,130,600**
	Contingency	35%			**$28,395,800**
	Total for Option 3				**$109,526,400**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$4,868,000	$4,868,000
	Sediment Removal and Beach Disposal	2,665,700	CY	$21	$55,979,700
	Subtotal				**$60,847,700**
	Contingency	35%			**$21,296,700**
	Total for Option 4				**$82,144,400**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$140,864,150**
3	**Upland Disposal**	**$227,898,375**
5	**Offshore Disposal [1]**	**$209,318,300**
6	**Beach Disposal [1]**	**$181,936,300**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Area B

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$3,500,000**
1	Mobilization	1	LS	$3,500,000	$3,500,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**1,440,000**	CY		**$21,600,000**
3	Excavate to Marshplain	1,398,600	CY	$15	$20,979,000
4	New Ballona Creek	27,700	CY	$15	$415,500
5	Channels Order 5	2,000	CY	$15	$30,000
6	Channels Order 4	5,500	CY	$15	$82,500
7	Channels Order 3	6,200	CY	$15	$93,000
8	Breach	0	CY	$15	$0
	Transportation	**1,440,000**	CY		**$7,200,000**
9	Onsite trucking	1,440,000	CY	$5	$7,200,000
	New Levees	**209,300**	CY		**$3,558,100**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	209,300	CY	$17	$3,558,100
	Stockpile	**1,218,100**	CY		**$6,090,500**
12	Stockpile	1,218,100	CY	$5	$6,090,500
	Levee Lowering and Ballona Creek Fill				**$1,783,600**
13	Levee Lowering	128,500	CY	$5	$642,500
14	Ballona Creek Fill	141,100	CY	$5	$705,500
15	Salvage Rip Rap	21,780	CY	$10	$217,800
16	Buried rock protection	10,890	CY	$20	$217,800
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$43,732,200**
	Contingency	35%			**$15,306,300**
	Total				**$59,038,500**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$1,113,000	$1,113,000
	Sediment Removal	1,218,100	CY	$3	$3,654,300
	Barge Sediment (approx. 30 NM)	1,218,100	CY	$4.50	$5,481,450
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	1,218,100	CY	$3	$3,654,300
	Subtotal				**$13,903,050**
	Contingency	35%			**$4,866,100**
	Total for Option 1				**$18,769,150**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$3,469,000	$3,469,000
	Sediment Removal	1,218,100	CY	$3	$3,654,300
	Barge Sediment (approx. 30 NM)	1,218,100	CY	$4.50	$5,481,450
	Stockpiling & Staging Material at POLA	1,218,100	CY	$1	$1,218,100
	Truck Material to Site (100 mi at $0.20/cy)	1,218,100	CY	$20	$24,362,000
	Placement, grading, compaction at Site	1,218,100	CY	$4.25	$5,176,925
	Subtotal				**$43,361,775**
	Contingency	35%			**$15,176,700**
	Total for Option 2				**$58,538,475**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$2,966,000	$2,966,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	1,218,100	CY	$28	$34,106,800
	Subtotal				**$37,072,800**
	Contingency	35%			**$12,975,500**
	Total for Option 3				**$50,048,300**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$2,225,000	$2,225,000
	Sediment Removal and Beach Disposal	1,218,100	CY	$21	$25,580,100
	Subtotal				**$27,805,100**
	Contingency	35%			**$9,731,800**
	Total for Option 4				**$37,536,900**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$77,807,650**
3	**Upland Disposal**	**$117,576,975**
5	**Offshore Disposal [1]**	**$109,086,800**
6	**Beach Disposal [1]**	**$96,575,400**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Area C

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$2,990,000**
1	Mobilization	1	LS	$2,990,000	$2,990,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**1,352,000**	CY		**$20,280,000**
3	Excavate to Marshplain	1,324,700	CY	$15	$19,870,500
4	New Ballona Creek	21,800	CY	$15	$327,000
5	Channels Order 5	800	CY	$15	$12,000
6	Channels Order 4	2,200	CY	$15	$33,000
7	Channels Order 3	2,500	CY	$15	$37,500
8	Breach	0	CY	$15	$0
	Transportation	**1,352,000**	CY		**$6,760,000**
9	Onsite trucking	1,352,000	CY	$5	$6,760,000
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**1,347,800**	CY		**$6,739,000**
12	Stockpile	1,347,800	CY	$5	$6,739,000
	Levee Lowering and Ballona Creek Fill				**$595,200**
13	Levee Lowering	42,900	CY	$5	$214,500
14	Ballona Creek Fill	47,100	CY	$5	$235,500
15	Salvage Rip Rap	7,260	CY	$10	$72,600
16	Buried rock protection	3,630	CY	$20	$72,600
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$37,364,200**
	Contingency	35%			**$13,077,500**
	Total				**$50,441,700**

Disposal Options - Cost Estimates from POLA / Weston and SCC

1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$1,231,000	$1,231,000
	Sediment Removal	1,347,800	CY	$3	$4,043,400
	Barge Sediment (approx. 30 NM)	1,347,800	CY	$4.50	$6,065,100
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	1,347,800	CY	$3	$4,043,400
	Subtotal				**$15,382,900**
	Contingency	35%			**$5,384,100**
	Total for Option 1				**$20,767,000**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$3,839,000	$3,839,000
	Sediment Removal	1,347,800	CY	$3	$4,043,400
	Barge Sediment (approx. 30 NM)	1,347,800	CY	$4.50	$6,065,100
	Stockpiling & Staging Material at POLA	1,347,800	CY	$1	$1,347,800
	Truck Material to Site (100 mi at $0.20/cy)	1,347,800	CY	$20	$26,956,000
	Placement, grading, compaction at Site	1,347,800	CY	$4.25	$5,728,150
	Subtotal				**$47,979,450**
	Contingency	35%			**$16,792,900**
	Total for Option 2				**$64,772,350**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$3,282,000	$3,282,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	1,347,800	CY	$28	$37,738,400
	Subtotal				**$41,020,400**
	Contingency	35%			**$14,357,200**
	Total for Option 3				**$55,377,600**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$2,462,000	$2,462,000
	Sediment Removal and Beach Disposal	1,347,800	CY	$21	$28,303,800
	Subtotal				**$30,765,800**
	Contingency	35%			**$10,768,000**
	Total for Option 4				**$41,533,800**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$71,208,700**
3	**Upland Disposal**	**$115,214,050**
5	**Offshore Disposal [1]**	**$105,819,300**
6	**Beach Disposal [1]**	**$91,975,500**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Phase 1

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$6,550,000**
1	Mobilization	1	LS	$6,550,000	$6,550,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**2,924,300**	CY		**$43,864,500**
3	Excavate to Marshplain	2,882,500	CY	$15	$43,237,500
4	New Ballona Creek	31,400	CY	$15	$471,000
5	Channels Order 5	1,500	CY	$15	$22,500
6	Channels Order 4	4,200	CY	$15	$63,000
7	Channels Order 3	4,700	CY	$15	$70,500
8	Breach	0	CY	$15	$0
	Transportation	**2,924,300**	CY		**$14,621,500**
9	Onsite trucking	2,924,300	CY	$5	$14,621,500
	New Levees	**49,240**	CY		**$492,400**
10	Levee Fill - no road	49,240	CY	$10	$492,400
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**2,889,960**	CY		**$14,449,800**
12	Stockpile	2,889,960	CY	$5	$14,449,800
	Levee Lowering and Ballona Creek Fill				**$1,828,500**
13	Levee Lowering	163,100	CY	$5	$815,500
14	Ballona Creek Fill	148,200	CY	$5	$741,000
15	Salvage Rip Rap	27,200	CY	$10	$272,000
16	Buried rock protection	0	CY	$20	$0
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$81,806,700**
	Contingency	35%			**$28,632,400**
	Total				**$110,439,100**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$2,639,000	$2,639,000
	Sediment Removal	2,889,960	CY	$3	$8,669,880
	Barge Sediment (approx. 30 NM)	2,889,960	CY	$4.50	$13,004,820
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	2,889,960	CY	$3	$8,669,880
	Subtotal				**$32,983,580**
	Contingency	35%			**$11,544,300**
	Total for Option 1				**$44,527,880**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$8,231,000	$8,231,000
	Sediment Removal	2,889,960	CY	$3	$8,669,880
	Barge Sediment (approx. 30 NM)	2,889,960	CY	$4.50	$13,004,820
	Stockpiling & Staging Material at POLA	2,889,960	CY	$1	$2,889,960
	Truck Material to Site (100 mi at $0.20/cy)	2,889,960	CY	$20	$57,799,200
	Placement, grading, compaction at Site	2,889,960	CY	$4.25	$12,282,330
	Subtotal				**$102,877,190**
	Contingency	35%			**$36,007,100**
	Total for Option 2				**$138,884,290**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal** [1]				
	Mobilization	1	LS	$7,037,000	$7,037,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	2,889,960	CY	$28	$80,918,880
	Subtotal				**$87,955,880**
	Contingency	35%			**$30,784,600**
	Total for Option 3				**$118,740,480**
6	**Beach Disposal** [1]				
	Mobilization	1	LS	$5,278,000	$5,278,000
	Sediment Removal and Beach Disposal	2,889,960	CY	$21	$60,689,160
	Subtotal				**$65,967,160**
	Contingency	35%			**$23,088,500**
	Total for Option 4				**$89,055,660**

Grand Totals with Disposal Options

Item	Description	Total Cost
1 / 2	**Disposal at POLA**	**$154,966,980**
3	**Upland Disposal**	**$249,323,390**
5	**Offshore Disposal** [1]	**$229,179,580**
6	**Beach Disposal** [1]	**$199,494,760**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Phase 2

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$2,900,000**
1	Mobilization	1	LS	$2,900,000	$2,900,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**1,192,500**	CY		**$17,887,500**
3	Excavate to Marshplain	1,165,500	CY	$15	$17,482,500
4	New Ballona Creek	15,500	CY	$15	$232,500
5	Channels Order 5	1,700	CY	$15	$25,500
6	Channels Order 4	4,600	CY	$15	$69,000
7	Channels Order 3	5,200	CY	$15	$78,000
8	Breach	0	CY	$15	$0
	Transportation	**1,192,500**	CY		**$5,962,500**
9	Onsite trucking	1,192,500	CY	$5	$5,962,500
	New Levees	**209,300**	CY		**$3,558,100**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	209,300	CY	$17	$3,558,100
	Stockpile	**923,500**	CY		**$4,617,500**
12	Stockpile	923,500	CY	$5	$4,617,500
	Levee Lowering and Ballona Creek Fill				**$1,253,500**
13	Levee Lowering	51,000	CY	$5	$255,000
14	Ballona Creek Fill	110,700	CY	$5	$553,500
15	Salvage Rip Rap	8,200	CY	$10	$82,000
16	Buried rock protection	18,150	CY	$20	$363,000
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$36,179,100**
	Contingency	35%			**$12,662,700**
	Total				**$48,841,800**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$844,000	$844,000
	Sediment Removal	923,500	CY	$3	$2,770,500
	Barge Sediment (approx. 30 NM)	923,500	CY	$4.50	$4,155,750
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	923,500	CY	$3	$2,770,500
	Subtotal				**$10,540,750**
	Contingency	35%			**$3,689,300**
	Total for Option 1				**$14,230,050**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$2,630,000	$2,630,000
	Sediment Removal	923,500	CY	$3	$2,770,500
	Barge Sediment (approx. 30 NM)	923,500	CY	$4.50	$4,155,750
	Stockpiling & Staging Material at POLA	923,500	CY	$1	$923,500
	Truck Material to Site (100 mi at $0.20/cy)	923,500	CY	$20	$18,470,000
	Placement, grading, compaction at Site	923,500	CY	$4.25	$3,924,880
	Subtotal				**$32,874,630**
	Contingency	35%			**$11,506,200**
	Total for Option 2				**$44,380,830**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$2,249,000	$2,249,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	923,500	CY	$28	$25,858,000
	Subtotal				**$28,107,000**
	Contingency	35%			**$9,837,500**
	Total for Option 3				**$37,944,500**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$1,687,000	$1,687,000
	Sediment Removal and Beach Disposal	923,500	CY	$21	$19,393,500
	Subtotal				**$21,080,500**
	Contingency	35%			**$7,378,200**
	Total for Option 4				**$28,458,700**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$63,071,850**
3	**Upland Disposal**	**$93,222,630**
5	**Offshore Disposal [1]**	**$86,786,300**
6	**Beach Disposal [1]**	**$77,300,500**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

Alternative 5 Phase 3

Item	Description	Quantity	Unit	Unit Cost	Total Cost
	Mobilization				**$2,990,000**
1	Mobilization	1	LS	$2,990,000	$2,990,000
	Demolition				**$0**
2	Demo culvert, daylight chan	0	LF	$1,000	$0
	Excavation	**1,352,000**	CY		**$20,280,000**
3	Excavate to Marshplain	1,324,700	CY	$15	$19,870,500
4	New Ballona Creek	21,800	CY	$15	$327,000
5	Channels Order 5	800	CY	$15	$12,000
6	Channels Order 4	2,200	CY	$15	$33,000
7	Channels Order 3	2,500	CY	$15	$37,500
8	Breach	0	CY	$15	$0
	Transportation	**1,352,000**	CY		**$6,760,000**
9	Onsite trucking	1,352,000	CY	$5	$6,760,000
	New Levees	**0**	CY		**$0**
10	Levee Fill - no road	0	CY	$10	$0
11	Levee Fill - with road	0	CY	$17	$0
	Stockpile	**1,344,600**	CY		**$6,723,000**
12	Stockpile	1,344,600	CY	$5	$6,723,000
	Levee Lowering and Ballona Creek Fill				**$620,200**
13	Levee Lowering	42,900	CY	$5	$214,500
14	Ballona Creek Fill	50,300	CY	$5	$251,500
15	Salvage Rip Rap	8,160	CY	$10	$81,600
16	Buried rock protection	3,630	CY	$20	$72,600
	Water Control Structures				**$0**
17	Culvert	0	SF	$2,010	$0
18	Tide Gate	0	LS	$100,000	$0
	Subtotal				**$37,373,200**
	Contingency	35%			**$13,080,700**
	Total				**$50,453,900**

Disposal Options - Cost Estimates from POLA / Weston and SCC

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1 / 2	**Unload Dredged Material at POLA / Disposal at CDF at POLA**				
	Mobilization	1	LS	$1,228,000	$1,228,000
	Sediment Removal	1,344,600	CY	$3	$4,033,800
	Barge Sediment (approx. 30 NM)	1,344,600	CY	$4.50	$6,050,700
	Unload Dredged Material (hydraulic unloader) or Disposal at CDF	1,344,600	CY	$3	$4,033,800
	Subtotal				**$15,346,300**
	Contingency	35%			**$5,371,300**
	Total for Option 1				**$20,717,600**
3	**Beneficial Use - Landfill Cover**				
	Mobilization	1	LS	$3,830,000	$3,830,000
	Sediment Removal	1,344,600	CY	$3	$4,033,800
	Barge Sediment (approx. 30 NM)	1,344,600	CY	$4.50	$6,050,700
	Stockpiling & Staging Material at POLA	1,344,600	CY	$1	$1,344,600
	Truck Material to Site (100 mi at $0.20/cy)	1,344,600	CY	$20	$26,892,000
	Placement, grading, compaction at Site	1,344,600	CY	$4.25	$5,714,550
	Subtotal				**$47,865,650**
	Contingency	35%			**$16,753,000**
	Total for Option 2				**$64,618,650**
4	**Disposal at Hazardous Waste Landfill - estimate not included, contamintant report pending**				
5	**Offshore Disposal [1]**				
	Mobilization	1	LS	$3,274,000	$3,274,000
	Sediment Removal and Offshore Disposal (approx. 3 mi offshore)	1,344,600	CY	$28	$37,648,800
	Subtotal				**$40,922,800**
	Contingency	35%			**$14,323,000**
	Total for Option 3				**$55,245,800**
6	**Beach Disposal [1]**				
	Mobilization	1	LS	$2,456,000	$2,456,000
	Sediment Removal and Beach Disposal	1,344,600	CY	$21	$28,236,600
	Subtotal				**$30,692,600**
	Contingency	35%			**$10,742,400**
	Total for Option 4				**$41,435,000**

Grand Totals with Disposal Options

1 / 2	**Disposal at POLA**	**$71,171,500**
3	**Upland Disposal**	**$115,072,550**
5	**Offshore Disposal [1]**	**$105,699,700**
6	**Beach Disposal [1]**	**$91,888,900**

Notes

1 - For Options 5 and 6, costs may range from the cost for Option 1 / 2 (lower end) up to the costs listed for Options 5 and 6 (upper end)

MEMO

Date: October 15, 2008
From: Ballona Wetlands Science Advisory Committee
To: Ballona Project Management Team

Background and Overview

The purpose of this memo is to summarize the Ballona Wetlands Science Advisory Committee (SAC) technical review of the Ballona Wetlands Restoration Feasibility Report and to make recommendations to the Project Management Team for the development of more refined alternatives prior to the CEQA/NEPA environmental review.

One of the primary purposes of the SAC is to provide advice on science-based objectives for restoration and on the evaluation of restoration alternatives. Over a series of meetings, the SAC provided substantial input on the project's ecosystem restoration goals and subgoals. The overall goal of the project is to restore, enhance, and create estuarine habitat and processes in the Ballona Ecosystem to support a natural range of habitat and functions, especially as related to estuarine dependent plants and animals.

After input from the public, environmental organizations, and agencies, five conceptual project alternatives were developed by the project's consultant team which reflects possible restoration actions. The alternatives represent a continuum that ranges from preservation and enhancement of existing upland and wetland habitats to restoration and creation of a tidally influenced wetland system, including partial realignment and restoration of the lower portions of Ballona Creek/Flood Control Channel. It is also recognized that variations of these alternatives are possible.

To assist the project team in evaluating how the five alternatives meet the project goals and sub-goals, the SAC developed more specific "measures of change". The purpose of these measures was to identify a common means of comparison, quantified when possible, for the alternatives. The Restoration Feasibility Report applied the measures of change to each of the five project alternatives to compare how each alternative would be expected to meet the project goals. The Restoration Feasibility Report was reviewed by the SAC members and extensive comments were incorporated into the final version to ensure the report was technically accurate. With the exception of the sections on public access and costing (which are beyond the scope of the SAC's review), t***he SAC endorses the analysis provided in the Restoration Feasibility Report for use in subsequent stages of alternatives development and review***.

Although the Restoration Feasibility Report includes preliminary cost estimates, alternatives were compared only in relation to the project goals and subgoals, without regard to cost. In addition, the alternatives were only evaluated for conceptual feasibility; additional work is needed to determine if there are barriers (such as easements, public health and safety, or environmental constraints) that affect the logistical, legal, or practical feasibility of a given approach. In developing more refined project alternatives for the environmental review process, the SAC recognizes that the Project Management Team will need to balance factors such as cost and practical feasibility to develop alternatives that best achieve the project goals.

The conclusions and recommendations below address only the ecosystem restoration goals of the proposed project. They focus on critical restoration choices that will affect the function of the habitat ultimately restored at the site. The purpose of these recommendations is to help the Project Management Team to develop more refined project alternatives that achieve the project's ecosystem restoration goal. Refined alternatives could include incorporating elements from several alternatives to produce a "hybrid" alternative that best achieves the project goals.

Relationship Between Alternatives and Project Goals

The Restoration Feasibility Report summarizes a number of trade-offs between different restoration approaches. Although the project area is 600 acres, making it the largest wetland restoration project in Los Angeles County, it is much smaller than its historical extent and is now surrounded by development. Consequently, restoration of one type of habitat may limit the area available for another habitat type. There are also a number of choices with regard to the hydrology of the restoration project that will affect the habitat function and its long-term sustainability.

The Science Advisory Committee agreed upon the following subgoals in support of the overall ecosystem restoration goal for the project:

1. *Habitat*: Preserve, restore, enhance, and create a variety of functional wetland and estuarine habitats representative of the Ballona Ecosystem.

2. *Biodiversity*: Preserve and increase the native biodiversity of the Ballona Ecosystem. Identify and protect multiple levels of diversity (e.g. species, habitats, biogeographic provinces and trophic structure).

3. *Physical/Chemical Processes*: Maintain and establish physical and chemical processes consistent with the restoration goals.

4. *Sustainability*: Facilitate the conservation and restoration of natural resources in a manner that maintains and improves the ecological integrity, function, diversity and productivity for future generations.

The SAC developed a number of measures of change to evaluate how the restoration would address the subgoals and objectives for the project. The SAC determined that the goals and objectives could best be met based on the following criteria.

1. Maximize area of estuarine habitat.

The SAC believes that the best way to achieve the habitat goals is to through the restoration of a functional estuarine habitat that includes shallow subtidal, mudflats, fully tidal wetlands, salt pan and transitional habitats. Tidal estuarine habitats would benefit vascular and non-vascular plants, small mammals, and a diverse community of aquatic invertebrates, fish, and many bird species known to utilize other southern California wetlands. Enhancement of muted tidal wetlands or upland habitat, such as coastal sage scrub, grassland and saline seasonal marsh, does have benefits to fish and wildlife, but not to the extent that can be achieved with full tidal restoration. The SAC recognizes that upland habitat is important for functioning estuarine habitat and may be necessary to accommodate potential sea level rise in the future, and has given consideration to including such areas within the alternatives.

Alternatives 3, 4 and 5 create the largest areas of tidal estuarine habitat while Alternatives 1 and 2 have larger areas of upland and artificially muted tidal habitat (controlled by tide gates). Alternatives 4 and 5 create large areas of shallow subtidal habitat adjacent to mudflat. This would provide spawning and nursery habitat for pelagic and demersal fish species; these may disperse to the adjacent nearshore habitat and to other regional wetlands

2. Restore large, contiguous and diverse estuarine wetlands with subtidal habitat adjacent to mudflat and wide transitional habitat areas. Refined alternatives should include preservation and enhancement of some upland and freshwater wetland habitat but should emphasize contiguous estuarine wetland habitat. Opportunities to create regionally significant habitat including vernal pools and native grasslands should be pursued, but not at the expense of the restoration of estuarine habitat.

Alternatives with larger, contiguous, areas of diverse estuarine wetland habitat are more likely to sustain populations of associated species. Alternatives with fewer roads, wider transitions and more channels would have a higher quality of wetland habitat because they would be more remote from noise, lights, cars, and other human impacts. Alternatives with larger areas of contiguous wetland would also have fewer impacts from, and require less active management for, invasive plant and animal species.

Generally, the alternatives that restore more estuarine habitat have less area available for adjacent upland habitats or other regionally significant habitats. While upland habitats provide support to functioning estuarine habitat, there are opportunities for restoration of coastal sage scrub and bluff habitats in nearby offsite areas. Nevertheless, inclusion of some native upland habitat within the restoration project would be desirable.

Alternatives 3, 4 and 5 allow for the greatest range of elevation gradients and variation in topography. As such, these alternatives would allow for restoration of shallow subtidal habitat, intertidal channel, mudflats, low to high marsh, salt pans and transition zones. Alternative 4 would provide for the most extensive subtidal habitat and associated adjacent mudflats. The gradients associated with these habitats would be particularly beneficial for numerous fish and bird species.

3. Restore fully tidal wetlands by removing or breaching levees to the extent possible.

The form of the tidal connection would affect the connectivity and function of habitat by influencing the movement of sediment, seeds, gases, nutrients, fish and fish larvae. Muted tidal systems, as in Alternatives 1 and 2, will have a reduced tidal range and therefore a compressed vertical range of habitats, limiting the area of transitional habitat that can be created. Fully tidal systems allow for greater tidal circulation and reduced residence time which will lead to a more rapid exchange of water with the ocean, and positive effects on exchange of gases, nutrients, fish larvae, sedimentation and improved water quality.

Tide gates do allow for control of water surface elevations within the wetlands but would limit connectivity with Ballona Creek and Marina del Rey, likely reducing wetland species diversity. Gates can also control pollutant loading, especially during storm events, although the muted tidal systems would have a longer residence time allowing greater settling of pollutants in the wetland.

Levee breaches proposed as part of Alternatives 3 and 4 allow for full tidal range, movement of larger fish and greater seed dispersal. Open breaches would allow greater tidal circulation, reduced residence times and would be able to adapt to rising sea levels. Levee removal in Alternative 5 has the advantages of breaches and increases the interaction between the wetlands and the Creek - creating gradients of inundation and salinity across the site, letting the morphology evolve and allowing for periodic disturbance by flooding and scouring. However, this alternative would require reliance on upstream flood control and pollutant removal, and could necessitate periodic removal of accumulated pollutants from some portions of the restored wetlands. Furthermore, it is unknown how the flow and sediment yield from the upper watershed would affect the sustainability of the marsh in terms of scour or sediment deposition.

4. Maximize hydrologic connections within the subareas and minimize potential water quality effects associated with influent

The higher quality sources of tidal water are the ocean and portions of Marina del Rey. The ability to bring this water into the wetlands would depend on the location of the tidal connection and the tidal excursion length. Alternatives 2, 3 and 4 improve tidal connections between Area A and higher quality water in portions of Marina del Rey; this would also benefit habitat connectivity for fish species. All alternatives have some connection to Ballona Creek, which, at present, has poorer water quality. Longer excursion lengths increase the mixing of water on each tidal cycle, improving water quality. Alternatives 3, 4 and 5, with the largest tidal prism, have excursion lengths extending to the ocean. The large intertidal areas of Alternative 2, 3 and 5 would have the shortest residence times, completely draining on most tidal cycles. As stated above, Alternative 5 would rely on upstream pollutant control measures to ensure water and sediment quality within the restored wetland.

5. Adaptive management measures should be incorporated into any restoration alternative

Alternative 1 has little change from the present situation and the risk associated with failed implementation is low. The restoration of wetlands in Alternative 2, 3 and 4 could be undertaken in distinct hydrologic areas which would allow for adaptive management and experimentation. Alternative 5 restores a large, contiguous area of habitat connecting a number of existing hydrologic units with Ballona Creek. This alternative makes the greatest change to the site, would be the hardest to reverse and consequently has the most risk. This risk may be mitigated to an extent by incorporating an adaptive management approach through phased implementation.

Open breaches would allow greater tidal circulation, reduced residence times and would be able to adapt to changing sea levels. Gates would require regular maintenance and management as failure could impact habitat and cause flooding. Fixed structures, such as gates and culverts, will need to accommodate both scour and sea level rise in their design.

SAC Recommendations

The SAC evaluated the ability of each alternative to achieve the ecosystem restoration goals of the project. This evaluation was based primarily on the expected physical and biological processes and habitat enhancement that would occur as a result of each restoration concept. SAC evaluation was not based on other project considerations of cost, logistics, or feasibility. These are critical issues for project design and implementation and will be evaluated by the Project Management Team during later phases of the project. Relative rankings of alternatives based on the analysis in the feasibility report, and summarized above are provided in Table 1.

The SAC recommends that Alternatives 4 and 5 be carried forward to the next phase of the analysis. Alternative 5 would result in the greatest amount of contiguous wetland habitat and would have the least artificial structures or impediments. However, there are several unresolved issues associated with Alternative 5 that could affect its ability to provide sustainable, functioning wetland habitat. These issues would need to be addressed should it become a preferred alternative:

- Effect of erosive shear stress associated with high velocity storm flows on sustainability of the marsh plain
- Ability to manage potential adverse effects of pollutant input to the wetlands until such time as upstream management measures reduce watershed contaminant loading
- Ability to include additional upland habitat for both intrinsic value and as a buffer to the restored wetlands. For example, the Project Management Team could consider restoring Area C as primarily upland or transitional habitat.
- Lack of control structures to aid in accommodating sea level rise Refined analysis of potential flood elevations and associated implications for integrity of the restored wetland. This analysis

should include consideration of the need for new/additional flood protection measures if the Ballona Flood Channel levees are removed

- Ability to implement Alternative 5 in phases so that impacts to existing species and habitats can be minimized as restoration proceeds

- Although it would have lower internal connectivity and would retain more artificial structures, Alternative 4 would provide many of the same wetland functions as Alternative 5. Internal circulation and flushing would be lower than in Alternative 5, but Alternative 4 would provide more contiguous subtidal habitat and associated mudflats and transition zones. While Alternative 4 would reduce beneficial effects of flood inundation (e.g. temporary salinity reduction, nutrient influx), it would be less susceptible to the adverse effects of flooding, such as contaminant input. If Alternative 4 is carried forward as a preferred alternative, the subtidal area in Area A should be designed to be shallow enough to allow substantial turn over during a relatively few tidal cycles and should be reoriented to allow two tidal connections and gentle transition slopes.

The SAC also recommends that the following additional analyses be completed for both Alternatives 4 and 5:

- Potential effects of scour, sediment input, and deposition
- Potential effects of pollutant inputs (including trash and debris) and any necessary management measures
- Potential effects of sea level rise on long-term sustainability and/or adaptability of restored wetlands
- Potential ability of the restored wetland to support target species (to be defined in coordination with the SAC) as an additional measure of change in the final feasibility study. Each alternative should be evaluated for both the species that it would or would not be likely to support.
- Projected salinity and temperature regimes of Alternatives 4 and 5 to determine if defining estuarine transitions in these elements will be present (as opposed to primarily marine conditions). This analysis should also include the effect of potential salinity reduction and productivity-inducing effects of freshwater influxes.

Finally, whichever alternative is selected, it should be implemented in phases to allow mid-course corrections and re-evaluation of progress toward achieving project goals.

Table 1: Summary of Rankings of Alternatives Relative to Goals and Measures of Change

Subgoal	Measures of Change	Alt. Rankings Lowest	Alt. Rankings Highest	Rationale
Habitat				
	area of tidal habitat	1	3, 4 & 5	Alternatives 3, 4, and 5 would each provide most of the site with unrestricted tidal access
	quality of estuarine habitat	1	4 & 5	Alternatives 4 and 5 would provide for the greatest amount of estuarine habitat with complex edge habitat, diversity of habitat types, and transitions between areas with varying tidal regimes
	habitat connectivity	1	5	Only Alternative 5 would provide for full internal site connectivity
	lack of impact to existing habitats	5	1 & 2	Alternative 5 would results in severe impacts to existing habitats
Biodiversity				
	number of wetland/aquatic plant and animal functional groups	1	4	Alternative 1 would likely result in the highest upland species diversity; however, Alternative 4 would likely have the highest wetland species diversity, partially due to the opportunity for mudflats that are contiguous to transitional habitats
	capacity to support sustainable populations of wetland dependent species	1	4 or 5	Alternatives 4 and 5 each have advantages in terms of sustainability. Alternative 5 has fewer artificial features, so maintenance may involve removal of sediment or trash or restoring scoured marsh vs. repair of structures. Additional analysis is necessary to determine the likely ability of each alternative to support target species.
Phys/Chem Processes				
	tidal circulation	1	5	Alternatives 3, 4, and 5 would all provide for full tidal access; however, circulation and mixing in Alternative 5 would be most like a "natural" system
	quality and reliability of source water	1	4 or 5	Circulation and flushing patterns in Alternatives 4 and 5 are both high; however, Alternative 4 provides greater ability to control pollutant inputs from the upstream watershed

stormwater and freshwater inputs	1	5	Only Alternative 5 would allow for stormwater and freshwater inputs that simulate "natural" conditions and are least restricted by infrastructure
biogeochemical cycling	1	4 & 5	Alternatives 4 and 5 would both provide a variety of habitats of various moisture regimes. The somewhat natural flow and circulation in Alternative 5 may favor some processes, while the longer residence time in Alternative 4 may favor others
sediment supply and quality	1 & 2	3 & 4	Alternatives 3 and 4 would provide for wetlands that are less susceptible to scour and deposition patterns from the upper watershed than Alternative 5
flood management	5	1	Alternative 1 would involve the lowest risk to infrastructure

Sustainability

sensitivity to sea level rise	3 & 4	1 & 2 (short term) 5 (long term)	Alternatives that maintain existing infrastructure would be most stable to a changing climate until the point were increased sea level overwhelms infrastructure. The unrestricted features of Alternative 5 could allow for more natural migration patterns than Alternatives 3 or 4 over the long term
resilience to episodic events	5	1	Alternative 5 would be susceptible to scour, pollutant spills, etc. that accompany floods, due to the unrestricted access to Ballona Creek
risk of terrestrial invasion	1	5	Restoration of wetland processes would create conditions more conducive to native vegetation outcompeting invasive species. Full tidal flushing would likely prevent persistence of any non-halophytic plants that might occasional invade. However, all alternatives would require ongoing control of invasive species.
risk of aquatic invasion	4 & 5	1	Alternatives that result in more subtidal area would be more susceptible to aquatic invasion (e.g., Japanese yellowfin goby, Asian date mussel).
intensity of maintenance needs	1	5	Alternative 5 would have the least infrastructure that would require maintenance, but could require substantial maintenance if impacted by a large watershed event (e.g. flood, scour). Alternative 5 design

		and management features should allow for natural processes to compensate for periodic disturbance to the maximum extent possible.

<u>Defend Ballona Wetlands et al. v. California Department of Fish and Wildlife,</u>
21STCP00240

Decision on petition for writ of mandate: granted in part

Petitioners Defend Ballona Wetlands, Robert Jan Van De Hoek, and Molly Basler (collectively, "Defend") seek a writ of mandate compelling Respondent California Department of Fish and Wildlife ("CDFW") to set aside its certification of the Environmental Impact Report ("EIR") for the Ballona Wetlands Restoration Project ("Project").

The court has read and considered the joint moving papers and appendix, opposition, and replies, heard oral argument at the May 9, 2023 trial, and renders the following decision.

A. <u>Statement of the Case</u>

1. <u>Petition</u>

Petitioner Defend, an unincorporated association, commenced this proceeding on January 28, 2021, alleging a cause of action for mandamus pursuant to the California Environmental Quality Act ("CEQA"). The verified Petition alleges in pertinent part as follows.

CDFW owns the land rights to most of the Ballona Wetlands Ecological Reserve ("Reserve"), the California State Lands Commission owns 60 acres, and the Southern California Gas Company ("SoCalGas") owns or leases the mineral rights for the Reserve. The US Army Corps of Engineers ("Corps") and Los Angeles County Public Works/Flood Control District ("Public Works") manage the Ballona Creek that runs through the Reserve.

The California State Coastal Conservancy's executive director, who has a documented history of investing in the fossil fuel industry, financed front groups like the Santa Monica Bay Restoration Foundation (the "Bay Foundation") to plan the bulldozing Project that CDFW inaccurately touts as a "restoration." The Bay Foundation receives funding from SoCalGas and also had a SoCalGas executive on its board until recently. Other groups supporting the Project have also received funding from SoCalGas. Proponents of the Project falsely describe the Reserve as terribly degraded and needing intervention or the wetlands will die. The Reserve actually is thriving with wildlife, including seven endangered species and dozens of species of concern.

A total of $6.25 million dollars from the Prop 12 bond was allocated by the Coastal Conservancy for hydrological analysis and scenic trail design in the 600-acre Reserve. The State Coastal Conservancy has misused funds by flying staff to and from Oakland to stay at hotels in Playa del Rey and dining with Bay Foundation staff to discuss plans to destroy the Reserve.

At the same time as the scoping began for the Project's draft EIR ("DEIR"), the federal government undertook an environmental review process under the National Environmental Policy Act ("NEPA"), with the Corps as the federal lead agency. In September 2017, the Corps issued its draft NEPA environmental impact statement ("EIS") and CDFW issued its draft EIR ("DEIR"). CDFW circulated the DEIR from September 25, 2017 to February 5, 2018. On December 30, 2020, CDFW certified the final EIR ("FEIR"). The Corps does not expect to file the final EIS until 2.5 years after the EIR's certification.

The FEIR's project description is incomplete and misleading in describing it as a restoration. CDFW spent $15,000,000 of Proposition 12 bond funds on planning and engineering the Project, which cannot be called a restoration and rather is a destruction and creation of something different than that which has been in place for 3000 years. Prop 12 bond language required the Project to protect, acquire or restore these wetlands, but the Project instead destroys the habitat. Multiple groups noted that the Project seeks to remove currently existing wetlands and other habitats and replace them with a type of wetland never seen on the Reserve. In doing so, the Project would raze 640 acres of natural beauty and leave many animals without habitat.

The FEIR fails to evaluate the Project's significant impacts on grasslands and other upland habitats, as well as freshwater and brackish wetlands, the estuary in Ballona Creek, endangered species, and public access. The FEIR fails to adequately respond to comments and failed to adopt a statement of overriding considerations.

There is no substantial evidence that the plan as the "Environmentally Superior Alternative." CDFW denied that the Corps told it that the Project needed additional flood protection measures even though the Corps said it did.

The DEIR asserts that CDFW did not know about the illegal drains in the wetlands until 2013, but then asserts that the Coastal Commission should ignore the drains. The Coastal Commission did not agree that the drains were insignificant and ordered them sealed so that rainwater would not drain from the wetlands. CDFW then capped the drains but used the conditions with uncapped drains in the FEIR for baseline purposes. The capped drains were significant new information meriting FEIR recirculation.

The Project calls for increased public access. The FEIR provides no evidence why bicyclists should forego direct commuting paths for time-consuming detours on meandering routes.

The FEIR does not respond adequately to public comments that the Project would not provide a beneficial impact to carbon sequestration.

CDFW inadequately responded to comments about a longitudinal sandbar in the Reserve formed in the 1930s which is a habitat for several infauna and epifauna, including some fish essential to feeding the local bird species. Petitioners raised questions about the impact on this sandbar and CDFW's response indicated that it does not even know the habitat exists.

In response to comments about specific species, CDFW mischaracterized the Palmer's Goldenbush as a common species to justify not pursuing protection of its habitat. Its analysis also ignores four endangered species and several special status species like the peregrine falcon.

CDFW's duty is to protect rare species. Despite this, CDFW did not consult with botanist specialists or Petitioner Van Hoek -- who discovered the presence of the Palmers Goldenbush -- before issuing the FEIR. CDFW also chose not to recirculate the FEIR when the endangered Least Bell's Vireo was discovered to be nesting and breeding on either side of Ballona Creek. CDFW also ignored U.S. Fish and Wildlife Service ("USFWS") comments about the effect on the federally endangered California Least Tern which breeds on the Reserve.

USFWS also asked whether there will be appropriate habitat conditions within the site to support the species. CDFW only responded by referring to the DEIR's section on Monitoring and Adaptive Management. The response did not answer USFWS' question, which focused on assurance that appropriate habitat conditions are part of the Project plan, and they clearly are not.

CDFW admits that the wrong flood risk standards were used for modeling the Project but relies on them anyway. CDFW argued with the Corps for at least two years about the need for greater flood risk standards. The Coastal Conservancy even hired a lobbyist to persuade then U.S. Senator Kamala Harris to obtain Congress' approval for the old, less protective, standards.

Petitioners seek a writ of mandate compelling CDFW to (1) set aside certification of the Project's FEIR, (2) not develop or alter the site until it brings the Project into compliance with CEQA, and (3) prepare, circulate, and consider a legally adequate EIR. Petitioners also seek attorney's fees and costs.

2. Course of Proceedings

There is no proof of service on file. CDFW has generally appeared in this case.

On March 8, 2021, Department 54 (Hon. Maurice A. Leiter) related this case to: Protect Ballona Wetlands v. California Department of Fish and Wildlife, ("Protect") 21STCP00237; Ballona Wetlands Land Trust v. CDFW, ("Land Trust") 21STCP00242 and Grassroots Coalition et. al v. CDFW ("Grassroots") 21STCV03657 (collectively, "Ballona Cases").

On March 29, 2021, after a peremptory challenge in Land Trust, Department 1 reassigned the Ballona Cases to Department 93 (Hon. Joel L. Lofton).

On April 6, 2021, after a peremptory challenge in Grassroots, Department 1 reassigned the Ballona Cases to Department 15 (Hon. Richard L. Fruin).

On April 22, 2021, after a peremptory challenge in Protect, Department 1 reassigned the Ballona Cases to Department 20 (Hon. Kevin C. Brazile).

On May 3, 2021, after a peremptory challenge in Defend, Department 1 reassigned the Ballona Cases to this court (Dept. 85).

On July 15, 2021, the court consolidated the Ballona Cases for purpose of trial only.

On August 10, 2021, the court related Grassroots Coalition et. al v. California State Coastal Conservancy ("Grassroots v. Conservancy"), 21STCP02237 to the Ballona Cases.

On August 2, 2022, the parties stipulated to try Grassroots v. Conservancy separately from the Ballona Cases.

On September 28, 2022, CDFW filed Answers to each of the Ballona Cases.

On March 14, 2023, the court granted an *ex parte* application allowing Petitioners Protect and Land Trust and to file a joint reply brief separately from Petitioners Defend and Grassroots, which would file their own joint reply brief.

B. CEQA

The purpose of CEQA, (Public Resources ("Pub. Res.") Code §21000 *et seq.*), is to maintain a quality environment for the people of California both now and in the future. Pub. Res. Code § 21000(a). The Legislature chose to accomplish its environmental goals through public environmental review processes designed to assist agencies in identifying and disclosing both environmental effects and feasible alternatives and mitigations. Pub. Res. Code §21002. Public agencies must regulate both public and private projects so that "major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian." Pub. Res. Code §21000(g).

"[T]he overriding purpose of CEQA is to ensure that agencies regulating activities that may affect the quality of the environment give primary consideration to preventing environmental damage." Save Our Peninsula Committee v. Monterey County Board of Supervisors, (2001) 87 Cal.App.4th 99, 117. CEQA must be interpreted "so as to afford the fullest, broadest protection to the environment within reasonable scope of the statutory language." Friends of Mammoth v. Board of Supervisors, (1972) 8 Cal.3d 247, 259.

The EIR is the "heart" of CEQA, providing agencies with in-depth review of projects with potentially significant environmental effects. Laurel Heights Improvement Assn. v. Regents o of University of California, ("Laurel Heights II") (1993) 6 Cal.4th 1112, 1123. An EIR describes the project and its environmental setting, identifies the potential environmental impacts of the project, and identifies and analyzes mitigation measures and alternatives that may reduce significant environmental impacts. Id. Using the EIR's objective analysis, agencies "shall mitigate or avoid the significant effects on the environment... whenever it is feasible to do so. Pub. Res. Code §21002.1. The EIR serves to "demonstrate to an apprehensive citizenry that the agency has in fact analyzed and considered the ecological implications of its actions." No Oil, Inc. v. City of Los Angeles, (1974) 13 Cal.3d 68, 86. It is not required to be perfect, merely that it be a good faith effort at full disclosure. Kings County Farm Bureau v. City of Hanford, ("Kings County") (1990) 221 Cal.App.3d 692, 711-12. A reviewing court passes only on the EIR's sufficiency as an informational document and not the correctness of its environmental conclusions. Laurel Heights Improvement Assn. v. Regents of University of California, ("Laurel Heights I") (1988) 47 Cal.3d 376, 392.

All EIRs must cover the same general content. Guidelines[1] §§ 15120-32. An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. The environmental effects need not be exhaustively reviewed and the EIR's sufficiency is viewed in the light of what is reasonably feasible. Guidelines §15151. The level of specificity of an EIR is determined by the nature of the project and the "rule of reason." Al Larson Boat Shop, Inc. v. Board of Harbor Commissioners, (1993) 18 Cal.App.4th 729, 741-42. The degree of specificity "will correspond to the degree of specificity involved in the underlying activity which is described in the EIR." Guidelines §15146. The agency's decision whether to approve a project is a nullity if based upon an EIR that does not provide decision-makers, and the public, with the information about the project required by CEQA. Santiago County Water District v. County of Orange, (1981) 118 Cal.App.3d 818, 829.

C. Standard of Review

A party may seek to set aside an agency decision for failure to comply with CEQA by petitioning for either a writ of administrative mandamus (CCP §1094.5) or of traditional mandamus. CCP §1085. A petition for administrative mandamus is appropriate when the party seeks review of a "determination, finding, or decision of a public agency, made as a result of a proceeding in which by law a hearing is required to be given, evidence is required to be taken and discretion in the determination of facts is vested in a public agency, on the grounds of noncompliance with [CEQA]." Public Res. Code §21168. This is generally referred to as an "adjudicatory" or "quasi-judicial" decision. Western States Petroleum Assn. v. Superior Court, ("Western States") (1995) 9 Cal.4th 559, 566-67. A petition for traditional mandamus is appropriate in all other actions "to attack, review, set aside, void or annul a determination, finding, or decision of a public agency on the grounds of noncompliance with [CEQA]." Where an agency is exercising a quasi-legislative function, it is properly viewed as a petition for traditional mandamus. Id. at 567; Pub. Res. Code §21168.5.

At issue is Petitioners' CEQA challenge to CDFW's action to approve the Project and certify the FEIR. This procedural setting, in which CDFW acted in a quasi-legislative capacity in approving the Project, is governed by traditional mandamus. In determining whether to grant a petition for either traditional or administrative mandamus in a CEQA case, the court decides

[1]As an aid to carrying out the statute, the State Resources Agency has issued regulations called "Guidelines for the California Environmental Quality Act" ("Guidelines"), contained in Code of Regulations, Title 14, Division 6, Chapter 3, beginning at section 15000.

whether there was a prejudicial abuse of discretion. Public entities abuse their discretion if their actions or decisions do not substantially comply with the requirements of CEQA. Sierra Club v. West Side Irrigation District, (2005) 128 Cal.App.4th 690, 698. Abuse of discretion is established if the agency has not proceeded in a manner required by law or if the determination or decision is not supported by substantial evidence. Western States, *supra*, 9 Cal.4th at 568; Pub. Res. Code §21168.5.

The court must adjust its scrutiny to the nature of the alleged defect, depending on whether the claim is predominantly one of improper procedure or a dispute over the facts. Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova, ("Vineyard") (2007) 40 Cal.4th 412, 435. Challenges to an agency's failure to proceed in the manner required by CEQA, such as an EIR's failure to address a required subject or to disclose information about a project's environmental effects, are subject to a less deferential standard than challenges to an agency's substantive factual conclusions. Id. at 435. In reviewing these claims, the court must "determine *de novo* whether the agency has employed the correct procedures and "scrupulously enforced all legislatively mandated CEQA requirements." Id; Sierra Club v. County of Fresno, ("Friant Ranch") (2018) 6 Cal.5th 502, 512. Whether an issue is procedural or factual "is not always clear". Id. at 513. Clear-cut procedural issues—such as whether the agency provided sufficient notice and opportunity to comment and whether the agency omitted the required discussion of alternatives—are reviewed *de novo*. Id. at 512.

Greater deference is accorded to factual findings under the substantial evidence standard of review. Id. At 512. "Substantial evidence" is defined as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached. Guidelines §15384(a). A court "'may not set aside an agency's approval of an EIR on the ground that an opposite conclusion would have been equally or more reasonable,' for, on factual questions, our task 'is not to weigh conflicting evidence and determine who has the better argument."' Sierra Club, *supra*, 6 Cal.5th at 512 (citing Laurel I, *supra*, 47 Cal.3d at 393). When reviewing factual determinations—such as the decision to use a particular methodology—substantial evidence review is appropriate. Id. at 514.

Whether substantial evidence exists is a question of law. *See* California School Employees Association v. Department of Motor Vehicles, (1988) 203 Cal.App.3d 634, 644. Argument, speculation, and unsubstantiated opinion or narrative will not suffice. Guidelines, 15384(a), (b). An EIR may not be overturned simply because the record reveals a disagreement among experts. Cadiz Land Co. v. Rail Cycle, (2000) 83 Cal.App.4th 74, 97. A petitioner must describe the evidence favorable to the agency and show why it is lacking. Mani Brothers Real Estate Group v. City of Los Angeles, (2007) 153 Cal.App.4th 1385, 1402. The failure to do so is fatal. Defend the Bay v. City of Irvine, (2004) 119 Cal.App.4th 1261, 1266. If the record contains any substantial evidence supporting the agency's decision, the decision must be upheld. Banning Ranch Conservancy v. City of Newport Beach, ("Banning Ranch") (2012) 211 Cal.App.4th 1209, 1230.

Deference to an agency's factual determinations is even more appropriate where the agency has been delegated regulatory authority in a particular field. CDFW is the state agency the missioni of which is to "manage California's diverse, fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment of the public." Fish & Game Code §712.1(a). CDFW also is the state's trustee for fish and wildlife resources. Fish & Game Code §711.7(a). Under CEQA, state lead agencies are required to consult with CDFW before preparing environmental impact reports that evaluate impacts on these resources.

Pub. Res. Code §21104(a). CDFW has been recognized as possessing special expertise for matters concerning fish and wildlife conservation. Fish & Game Code §1802 (requiring CDFW to provide its biological expertise to lead and responsible agencies in their reviews of environmental impacts under CEQA); *see also* Environmental Council of Sacramento v. City of Sacramento, (2006) 142 Cal.App.4th 1018, 1042 ("The agencies entrusted with the statutory obligation of balancing the needs of human populations with those of endangered plants and animals are guided by the expertise of their scientific staffs"). For this reason, the courts defer to CDFW's fact findings, even when presented with conflicting opinions from other experts. *See* ibid. ("We will not arbitrate between scientists and we will not intrude on the public agencies' duties to make policy and protect the species"). *See* Opp. at 11.

The court also may have to determine "whether an EIR's discussion of environmental impacts is adequate, that is, whether the discussion sufficiently performs the function of facilitating 'informed agency decisionmaking and informed public participation.'" Sierra Club, *supra*, 6 Cal.5th at 513 (citation omitted). "[T]he adequacy of an EIR's discussion of environmental impacts is an issue distinct from the extent to which an agency is correct in its determination whether the impacts are significant." Id. at 514. Where the issue is the adequacy of an EIR's discussion of a potentially significant impact, "[t]he ultimate inquiry . . . is whether the EIR includes enough detail 'to enable those who did not participate in its preparation to understand and consider meaningfully the issues raised by the proposed project.'" Id. at 516 (citation omitted).

The inquiry on the adequacy of an EIR's discussion is generally a mixed question of law and fact. The court must engage in *de novo* review to determine "whether the EIR serves its purpose as an informational document." Id. at 516. This is an issue of law, and no deference is given to the agency's determination. Washoe Meadows Community v. Department of Parks and Recreation, ("Washoe") (2017) 17 Cal.App.5th 277, 286. However, "to the extent factual questions (such as the agency's decision which methodologies to employ for analyzing an environmental effect) predominate, a substantial evidence standard of review will apply." South of Market Community Action Network v. City and County of San Francisco, ("SoMa") (2019) 33 Cal.App.5th 321, 332. "[I]n reviewing an EIR's discussion, [courts] do not require technical perfection or scientific certainty." Sierra Club, *supra*, 6 Cal.5th at 515. The "overriding issue on review is thus whether the lead agency reasonably and in good faith discussed a project in detail sufficient to enable the public to discern from the EIR the analytic route the . . . agency traveled from evidence to action." SoMa, *supra*, 33 Cal.App.5th at 331 (citation omitted).

D. Statement of Facts[2]

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[2] Petitioner Defend requests judicial notice of the Corps' Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures, published April 30, 2014 ("Corps Guidelines"). RJN Ex. A. Petitioners note that two superseded versions of the Corps Guidelines are in the record (AR 73597-618, 87015) and that CDFW agreed to allow the inclusion of documents that should have been in the record. CDFW responds only that RJN Ex. A does not prove that it failed to analyze potential impacts on flood control levee vegetation and has no objection to judicial notice of RJN Ex A. The request is granted. Evid. Code §452(c).

Petitioner Defend also requests judicial notice of the following facts: (1) the Project's Operations and Maintenance Plan ("Operations Plan") states that the levees will be maintained by applying the Corps Guidelines (AR 5438; RJN No. 2); (2) the Corps Guidelines state that

1. The Reserve

The Reserve is approximately 600 acres of open space located in the middle of the County's coast, approximately five miles north of the Los Angeles International Airport and close to Loyola Marymount University, bordered by the communities of Westchester, Marina del Rey, and Playa Vista. AR 103951.

CDFW manages and primarily owns the Reserve, with a smaller interest owned by the California State Lands Commission. AR 208. The County's Department of Public Works-Flood Control District ("Public Works" or "LACFCD") owns and operates the Ballona Creek channel and levee system, which are features of a federally authorized Los Angeles County Drainage Area ("LACDA"). AR 208.

The Corps is the federal agency with jurisdiction over the Ballona Creek channel and levee system within the Project site. AR 8300. As a result, authorization from the Corps under Section 404 of the Clean Water Act and Sections 10 and 15 of the Rivers and Harbor Act would be necessary to carry out the Project. AR 8300. Corps approval also would be required to modify the Operations Plan to reflect Project changes to existing LACDA infrastructure on the Project site. AR 8300. The Corps is the lead agency under NEPA for any such project. AR 8300.

The Reserve is a heavily impacted remnant of a much larger wetland complex that stretched from Venice to Baldwin Hills. AR 103951. The Ballona Wetlands once spanned more than 2,100 acres and supported a tremendous diversity of both freshwater and brackish wetlands. AR 275, 3246. A scoping report found that, after the Los Angeles River shifted to the south in 1825 with a resulting reduction of flow into the area, the Ballona Wetlands evolved into an expansive marshy system consisting mostly of brackish to salt marsh, which supported abundant wildlife. AR 3247. The scoping report found no evidence that the Ballona Lagoon remained perennially open to the Pacific Ocean. AR 3248. Rather, textual sources indicate that access to the ocean depended on hydraulic forces during any given year. AR 3248. In historical records, brackish, freshwater, and salt marsh predominated over perennially open tidal wetlands. AR 3249. Approximately half of the Ballona Lagoon consisted of freshwater and tidally affected saltmarsh and brackish habitats that transitioned to a more alkaline/freshwater system about 1.5 miles inland. AR 3248. As a result, the term "tidal" is too limiting for the Reserve because the tidal influence has been low or moderate and the predominant influence has been freshwater inputs from the watershed. AR 3247.

Ballona Creek runs through the center of the Reserve. AR 273. In the 1930s, the Corps built a concrete-sided flood risk management channel that confined the portion of Ballona Creek that flowed through the wetlands. AR 273. During Marina del Rey's construction in the 1950s,

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vegetation must be controlled to limit those habitat characteristics that encourage the creation of animal burrows. (RJN No. 3); (3) the Corps Guidelines state that an operations and maintenance manual for levees must include an annual maintenance program to control animal burrows and vegetative growth (RJN No. 4); (4) the Corps Guidelines require repair of animal burrows (RJN No. 5); (5) this language is the same as in the Corps Guidelines in the administrative record (AR73609, 73617, 73618; RJN No. 6); (6) while a local sponsor may request a variance from the standard vegetation guidelines, such request process must follow specific procedures and meet certain requirements (Corps. Guidelines; RJN No. 7); and (7) based on the above facts, animal burrows are not allowed on levees unless a variance is requested and granted (RJN No. 8). The requested facts are merely Petitioners' interpretation of the Corps Guidelines and Operations Plan and are not subject to judicial notice. Requests Nos. 2-8 are denied.

2.8 to 3.5 million cubic yards of dirt was dumped on top of the Ballona Wetlands. AR 208, 210. This transformed the wetlands into an upland, degraded wetlands. AR 210.

The Reserve now consists of three areas. AR 273. Area A is approximately 156 acres in the northwestern portion of the Reserve north of Ballona Creek, west of Lincoln Boulevard, and south and east of Fiji Way. AR 273. Area A is undeveloped except for parking areas along the western boundary, a SoCalGas access road on the western end, and a drainage channel along the northern boundary. AR 273. Area B is approximately 335 acres in the southern portion of the Reserve, south of Ballona Channel and west of Lincoln Boulevard. AR 274. Area B is crossed by Culver Boulevard and Jefferson Boulevard. AR 274.

The state owns 60 acres in the southeast portion of Area B, as well as a freshwater marsh which is a treatment wetland and mitigation project that was part of the Playa Vista development and is not part of the Reserve. AR 274, 8327. Storm drainage in Playa Vista currently flows into the freshwater marsh and out to Ballona Creek through a culvert with a drainage flap. AR 392. The flap gate closes during periods of high flow in Ballona Creek, and stormwater drainage then collects in the freshwater marsh. AR 392. Storm flow greater than a one-year storm event overflows from the freshwater marsh into southeast Area B to prevent storm drainage from backing up into Playa Vista. AR 392.

Area C is approximately 69 acres located in the northeastern portion of the Reserve, north of Ballona Channel and east of Lincoln Boulevard. AR 274. It is bisected by Culver Boulevard. AR 274.

2. <u>The Corps Guidelines</u>

Per the Corps Guidelines' chapter on the treatment of levees and floodwalls, vegetation must be controlled to limit those habitat characteristics that encourage the creation of animal burrows. RJN Ex. A, p. 3-1.

Any project's operations and maintenance manual must include an annual maintenance program to control animal burrows and vegetative growth. RJN Ex. A p. 5-1. The repair of animal burrows is a separate requirement. RJN Ex. A p. 5-2 (citing a Federal Emergency Management Agency publication for more details).

In certain instances, to further enhance environmental values or to meet state or federal laws and/or regulations, the local sponsor may request a variance from the standard vegetation guidelines set forth in this ETL. RJN Ex. A, p. 1-1; AR 73603. The variance must be necessary and the only feasible means to preserve, protect, and enhance natural resources or to protect the rights of Native Americans. RJN Ex. A, p. 1-1. Any variance for flood damage reduction systems must retain (1) safety, structural integrity, and functionality, and (2) accessibility for maintenance, inspection, monitoring, and flood-fighting. RJN Ex. A, p. 1-1. The term "retain" assumes a pre-variance condition that is fully consistent with the requirements set forth in the Corps Guidelines and any other applicable criteria. RJN Ex. A p. 1-1.

3. <u>The Project</u>

The Project's purpose is to restore and reconnect Ballona Creek with its historical floodplain, include adaptation for sea-level rise, restore upland and non-tidal wetlands, construct public access improvements, establish new flood risk and stormwater management infrastructure, and provide for long-term maintenance activities. AR 1.

The Project includes restoration components of (1) an overall net increase of approximately 201 acres of wetlands, (2) removal and replacement of existing levees with transitional zones to accommodate sea-level rise and introduce a meandering shape, (3) restoring, enhancing, and establishing estuarine aquatic and associated uplands, (4) improving tidal circulation into the Reserve to support estuarine and associated habitats, (5) modifying existing infrastructure to implement restoration activities, including abandonment or relocation of SoCalGas wells and pipelines, and (6) implementing long-term post-restoration activities such as inspections, repairs, vegetation management, and related activities. AR 1.

Public access improvements include the removal and realignment of bicycle trails, installation of new pedestrian-only trails and boardwalks, construction of two bicycle and pedestrian bridges, construction of a bicycle trail connection under Lincoln Boulevard, and improvements to two parking lots. AR 1.

The Project FAQs sheet asserts that the Reserve is highly degraded after approximately three million cubic yards of marine sediment was dumped into the wetlands to build Marina del Rey's harbor and the Ballona Creek flood control channel. AR 103951. Invasive plants have become roughly half the vegetation of the Project site and will continue to outcompete native plant life if unchecked. AR 103955. Repairing the basic structure and function of the Reserve will provide additional habitat for native plants, birds, and other wildlife clinging to existence as their habitats shrink. AR 103951-52.

The Project FAQs sheet asserts that the tide gates could be closed permanently in the future with the rise of sea levels due to climate change. AR 103955. This would cut tidal wetland habitats off from the estuary and convert them into a mudflat or subtidal habitat. AR 103955. The Project attempts to respond to the rise in sea levels with gently sloping earthen levees that will allow the restored wetlands to migrate upslope as the sea level rises. AR 103955.

Currently, most of the Reserve is closed to the public due to its degraded state. AR 103956. The Project seeks to provide greater access for bike trails atop the newly built levees around the Reserve perimeter, new pedestrian-only trails, and approximately 2000 feet of new elevated boardwalks to allow visitors to walk adjacent to the wetlands and obtain closer habitat views. AR 103956.

4. <u>The Scoping Process and Interim Studies</u>

In July 2012, CDFW began the Project review process by issuing a NOP. AR 64907-09. In August 2012, CDFW held a public scoping meeting to receive agency and public comment for the DEIR preparation. AR 1430. CDFW received numerous comments, objections, proposed alternatives, and suggested environmental impacts. AR 1430-47.

The Corps also issued a Notice of Intent to prepare a joint draft EIS/EIR with CDFW for the Project. AR 25106. The Notice of Intent explained that the Project would require several permits including a 33 U.S.C. Section 408 permit ("Section 408 permit") from the Corps to LACDPW, the non-federal sponsor of the LACDA. AR 25106, 25109.

A January 2012 biology study found that, in contrast to hydrologic performance, biological structure in restored or created wetlands recovers to only an average of 77% of reference values, even 100 years after restoration. AR 66792.

On March 26, 2012, the United States Environmental Protection Agency ("EPA") released a report on total maximum daily loads for sediment and invasive exotic vegetation in the Ballona Wetlands. AR 66169. The report cited to data from a 1998 Marina Del Rey Shoaling and Disposal Feasibility Study that approximately 1,557,000 cubic yards of material was removed from Marina del Rey and placed in Area A of the Ballona Wetlands. AR 66240. Coupled with other historical sediment movement, the EPA estimated that 2.1 million cubic yards of sediment was placed in

Ballona Wetlands Area A between the 1870s and 2005. AR 66241. The EPA recognized the inherent assumptions and uncertainties with these estimates. AR 66241.

In October 2012, the University of Southern California's Spatial Sciences Institute advised that studies had found no evidence that the Ballona Lagoon remained perennially open. AR 1711. Rather, the Ballona wetlands were only open to the ocean periodically in response to winter rains. AR 1710. Textual sources indicated that access to the ocean depended on hydraulic forces during any given year. AR 1711. As a result, the site would not be restored by introducing permanent tidal flows and the creation of a meandering channel for Ballona Creek would not restore the Reserve. AR 1710-11.

On June 25, 2014, a study for the California State Coastal Conservancy ("State Coastal Conservancy"), which worked with DCFW for the Project, showed that Alternative 1 (which did not yet exist in a DEIR) would increase the Reserve's ability to sequester carbon dioxide by 13,100 to 40,300 tons by 2100 (minus emissions). AR 54408-09.

On February 1, 2017, the U.S. Fish and Wildlife Service ("USFWS") informed the Corps that it would no longer cooperate with the development of a joint EIS/EIR. AR 9313. USFWS previously suggested changes to Project design features that will restore and enhance natural estuarine functions, reduce habitat fragmentation, and minimize disturbance associated with recreational access and maintenance activities. AR 9313. Because of competing commitments, USFWS felt it could no longer provide the level of attention necessary to resolve the environmental issues. AR 9313.

5. <u>The Design Discharge Issue</u>

On August 22, 2012, the Corps referred CDFW to the Corps' Operations and Maintenance ("O&M") Manual for the required design discharges for the Project. AR 20009. The Corp representative stated that the design standard is based on the approved report for the original project, which he could not find because it dated back a lot of years. AR 20009. He attached the O&M Manual sheets and data tables and stated that the Project design should follow the discharges noted. AR 20009. The O&M Manual listed the design discharge as 46,000 cubic feet per second ("cfs"). AR 20014.

On February 28, 2017, the Corps asked CDFW what the "authorized discharge" is for the Project's channel. AR 19860. The Corps had learned that, after it (the Corps) designed and built the original project, LACFCD modified the project and appeared to have raised the levees. AR 19860. The Corps had not confirmed why this was done and whether it was intended to increase the design discharge. AR 19860.

On March 20, 2017, the Corps noted that it had found some additional documents regarding design discharge. AR 19859. According to these documents, any changes to the channel should be designed for a future Standard Project Flood ("SPF") of "unrestricted channel flow." AR 19859, 18829. The Corp had not found any documents to update the design discharge value for the Ballona Creek channel and stated that it should be 68,000 cfs. AR 19859.

On April 3, 2017, CDFW asked the Corps to clarify the design discharge for the Ballona Creek channel. AR 19859. LACFCD's design drawings from 1959 and 1963 for the levee modifications indicated a design discharge of 49,500 cfs. AR 19859. Based on the Corps' previous email referring to the O&M Manual, CDFW identified the design discharge for the Project as 46,000 cps. AR 19859. The hydrology report referenced in the Corps' email referred to a future, unrestricted SPF of 68,000 cfs but that did not match the Ballona Creek channel as constructed. AR 19859. CDFW also understood that the channel upstream of the Reserve could not contain a flow of 68,000 cfs. AR 19859.

On April 20, 2017, the Corps replied that the Ballona Creek channel was designed for SPF discharge, which changed over time as a result of development in the watershed. AR 19793. Based on a 1979 feasibility study, the SPF values were approved, and the table indicates a discharge of 68,000 cfs. AR 19793, 19596. Knowing that it was approved for an updated SPF of 68,000 cfs, the Corps would not go back and redesign the Project for the original design discharge of 46,000 cfs. AR 19793. To change the authorized level of protection for a flood risk, CDFW would have to have a new feasibility study that used risk-based probability methodology and procedures, and the study would have to be presented to Congress for reauthorization. AR 19793, Even in that circumstance, the Section 408 permit process follows almost the same methods of approval, and the outcome would still require a design discharge of 68,000 cfs. AR 19793.

On April 21, 2017, a CDFW employee wrote an internal email that the 68,000 cfs flow rate was presenting a real problem and he was trying to leave the issue to CDFW's engineers. AR 19596. The County believed (but would not say so in writing) that the 68,000 cfs is unreasonable because it is a hypothetical scenario that could not happen. AR 19596. That standard may require re-visiting a few chapters, raising the levee height, and performing all the calculations that go with it. AR 19596. He asked another CDFW employee what he still had up his sleeve to deal with this problem. AR 19596.

On April 24, 2017, CDFW's engineers informed a State Coastal Conservancy employee that they ran a hydraulic model based on a discharge of 68,000 cfs. AR 19580. The model showed that the south levee would be shallowly overtopped upstream of Lincoln Blvd, but that the rest of the channel conveys 68,000 cfs. AR 19580. The State Coastal Conservancy forwarded this information to the Corps. AR 19580.

In September 2017, the Corps sent CDFW a formal letter that the Project's Section 408 permit application was being withdrawn. AR 18321. While CDFW had provided preliminary engineering design information, it did not provide the detailed engineering information needed for a preliminary technical analysis for the application. AR 18321. CDFW did not anticipate providing the required information for approximately two years, and the Corps would reinitiate review of the previously submitted Section 408 permit application and restart the EIS process upon its receipt. AR 18321.

6. The DEIR

Also in September 2017, CDFW released the DEIR prepared by Environmental Science Associates. AR 183. The DEIR defines the Project as restoration of the Reserve and incidental work necessitated by the proposed restoration activities. AR 206.

The DEIR notes that, in 2012, the EPA determined that all wetland habitats within the Reserve are impaired. AR 208. Between 2012 and 2014, CDFW used a California Rapid Assessment Method estuarine module as a baseline to compare the Reserve's score with that of other wetlands in Southern California. AR 748. Most areas in the Reserve had the lowest scores in the state, and even the highest scoring parts of Area B fell below healthy reference scores. AR 748. Based on standardized wetland condition protocols, a portion of the Reserve is among the most degraded wetlands in California. AR 687. The most significant impact is a lack of hydrological connection to an estuarine water source. AR 687.

Because the Project's changes to the Ballona Creek channel would require the Corps' review and approval under NEPA, the Corps and CDFW prepared a joint DEIR/EIS. AR 207, 212. Under NEPA, the Project's purpose is to (a) restore ecological functions and services within the Reserve, in part by increasing tidal influence to achieve predominantly estuarine wetland conditions and (b) ensure that any alteration or modification to the LACDA project components maintain authorized levels of flood risk management. AR 213.

The DEIR acknowledges receiving comments and input from the public and various agencies during the scoping process. AR 222.

a. The Project

The Project site consists of approximately 566 acres, mostly in the Reserve. AR 273. The Ballona Creek channel bisects the Reserve. AR 273. Artificial fill from dredging is present in every area of the Project site and ranges from 0 to 20 feet in depth. AR 920. Areas A and C have the most extensive fill coverage, with depths exceeding 20 feet in most portions. AR 920-21.

The Project is a large-scale effort to restore, enhance, and establish native coastal wetland and upland habitats within the Reserve. AR 326. The Project's goals are, *inter alia*, to restore, enhance, and create estuarine and associated habitats, return the daily ebb and flow of tidal waters where practically feasible to achieve predominantly estuarine conditions, maintain freshwater conditions, and enhance physical and biological functions within the Reserve. AR 185, 214.

The Project objectives include establishing natural processes and functions within the Reserve that support estuarine and associated habitats. AR 271. Measures to accomplish this goal include improving tidal circulation into the wetlands, increasing tidal prism and excursion, lowering residence time of water, ensuring a more natural salinity gradient, and creating dynamic hydrologic interactions between the Ballona Creek channel, wetlands in the Reserve, and the Santa Monica Bay. AR 271-72.

The Project would restore and revitalize the Reserve by removing the dredged material from the 1950s Marina del Rey construction and clearing out the invasive plants. AR 323, 350-53.[3]

Under Alternative 1, the Project would remove the existing concrete levees on a portion of the Ballona Creek channel and realign the creek into a meandering shape as it flows through the Reserve. AR 216. This would reconnect Ballona Creek with its reestablished floodplain within the Reserve, which would improve tidal flow and circulation into and within the wetlands. AR 216, 103950. The Project would replace the removed levees with earthen, sloping levees to prevent flooding in the surrounding area. AR 216.

The construction would require CDFW to cut 2.4 million cubic yards of soil, up to 110,000 of which would be exported offsite, to build the levees in Area A. AR 426. The new levees would accommodate a flow rate of 46,000 cfs, which is the same as the channel's original design. AR 1112, 7475.

The 46,000 cfs flow rate was designed for a channel with five to seven feet of freeboard to the levee crest. AR 1112. The 46,000 cfs design flow was developed by the Corps from a 24-hour, 50-year rainfall event and is greater than the 44,690 cfs peak flow for a 100-year event on the Reserve because it considers canyon and mountainous wildfire debris in the runoff. AR 1112.

[3] As defined by the Corps' regulations (33 CFR §332.2), "restoration" means manipulation of a site to a former or degraded source. AR 323. A restoration may be a "re-establishment" or a "rehabilitation". A "re-establishment" 'returns natural/historic functions to a former aquatic resource and results in a gain in aquatic area and functions while a "rehabilitation" improves aquatic resource functions without a gain in aquatic resource area. AR 323. An "enhancement" intensifies or improves a specific resource function. AR 323.

The documentation for the original design capacity is limited, but the LACFCD project design and as-built drawings from 1959 and 1963 show a design discharge of 49,500 cfs. AR 213, n. 3. Documentation for subsequent projects refers to a SPF flow of 46,000 cfs, first computed by the Corps in the 1950s. AR 213. The SPF figure was later revised to identify a future, unrestricted flow of 68,000 cfs. AR 213, n. 3. The DEIR admits that the Corps could increase the required conveyance capacity up to the SPF of 68,000 cfs. AR 213, 270, 309. Nevertheless, all the data calculations, including for HEC-RAS Model Scenario and peek sheer stress, assume a flow rate of 46,000 cfs. AR 1134, 1144; *see also* AR 3700, 7476, 7631, 7481 ("based on preliminary direction from Corps staff, analyses of flood performance were based on the design flow rate of 46,000 cfs....")

The DEIR outlines and illustrates steps to improve public access to the Reserve and the wetlands through new visitor entrances, two pedestrian and bike bridges, elevated boardwalks, and bicycle paths. AR 217, 396-14. This includes 3.6 miles of bicycle paths over flood control levees (AR 406) and 29,000 feet of pedestrian-only trails (AR 412), 2,000 feet of which would be of elevated boardwalk adjacent to wetlands (AR 412). A map of proposed paths show that they would be deeper in the Reserve than existing paths. AR 407.

Based on a map of the proposed breakdown of habitats post-restoration, levees -- estimated to be up to 20 feet in elevation -- would be constructed along the edges of Area A, along the southern edge of Area C, and within Area B. AR 337, 406. The proposed habitats of this area would be upland or salt marsh. AR 337. A bike path of at least 12 feet wide, combined with a six-foot wide pedestrian path would be located on the top of the levees. AR 406.

The DEIR provides a breakdown of the infrastructure and utility modifications that will be required to complete the Project. AR 414-22. Of the wells on the Project site, Phase 1 would only decommission the wells needed to complete the work. AR 349. CDFW would decommission the rest of the wells in Phase 2. AR 349.

The DEIR provides a timeline for the different phases of Alternative 1. AR 422-442. Phase 1 of the Project consists of the restoration of Area A, North Area B and Area C, with realignment of the Ballona Creek channel. AR 349-50, 353-54. Within Area B, CDFW would build new perimeter flood protection levees and an interim levee along West Area B, berms around the wetlands, new culverts and tide gates, and new tidal channels. AR 353. Phase 1 also includes invasive vegetation removal and native vegetation restoration in south and southeast Area B. AR 353. Phase 2 would be full tidal restoration of west Area B and new west Area B perimeter flood protection levee. AR 349.

b. <u>The Alternatives</u>

The DEIR lists four alternatives, with Alternative 4 as the No Action Alternative. AR 216-21. Alternative 1 incorporates both freshwater and non-tidal elements. It routes freshwater into the southeast corner of Area B to create and maintain brackish marsh. AR 353. It also employs water control structures to limit tidal circulation, all to create habitats similar to historic wetland habitats at the Reserve. AR 363. This contrasts with current conditions whereby the freshwater marsh outflow discharges through the culvert to Ballona Creek. AR 363. The description of Alternative 1 includes a discussion of flood risk and stormwater management activities, including construction of levees along Fiji Way in Area A and Culver Boulevard in west Area B. AR 382-84. Maps illustrate the locations of various levees. AR 385-88.

Alternative 1 would provide the most comprehensive changes and is the Proposed Action proposed by CDFW in its Section 408 permit application to the Corps. AR 185, 216. The DEIR confirms that both Alternative 2 and Alternative 3 are reasonable, would meet the Project's overall purpose and basic objectives, and would be practicable to implement. AR 316-20.

All of Alternatives 1-3 would (1) enhance and create wetlands, aquatic resources and upland habitats within the Reserve, including through large-scale grading and revegetation, (2) improve flood and storm water management in the surrounding area, including by installing new levees and other water-control structures, (3) provide public access and visitor amenities, including by constructing new trails and bike paths, bridges, and gateway entrances, and (4) modify infrastructure and utilities within the Reserve to support the restoration efforts, including the abandonment of gas wells and removal of a sewer pipe. AR 185, 321.

The difference in the three restoration Alternatives is the size of the Project site. Alternative 1 would restore or enhance wetlands both north and south of the existing Ballona Creek channel in Areas A and B. AR 185, 211, 321, 323. Alternative 2 would only affect Area A and some of Area B, and Alternative 3 would not affect Area B at all. AR 185, 321. As a result, Alternative 1 would eliminate 17 more acres of habitat for the Belding's Savannah Sparrow than Alternative 2. AR 259. It is also the only alternative that would require construction of a flood control berm around a saltpan habitat, and the only one that would split the Project into two phases. AR 423, 485, 497. Alternative 2 is the only alternative that would require removal of Little League baseball fields. AR 1274, 1278.

The DEIR rejects Alternative 10, which attempts to increase the amount of freshwater introduced into the Reserve by pumping water from upstream, downstream, or groundwater to create fresh and brackish wetlands and seasonal wetlands habitats. AR 537. This alternative is designed to replace the historic freshwater and brackish marsh lost because the Ballona Creek channel was designed to have a permanent opening between the creek and the Pacific Ocean. AR 537.

Some elements of Alternative 10 could be adjusted to maintain the authorized LACDA project levels of flood risk management. AR 538. However, Alternative 10 would not maintain or improve flood protection. AR 538. Because it relies on mechanical means to pump freshwater into the system, it would introduce a new risk of flooding due to possible mechanical failures. AR 538. It also would not limit the need for significant modification to infrastructure because it called for the raising of roadways in the Reserve. AR 538. This makes Alternative 10 impracticable because raising Culver Boulevard and Jefferson Boulevard would almost double the restoration cost per acre, by a total between $143 and $200 million for a 20-foot raise and could create new significant environmental impacts. AR 538-39. The habitats would not be self-sustaining because the created habitats would rely on those pumps and other managed infrastructure. AR 538. Because Alternative 10 does not account for sea-level rise, additional construction costs could also accrue over time to address that issue. AR 538.

Although Alternative 10 is reasonable and would be practicable to implement and maintain, it would not meet the Project purpose of increasing tidal influence, would not be practicable in terms of cost, and would not avoid or lessen Alternative 1's significant impacts. AR 269-70, 538, 540.

c. <u>Environmental Impacts</u>

DEIR Section 3.4.6 discusses direct and indirect impacts of the restoration Project. AR 762. For greenhouse gas emissions ("GHG"), the DEIR acknowledged that soil disturbance can release sequestered carbon. AR 1032. While converting a salt marsh to a mudflat will not release carbon, draining a marsh can do so. AR 1032. Carbon dioxide emissions from the Project's restoration activities would total 25,252 megatons ("MT"). AR 1040. A 2014 study asserted that the wetlands' expansion under Alternative 1 would remove 13,100 to 40,300 MT by 2100. AR 1040.

The DEIR asserted that the Project would increase the wetland habitat suitable for native species by about 200 acres. AR 255. The area of tidal marsh would increase by about 137 acres. AR 895. This long-term conservation benefit mitigates to less than significant the short-term adverse impacts to special-status species and associated habitats that the Project fails to avoid. AR 896.

The DEIR identifies the vegetation contemplated for each of the habitats within the Reserve after the Project's completion. AR 337, 445, 448-50. A map shows the planned location of each habitat type. AR 337. Each habitat has its own set of performance criteria and timeframes for meeting them. AR 445-51. These criteria include comparisons of species before and during the Project for the following: tidal marsh birds (AR 445), tidal channel fish (AR 446), mudflat macroinvertebrates and birds (AR 447), saltpan birds (AR 449), and upland scrub birds AR 450-51. For example, the vegetation performance criteria for tidal marshes provides that there be a minimum of five native species, although one or two may predominate. AR 445.

The DEIR discusses the environmental impact of the Project on the essential habitats of rare and special status species inside the Reserve, including the El Segundo Blue Butterfly, Western S-Banded Tiger Beetle, Silvery Legless Lizard, Belding's Savannah Sparrow, California Gnatcatcher, Great Blue Heron, Least Bell's Vireo, and Burrowing Owl. AR 226–35.

For upland birds in general, the DEIR acknowledges that Alternative 1 would result in a substantial adverse impact without mitigation. AR 232. However, after restoration, Alternative 1 also would provide comparable amounts of habitat and may expand foraging and nesting habitat for these species. AR 232. As a result, it will create a long-term beneficial effect upon mitigation. AR 232.

The DEIR contains a map of the current potential Burrowing Owl habitats. AR 736. The DEIR compares the acreage on this map to the acreage on a projected post-Project map of Burrowing Owl habitats and finds that there will be a 7:1 increase in habitat. AR 337, 351, 794.

A table in the DEIR summarizes the Project's potential impacts on federal-listed and other special status species, including the El Segundo Blue Butterfly, California Least Tern, and Least Bell's Vireo. AR 258-75. This includes a breakdown of the permanent loss and net gain of each habitat. AR 258-60. Because of the increase in usable habitat, the DEIR concludes that the Silvery Legless Lizard, Belding's Savannah Sparrow, Least Bell's Vireo, special-status marsh birds, Southern California Salt Marsh Shrew, and South Coast Marsh Vole all would experience population net gains in the long-term. AR 228, 230, 232, 233.

The DEIR's Impact Summary for Alternative 1 lists multiple adverse direct and indirect impacts but considers them as either "less than significant with mitigation incorporation" or "less than significant impact." AR 784-85, 828-29. After mitigation, none of the three restoration alternatives have significant or unavoidable adverse impacts. AR 223.

d. <u>Mitigation</u>

The DEIR discusses required mitigation measures. AR 326, 230-31, 328-29. This includes preparation and implementation of a Habitat Restoration and Monitoring Plan ("HRMP") before commencement of any restoration activities that involve vegetation or land disturbance. AR 328-29. The HRMP shall identify (1) specific restoration activities and monitoring programs to implement during restoration and any long-term habitat management; (2) a timeline for the implementation of the monitoring program, with a work plan or schedule for long-term monitoring after the site has achieved applicable performance goals; and (3) specific protocols for monitoring. AR 328-29. A Conceptual Habitat Restoration and Adaptive Management Plan ("Conceptual Plan") attached as Appendix B3 provides further guidelines for HRMP preparation with the principle of adaptive management. AR 5265, 5273.

7. <u>The Continued Flood Standard Discussion</u>

On April 6, 2019, the Corps informed CDFW that a change in its internal Section 408 permit analysis and NEPA policies means that the Corps would not issue a final EIS until CDFW submitted additional design information for the Project and the Corps reviewed it. AR 18513. CDFW estimated that it could take 2.5 years to draft and provide that information. AR 103951.

CDFW decided to separate its EIR from the Corps' EIS to avoid an extended delay for the certification of the EIR. AR 99022, 103951.

On October 19, 2019, the State Coastal Conservancy requested then-Senator Kamala Harris to process a Water Resources Development Act ("WRDA") request to lower the authorized flood control standard to 46,000 cfs as that is "the documented design flow rate of the existing channel." AR 25082-84. The WRDA request triggered emails between the Corps and LACFCD indicating that the State Coastal Conservancy did not consult either entity prior to submitting the request. AR 24801-03. In one email, the Corps said that it could not support the lower number without an "H&H analysis" and a decision document to support the lower number. AR 24812. Another Corps employee noted that the proposed WRDA language would reinforce the existing authorized design discharge of 46,000 cfs but that any modification of the Ballona Creek channel would still be subject to the Section 408 permit requirement of no increased flood risk, which is independent of design discharge. AR 24811. Since the Project would reduce the existing capacity of the channel, it would increase the flood risk. AR 24811.

On October 22, 2019, after a conference call, Public Works informed the Corps that it had decided to support the higher discharge number as documented in the Corps' 1979 report. AR 24809. The project manager's notes explained that any change to the existing 68,000 cfs standard would require detailed analysis of changes in velocity, water surface profiles, flow distribution, scour analysis, sediment transport analysis, and upstream and downstream impacts of proposed alterations. AR 24809.

On December 10, 2019, in response to Petitioner Protect's inquiry, the Corps explained that, as part of the Section 408 permit process, the Corps would consider any information the applicant provides whether to change the flood standard for the Ballona Creek channel. AR 18196. The Corps has not taken a position on whether the channel's SPF should be changed, and it expected CDFW to provide the pertinent information in mid- to late-2020. AR 18196. When the Corps issues a final EIS, it would include a preliminary decision regarding the SPF as well as for the Section 408 permit application. AR 18196.

8. <u>The FEIR</u>

On December 1, 2019, CDFW issued the FEIR with 4,000 pages of responses to the comments. AR 8296, 8308. It published the FEIR to the State Clearinghouse on December 20. AR 36998.

The FEIR notes that the DEIR refers to the Project as any of the three Alternatives, all of which were similar. AR 8330. The FEIR concludes that the Project is Alternative 1. AR 8330.

The FEIR notes that a commenter stated that the term "restoration" is nuanced and complex. AR 8340. Another commenter accurately noted that the DEIR's use of the term "restoration" included elements of both habitat creation and restoration. AR 8340. The FEIR clarifies that it uses the word "restoration" for both reestablishment of natural processes and ecological functions and habitat creation or enhancement. AR 8341. The FEIR dismisses objections to the use of the word "restoration" as mere semantics. AR 8342. All three restoration alternatives would result in a greater quantity of estuarine and associated habitats at the Reserve than currently exist. AR 8342.

The FEIR responds to arguments that the Project should consider a predominantly freshwater restoration alternative. AR 8349. The Reserve has long been identified as a significant regional opportunity for estuarine wetlands restoration, which include vegetated tidal marsh, intertidal channels, mudflats, and saltpans, and are a regionally rare habitat that can only be restored in very specific locations. AR 8349. The Southern California Wetlands Recovery Project identifies tidal wetland restoration as a key priority for its regional strategy and restoration of the Reserve represents the only opportunity to restore a large tidal wetland in Santa Monica Bay. AR 8349.

The FEIR cites studies explaining that the Ballona Wetlands historically has experienced closed fresh water and intermittent tidal conditions resulting from breaching during high flows. AR 10664. Because the longshore drift of sand rapidly closed the berm connecting the Ballona Wetlands to the ocean after major storms, a large freshwater lake was the rule rather than the exception. AR 10670.

Some commenters asked how the Corps' 2005 feasibility study relates to the process. AR 8328. The purpose of the Corps' study was to evaluate alternatives for channel modification, habitat restoration, recreation, and related purposes along the lower reach of Ballona Creek. AR 8328. In July 2012, the Santa Monica Bay Restoration Commission requested that the Corps terminate the study, and it did so in September 2012. AR 8328. The FEIR explains that the Corps' 2005 study is separate and independent from the Project because the who, what, when, and where of the proposals differ. AR 8328. This Project is a restoration project, not a civil works cost-shared project, and it would maintain existing and authorized LACDA project levels of flood risk management. AR 8328.

For Mitigation Measure BIO-1b-ii's biological monitoring, the FEIR clarifies that the biologist shall salvage low-mobility wildlife "either by trapping or other appropriate means" if Project-related vegetation or ground disturbances could kill or injure the animal. AR 13113. Salvaged species should be relocated to adjacent suitable habitat not subject to site disturbances. AR 13114. Any relocation efforts would include assessment to determine areas within the Reserve that would be most appropriate to receive species. AR 13114.

The FEIR revises the DEIR's performance criteria tables by replacing language that that species abundance "may be" greater than pre-restoration levels with language that they are "expected to be" greater. AR 13133.

9. <u>Responses to Comments</u>

The public comment period for the DEIR began on September 25, 2017, and CDFW extended the deadline to February 5, 2018. AR 8304-05. During that period, CDFW received over 8,000 postcards, e-mails, and letters with almost 3,000 distinct comments. AR 103951.

The Project has support with some recommendations from Friends of Ballona Wetlands, Heal the Bay, Los Angeles Waterkeeper, the Trust for Public Land, and the Surfrider Foundation. AR 9647-48, 11494-95, 11497, 11633, 11768, 11789.

Some comments asserted that the DEIR did not firmly state a preferred alternative. AR 8721 (02-17), 11663 (021-2), 11518 (015-12). However, three Petitioners asserted that the DEIR presented Alternative 1 as the preferred alternative. AR 8784 (Alternative 1 is "being pushed" by CDFW), 8898 (Alternative 1 was "obviously preferred"), 8950 (preferred Alternative 1 was included in 2012 memorandum). In response, CDFW stated that the FEIR clarifies that Alternative 1 is the Proposed Project and the environmentally superior alternative. AR 8353, 11582. The FEIR also asserted that CEQA does not require it to identify a preferred alternative, which is a NEPA concept. AR 8353 (*citing* Washoe, *supra*, 17 Cal.App.5th at 289).

One comment asked about a DEIR footnote stating that its use of the term "Project" does not indicate or imply the Corps' endorsement. AR 8721 (02-17). CDFW explained that, while Alternative 1 is the "Proposed Action," the Corps will not decide whether to approve a permit for any alternative until it had an opportunity to consider all relevant evidence, including agency and public input. AR 8869. The Corps would make its own judgment about which of the three Alternatives is environmentally superior. AR 8869.

Land Trust asserted that the DEIR lacks a reasonable range of alternatives. AR 8944 (04-14), 8946. The three restoration alternatives reflected project goals and objectives were too narrowly defined in order to ensure a predetermined outcome. AR 8944. The restoration alternatives are all varying degrees of the same concept. AR 8944. Petitioner Grassroots also called the three alternatives limited and confusingly similar but narrow. AR 10268 (011-344).

10. Certification of the FEIR

On January 8, 2020, Petitioner Land Trust requested that CDFW add to the administrative record various government communications about flood control that Land Trust had received through a California Public Records Act ("CPRA") Request. AR 25080.

On January 29, 2020, the State Coastal Conservancy wrote to CDFW and the Corps that the reports with an SPF value of 68,000 cfs were created in 1978. AR 18070, 25092. If the Project modifies the flood control channel, it either should convey the SPF or the Corps and the County should make new models to update the SPF to reflect current conditions. AR 18070. The better option would be to update the model instead of relying on a figure from the 1970s. AR 18070.

In April 2020, a Land Trust representative asked CDFW to confirm that the Corps' EIS finalization process would not begin until after EIR certification. AR 13828. The Corps' website said that the EIS finalization could take two years. AR 13828.

On December 30, 2020, CDFW certified the FEIR. AR 141-42. The NOD filed with the Office of Planning and Research describes the Project as Alternative 1, except for construction of a three-story parking garage and an access road behind business on Culver Boulevard. AR 1.

E. The Motion to Augment Record

In conjunction with their reply, Petitioners Protect and Land Trust move to augment the record with five documents.

1. Applicable Law

For cases arising under CEQA, the contents of the administrative record is governed by Pub. Res. Code section 21167.6(e) ("section 21167.6"):

> (e) The record of proceedings shall include, but is not limited to, all of the following items:

(1) All project application materials.

(2) All staff reports and related documents prepared by the respondent public agency with respect to its compliance with the substantive and procedural requirements of this division and with respect to the action on the project.

(3) All staff reports and related documents prepared by the respondent public agency and written testimony or documents submitted by any person relevant to any findings or statement of overriding considerations adopted by the respondent agency pursuant to this division.

(4) Any transcript or minutes of the proceedings at which the decision-making body of the respondent public agency heard testimony on, or considered any environmental document on, the project, and any transcript or minutes of proceedings before any advisory body to the respondent public agency that were presented to the decision-making body prior to action on the environmental documents or on the project.

(5) All notices issued by the respondent public agency to comply with this division or with any other law governing the processing and approval of the project.

(6) All written comments received in response to, or in connection with, environmental documents prepared for the project, including responses to the notice of preparation.

(7) All written evidence or correspondence submitted to, or transferred from, the respondent public agency with respect to compliance with this division or with respect to the project.

(8) Any proposed decisions or findings submitted to the decision-making body of the respondent public agency by its staff, or the project proponent, project opponents, or other persons.

(9) The documentation of the final public agency decision, including the final environmental impact report, mitigated negative declaration, or negative declaration, and all documents, in addition to those referenced in paragraph (3), cited or relied on in the findings or in a statement of overriding considerations adopted pursuant to this division.

(10) Any other written materials relevant to the respondent public agency's compliance with this division or to its decision on the merits of the project, including the initial study, any drafts of any environmental document, or portions thereof, that have been released for public review, and copies of studies or other documents relied upon in any environmental document prepared for the project and either made available to the public during the public review period or included in the respondent public agency's files on the project, and all internal agency communications, including staff notes and memoranda related to the project or to compliance with this division.

(11) The full written record before any inferior administrative decision-making body whose decision was appealed to a superior administrative decision-making body prior to the filing of litigation.

Section 21167.6(e) "contemplates that the administrative record will include pretty much everything that ever came near a proposed development or to the agency's compliance with CEQA in responding to that document." County of Orange v. Superior Court, (2003) 113 Cal.App.4th 1,

8. The trial court makes determinations of the completeness of the administrative record. Madera Oversight Coalition, Inc. v. County of Madera, (2011) 199 Cal.App.4th 48, 63, *disapproved on other grnds.*, Neighbors for Smart Rail v. Exposition Metro Line Construction Authority, ("Neighbors for Smart Rail") (2013) 57 Cal.4th 439. Specifically, the trial court resolves disputes between the parties over what should be included in, or excluded from, the administrative record. Ibid.

2. Analysis

Petitioners Protect and Land Trust move to augment the record with five documents: (1) a November 30, 2021 Grant Agreement between the State Coastal Conservancy and CDFW (Ex. A); (2) a January 2023 email from Corp employee Aaaron Allen to Land Trust President Walter Lamb (Ex. B); (3) a January 2022 Preliminary Comments on Ballona Wetlands Concept Review by Public Works ("Ex. C"); (3) a December 2022 CDFW response to Ex. C (Ex. D); and a (4) Ballona Wetlands Restoration Project Frequently Asked Questions document published by CDFW (Ex. E).

As CDFW argues, Petitioners' motion to augment is untimely, having been filed and served on April 21, 2023, only 12 court days before the May 9, 2023 hearing, in lieu of the 16 days required by CCP section 1005. *See* Opp. at 2. Petitioners claim that the evidence is offered to rebut CDFW's opposition and that they could not have anticipated that CDFW would rely on a different set of facts. Mot. at 3. This may justify Petitioners' desire for late action, but it does not excuse making a noticed motion on less than 16 days' notice without seeking an order shortening time.

More important, this case concerns DFW's quasi-legislative decision to approve the Project and certify the EIR, and extrinsic evidence is generally not admissible for quasi-legislative administrative mandamus. Western States, *supra*, 9 Cal.4th at 573, 576. Evidence outside the record may be considered at trial only if it (1) existed before the agency made its decision, and (2) it was not possible to present it to the agency before the decision was made. Id. at 578. Even then, extra-record evidence may never be admitted to contradict the evidence relied upon by the administrative agency or question the wisdom of its decision. Id. at 579.

Petitioners admit that Exhibits A-D do not meet this test because four of the five documents were created after the FEIR was certified. Mot. at 3. They argue instead that the evidence is admissible to show CDFW's misconduct. *See* Barthelemy v. Chino Basin Municipal Water District, (1995) 38 Cal.App.4th 1609, 1621 (extra-record evidence may be admissible to show misconduct). They argue that CDFW committed misconduct by failing to admit that the Corps flow rate capacity is a firm Project requirement, and its supporting evidence in the record tries to mislead the public by obscuring the true facts around the size and configuration/design of levees that are part of the Project. Id.

As CDFW argues, Exs. A-D do not show its misconduct. Petitioners rely on these documents as evidence that the true flow rate required by the Corps is 68,000 cfs. Opp. at 3. As such, the exhibits are offered to contradict the evidence cited in CDFW's opposition, not to show agency misconduct. Petitioners' attempt to show CDFW's knowledge is not the type of misconduct that would permit extra-record evidence. Additionally, Ex. D, which was created before the EIR was certified, already is in the record. *See* AR 103951-56. The motion to augment is denied.

F. Analysis

Petitioners contend that the FEIR certification must be set aside because (1) it impossible to identify the preferred Project from the three restoration alternatives in the project description, (2) the project description's reference to "restoration" is misleading, (3) the project description fails to include the correct flood control design standard, (4) the Project's restoration performance criteria are indefinite and lack a binding framework, (5) the FEIR fails to include a vegetation map, (6) the FEIR fails to consider a reasonable range of alternatives by excluding a freshwater alternative, and (7) the FEIR's analysis of environmental impacts is inadequate.[45]

1. The Preferred Project

a. The Law Concerning the Project Description

An EIR "provide[s] public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment." Pub. Res. Code §21061. The ability of informed citizens to participate in environmental review is a key tenet of CEQA. Washoe, *supra*, 17 Cal.App.5th at 285. To adequately apprise the public of a project and its environmental impacts, an EIR must contain "an accurate, stable and finite" project description. Citizens for a Sustainable Treasure Island v. City and County of San Francisco, ("Treasure Island") (2014) 227 Cal.App.4th 1036, 1045; County of Inyo v. City of Los Angeles, ("Inyo") (1977) 71 Cal.App.3d at 185, 193.

"[A] project description that gives conflicting signals to decision makers and the public about the nature and scope of the project is fundamentally inadequate and misleading." Treasure Island, *supra*, 277 Cal.App.4th at 1052. An unstable and incomplete project description "stultifies" public participation. San Joaquin Raptor Rescue Center v. Cnty. of Merced, ("San Joaquin Raptor") (2007) 149 Cal.App.4th 645, 656. "Only through an accurate view of the project may affected outsiders and public decision makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal [] and weigh other alternatives in the balance." Inyo, *supra*, 71 Cal.App.3d at 192–193. A project description also cannot narrow the scope of environmental review or minimize the project's impacts on the environment. Laurel Heights I, *supra*, 47 Cal.3d at 405.

The failure to maintain an accurate and stable project description is a failure to proceed in the manner required by law subject to *de novo* review. Stopthemillenniumhollywood.com v. City of Los Angeles, ("Stothemillennium") (2019) 39 Cal.App.5th 1, 15; SoMa, *supra*, 33 Cal.App.5th at 332 ("Whether an EIR correctly describes a project is a question of law, subject to de novo review."). No deference is given to the agency's determination on this issue. Washoe, *supra,* 17 Cal.App.5th at 286. The court reviews a EIR "not for perfection but for adequacy, completeness, and a good faith effort at full disclosure." Guidelines §15151. However, an EIR's failure to provide a stable and finite project renders it deficient even if "the informative quality of the EIR environmental forecasts [were] not affected by the ill-conceived, initial project description". Inyo, *supra* 71 Cal.App.3d at 199. To conclude otherwise "would only countenance the practice of releasing a [DEIR] for public consumption that hedges on important environmental issues while

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[4] CDFW does not contend that any of the four Petitions fails to allege the issues addressed in the joint opening brief. As a result, all issues raised in the joint opening brief have been considered for all Petitions.

[5] A FEIR includes the DEIR and the agency's responses to comments. For clarity, the court will refer to the document located at the citation, whether it is the DEIR, response to comment, or the FEIR.

deferring a more detailed analysis to the [FEIR] that is insulated from public review." *See* Mountain Lion Coalition v. Fish & Game Comm'n, (1989) 214 Cal.App.3d 1043, 1052 (declining to consider whether FEIR's cumulative impact analysis cleared up DEIR's deficiencies because it was never subject to public review and comment). Such error is necessarily prejudicial. Sierra Club, *supra*, 6 Cal.5th at 515; Washoe, *supra,* 17 Cal.App.5th at 290 (citation omitted). *See* Pub. Res. Code §§ 21005, 21168.5.

b. Inyo, Washoe, and SoMa

(i). Inyo

In Inyo, the court addressed whether an EIR project description for the extraction of subsurface water satisfied CEQA. 71 Cal.App.3d at 185. The EIR described the project as a 51-cfs increase in the water extraction rate. Id. at 189. The court noted that "the project concept expands and contracts from place to place within the EIR." Id. at 190. Even though not included in the project description, some sections of the EIR analyzed a "recommended project" with higher rates of groundwater extraction as well as the development of infrastructure to export water to Los Angeles. Id. The court explained: "The small-scale groundwater project described at the outset was dwarfed by the 'recommended project' ultimately endorsed by the FEIR and approved by the board of commissioners." Id. at 199.

As such, the city's approval of the FEIR was a failure to proceed in the manner required by law. Id. at 200. The court stated that, while the CEQA process is not designed to freeze the initial project as the project ultimately approved, and new and unforeseen insights may emerge that require project revision, the selection of a narrow project as the launching pad for a vastly wider proposal frustrated CEQA's public informational aims. Id. at 199-200. Although "the informative quality of the EIR environmental forecasts" was not affected by the initial project description, the court underscored that "[t]he defined project and not some other project must be the EIR's bona fide subject." Id. at 197, 199. The EIR's failure to properly describe the project, regardless of the adequacy of its environmental analysis, frustrated CEQA's public information aims. Id. at 199-200.

(ii). Washoe

In Washoe, the California Department of Parks and Recreation proposed an "Upper Truckee River Restoration and Golf Course Reconfiguration Project" because the existing golf course had altered the course and flow of the Upper Truckee River, causing deterioration in habitat and water quality. 17 Cal.App.5th at 282. The DEIR described five different project alternatives to reduce sediment discharge from the river into Lake Tahoe. Id. at 283. The DEIR did not identify a preferred alternative, and instead proposed that the department would identify the preferred alternative after public comment and the final decision would be included in the FEIR. Id. at 281, 283.

The FEIR identified "[a] refined version of Alternative 2" (river restoration with reconfigured 18-hole golf course) as the preferred alternative, stating that Alternative 2's acreages had been modified "to address public access issues" and the final design may reflect further modifications as a result of the "normal design refinement process". The FEIR stated that these minor modifications to Alternative 2 did not require recirculation because they did not change the DEIR's conclusions on the significance of impacts. Id. at 284.

The court affirmed the trial court's decision to set aside the project approval and FEIR certification because, *inter alia*, the DEIR did not contain an "accurate, final and stable" project description and this acted as "an obstacle to informed public participation." Id. at 285, 290. The court agreed with the trial court:

> "[F]or a project to be stable, the DEIR, the FEIR, and the final approval must describe substantially the same project. An EIR that states the eventual proposed project will be somewhere in 'a reasonable range of alternatives' is not describing a stable proposed project." Id. at 288.

The fact that the DEIR thoroughly analyzed Alternative 2's environmental impacts – a version of which was ultimately approved as the project -- did not alter the analysis. Id. at 288. The court held that "an agency's failure to propose a stable project is not confined to 'the informative quality of the EIR's environmental forecasts.'" Id. at 288 (quoting Inyo, *supra,* 71 Cal.App.3d at 197). The failure to identify and select any project at all impairs the public's right and ability to participate in the environmental review process. Ibid. "A description of a broad range of possible projects, rather than a preferred or actual project, presents the public with a moving target and requires a commenter to offer input on a wide range of alternatives that may not be in any way germane to the project ultimately approved." Ibid. While there may be situations in which the presentation of a small number of closely related alternatives would not present an undue burden on the public, the difference between the five projects was too vast because each created a different footprint on the land. Ibid.

The court found that the prejudice required by Pub. Res. Code section 21005 exists "'if the failure to include relevant information precludes informed decisionmaking and informed public participation, thereby thwarting the goals of the EIR process.'" Id. at 290 (citation omitted). "A deficiency in the EIR may be deemed prejudicial under this standard 'regardless of whether a different outcome would have resulted if the public agency had complied with those provisions.'" Id. Because the DEIR failed to designate a stable project, the court held that the lower court properly granted the writ petition challenging the project. Id.

(iii). SoMa

In SoMa, the city and county of San Francisco approved a mixed-use business and residential project. 33 Cal.App.5th at 327. The DEIR "described two 'options' for the [mixed-use] project, an 'Office Scheme' and a 'Residential Scheme.'" 33 Cal.App.5th at 328. The overall square footage was substantial the same in both project schemes, with varying mixes of office and residential use. Id. at 328. The DEIR discussed nine alternatives to the project, including a "Preservation Alternative" which was a similar mixed-use project that would avoid demolition of a nearby building and reduce certain environmental impacts. Id.

In upholding the approval of the revised project based on the DEIR's Preservation Alternative, the SoMa court found the petitioners' claim that the DEIR presented multiple possible projects to be specious. Id. at 332. The court explained that the office and residential schemes were two project options with the same overall square footage but a varying mix of residential and office uses." Id. at 333. Both involved construction of new floor space, similar massing and land use, and retention of some buildings and demolition of others. Id. at 333. The DEIR set forth in text and table format the square footage for both schemes. Id. at 333. The public was able to comment without confusion on the two schemes. Id. at 333. Thus, there was one project with two options for different allocations of residential and office uses. Id. at 333-34.

The SoMa court distinguished Inyo:

> "[In Inyo,] throughout the EIR process, the project description varied, with the result that the 'small-scale groundwater project described at the outset was dwarfed by the 'recommended project' ultimately endorsed' that dealt with 'important, large-scale phases of the city aqueduct management program.' The [Inyo] court concluded the agency's selection of a 'narrow project as the launching pad for a vastly wider proposal frustrated CEQA's public information aims.' Here, there were no similar fluctuations in the project description during the EIR process, nor is the initial project description a misleading fragment of the ultimately approved project." Id. at 335. (citations omitted).

The SoMa court also distinguished Washoe, stating that the SoMa project description clearly described a mixed-use project at a specific location with two options for allocations of office and residential use. Id. at 335. While the petitioners complained that the FEIR adopted a revised project that was a variant of the preservation alternative identified in the DEIR, the petitioners had not identified any component of the revised project that had not been "addressed in the DEIR or subject to public comment." Id. at 335 (emphasis added). Further, CEQA's reporting process is not intended to "handcuff decisionmakers" or "freeze the ultimate proposal in the precise mold of the initial project" since CEQA's purpose is to encourage adopting alternatives that reduce environmental impacts. Id. at 335-36. "The whole point of requiring evaluation of alternatives in the DEIR is to allow thoughtful consideration and public participation regarding other options that may be less harmful to the environment." Id. at 335-36. *See also* Treasure Island, *supra*, 227 Cal.App.4th at 1055 ("Many of the environmental impacts described in [Inyo's] EIR were related to the much broader project, rather than the smaller project described").

c. Analysis

Petitioners argue that the EIR fails to identify a preferred alternative or a stable project, thus confusing the public and reviewing agencies and rendering the EIR inadequate as an informational document. According to Petitioners, the EIR improperly identifies the Project as one of three restoration alternatives prejudices the public in two different ways.

First, it is impossible to determine what the Project is, thus rendering the EIR's project description defective. "[A] range of alternatives simply cannot be a stable proposed project." Washoe, *supra,* 17 Cal.App.5th at 288. The three alternatives proposed for the restoration are substantially different, with a different set of environmental impacts, mitigation measures, costs, duration, and other important considerations. For instance, Alternative 1 would eliminate 17 more acres of existing habitat for the endangered Belding's Savannah Sparrow than Alternative 2. AR 259. Alternative 3 leaves the Ballona Wetlands channel levees in place and would not affect any land south of the channel. AR 491. Alternative 1 envisions the construction of a new flood control berm around the saltpan habitat but this berm would not be necessary with Alternatives 2 and 3. AR 491, 467, 491. Alternatives 1 and 3 envision no change to the Little League baseball fields whereas Alternative 2 requires the removal of the fields. AR 1274, 1278. Alternative 1 is the only option with two phases of construction. AR 423, 485, 497. As such, the alternatives analysis was confusing and presented "an obstacle to informed public participation." Pet. Op. Br. at 22.

Second, it impossible to properly compare the preferred alternative to the other alternatives to determine if impacts could be lessened. Logically, an alternative is a choice to something else. CEQA requires an alternatives analysis that presents "a reasonable range of alternatives to the project…which…offer substantial advantages over the project proposal." Citizens of Goleta Valley v. Bd. of Supervisors, (1990) 52 Cal.3d 553, 566. This analysis cannot happen in the EIR because there is not a predictable way to measure alternatives against a proposed Project. Additionally, the EIR's treatment of alternatives placed too high a burden on the public commenters and reviewing agencies. As Washoe explained: "A description of a broad range of possible projects, rather than a preferred or actual project, presents the public with a moving target and requires a commenter to offer input on a wide range of alternatives that may not be in any way germane to the project ultimately approved." 17 Cal.App.5th at 288–89. Pet. Op. Br. at 22.

In making this argument, Petitioners fail to distinguish between the DEIR and the FEIR. The FEIR states that the DEIR used the term "Project" to refer to restoration via any of the three restoration alternatives…." AR 8330 (emphasis added). The FEIR then defines the term "Project" to mean "restoration of the Reserve and incidental work as presented in CDFW's application for authorization from the Corps (*i.e.*, Alternative 1)." AR 8330 (emphasis in original). Thus, the FEIR clearly identifies Alternative 1 as the Project.

The DEIR also identifies Alternative 1 as the Project, albeit less clearly, because it repeatedly refers to Alternative 1 as the "Proposed Action". AR 185, 216, 278, 336. The DEIR explains that Alternative 1 is the Project for which CDFW is seeking approval from the Corps. AR 276, n.13, 307, 311. The DEIR further explicitly states that Alternatives 2 and 3 are identified for the purpose of complying with the requirement under CEQA that an EIR discuss a reasonable range of alternatives to the proposed Project (Alternative 1). AR 301; *see also* 307, 314, 315. Hence, regardless of how they are labeled, the DEIR presents three alternatives as (a) the proposed Project (Alternative 1) and (b) two alternatives (Alternatives 2 and 3). The public was not misled by this approach. Indeed, three of the Petitioners indicated in their comments on the DEIR that they understood Alternative 1 is the preferred alternative. AR 8784, 8898, 8950.

Petitioners' reliance on Washoe is misplaced. Opp. at 14-15. Washoe did not hold that a DEIR must identify a preferred alternative. Instead, Washoe held that the DEIR in that case did not identify a proposed project because its range of alternatives was so broad, and the differences between them so vast, that the public effectively was required to "offer input on a wide range of alternatives that may not be germane to the project ultimately approved." 17 Cal.App.5th at 288-89. Unlike the DEIR in Washoe, the DEIR identifies Alternative 1 as the Proposed Action.

Even if the DEIR does not clearly state that Alternative 1 is the Project, Washoe does not support Petitioners' claim. The range of alternatives in Washoe was broad, their differences substantial, their objectives were fundamentally different (restoration versus stabilization), and they were to be accomplished in different ways (reconfiguration versus downsizing versus removal of the golf course). Washoe acknowledged that there could be cases in which the presentation of "a small number of closely-related alternatives would not present an undue burden on members of the public wishing to participate in the CEQA process." Ibid.

This is such a case. Unlike the dramatically different alternatives in Washoe, the three restoration alternatives in the DEIR are closely related and would accomplish similar objectives. As CDFW's opposition argues, each of the DEIR's three alternatives would (a) enhance and create wetlands, aquatic resources, and upland habitats within the Reserve, including through large-scale grading and revegetation, (b) improve flood and storm water management in the surrounding area, including by installing new levees and other water-control structures, (c) provide public access and visitor amenities, including by constructing new trails, bike paths, bridges, and gateway entrances, and (d) modify infrastructure and utilities within the Reserve to support the restoration efforts, including through the abandonment of gas wells and removal of a sewer pipe. AR 185, 321.

The only material differences between the three restoration alternatives are the location and extent of the planned restoration. Alternative 1 would restore or enhance wetlands both north of the existing Ballona Creek channel (Area A) and south of that channel (Area B), Alternative 2 similarly would restore wetlands in Area A but would restore or enhance wetlands only in a portion of Area B, and Alternative 3 would restore wetlands in Area A only. AR 185, 321. The three alternatives are not so different that the members of the public reviewing the DEIR were left to guess about the basic characteristics of the Project.

Finally, as in SoMa, Petitioners have not identified any component of the Project that was not "addressed in the DEIR or subject to public comment." 33 Cal.App.5th at 335. Indeed, Petitioner Land Trust acknowledged during in a public comment that the Alternatives discussed in the DEIR represented "varying degrees of the same concept." AR 8944.[6] Petitioner Grassroots also commented that the range of alternatives was too "narrow" and the individual alternatives too "similar." AR 10268.

By its repeated references to Alternative 1 as the Proposed Action and its identification of three closely related alternatives for restoring the Ballona Wetlands, the DEIR adequately identifies the Project and did not present the public with a moving target and require input on a wide range of alternatives that may not be in any way germane to the project ultimately approved. *See* Washoe, *supra,* 17 Cal.App.5th at 288–89. This identification carried over through the responses to comments and FEIR. AR 8353, 11582.

2. The Term "Restoration" in the Project Description

a. Pertinent Facts

The FEIR notes that a commenter stated that the term "restoration" is nuanced and complex and that a commenter accurately noted that the DEIR's use of the term "restoration" included elements of both habitat creation and restoration. AR 8340. The FEIR clarifies in Section 2.2.26 (The Definition of "Restoration") that the term "restoration" is defined to mean both reestablishment of natural processes and ecological functions and habitat creation or enhancement. AR 8341-42. The FEIR dismisses objections to the use of the word "restoration" as semantics. AR 8342. All Project alternatives would result in a greater quantity of estuarine and associated habitats at the Reserve than currently exist. AR 8342.

b. Analysis

A project description that gives conflicting signals to decisionmakers and the public about the nature of the project is fundamentally inadequate and misleading. SoMa, *supra,* 33 Cal.App.5th at 332. An EIR must be sufficiently detailed and accurate to allow "those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." Laurel Heights I, *supra,* 47 Cal.3d at 405.

Petitioners contend that the FEIR mischaracterizes the Project as a restoration instead of the creation of a full tidal estuary subject to the ebb and flow of daily tides. Restoring the daily ebb and flow of the ocean tide is not restoration when the Ballona Wetlands have been

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[6] Petitioners reply that CDFW's opposition misleadingly quotes Land Trust because its comments in context underscore the materially different environmental impacts of the three alternatives. AR 8944. Protect Reply at 11. The context does not undermine CDFW's point that Land Trust admitted that the three alternatives, although modestly different, were similar.

predominantly closed to the Pacific Ocean for 2000 years. Contrary to CDFW's dismissal of this concern as semantics, there are material differences between restoring something that previously existed and creating something new to the site. Although hundreds of citizens decried the characterization of the Project as a restoration, and scientists submitted comments clarifying that their own studies were being misconstrued by CDFW, the FEIR only re-defines "restoration" to include "elements of both habitat restoration and habitat creation." AR 8341. Pet. Op. Br. at 30-31; Grassroots Reply at 5-6.

Petitioners note that San Joaquin Raptor struck down an EIR for a mining project because it both claimed that the project would not increase production and later indicated the potential to double production. 149 Cal.App.4th at 655. Because the reader could not determine whether the project would maintain or increase production, the court found the project description was fundamentally inadequate. Id. at 656. Similarly, in Communities for a Better Environment v. City of Richmond, ("Communities for a Better Environment") (2010) 184 Cal.App.4th 70, 83, uncertainty over whether the project would process heavy crude rendered the project description uncertain and misleading. Pet. Op. Br. at 31.

Petitioners argue that the starkest example of the ambiguity between restoration and creation is the DEIR's statement that the Project "is intended to return the daily ebb and flow of tidal waters where practically feasible to achieve predominantly estuarine conditions". AR 185, 216, 278 (emphasis added). The Dark et al. study cited by CDFW indicated that the Ballona Wetlands were historically a predominantly closed, fresh-water system not subject to the "daily ebb and flow of tidal waters." AR 3248. "We found no evidence that the [Ballona] lagoon remained perennially open, but rather textual sources indicate that access to the ocean depended on hydraulic forces during any given year." AR 3248. Other studies on the Ballona Wetlands similarly noted the episodic nature of tidal influence, explaining: "The longshore drift of sand rapidly closed the berm...a large freshwater lake was the rule, rather than the exception…" AR 10670. Pet. Op. Br. at 31-32.

CDFW responses to comments, including from experts, claimed that the Project restores the Ballona Wetlands to conditions that existed prior to 1825 when the Los Angeles River flowed through the wetlands to the ocean. AR 8343–44. CDFW cited to a portion of the Dark study mentioning the term "tidal." AR 8344 (quoting Dark study at AR 3248). CDFW failed to disclose that the study's authors found the use of the word "tidal" was too limiting to describe the habitat. AR 3247. Travis Longcore ("Longcore"), one of the co-authors of the Dark study, clarified that Ballona Lagoon periodically emptied into the Pacific Ocean but was always predominantly closed to the ocean. AR 11533. Pet. Op. Br. at 32.

Regardless, if CDFW believed the Ballona Wetlands were a predominantly tidal wetland prior to 1825, the FEIR should have set forth the disagreement between experts. Guidelines §15151. While the lead agency may ultimately disagree with the opinions of other lead agencies or experts, "[i]n order to serve the important purpose of providing other agencies and the public with an informed discussion of impacts, mitigation measures, and alternatives, an EIR must lay out any competing views put forward by the lead agency and other interested agencies." Banning Ranch, *supra*, 2 Cal.5th at 940. Yet, the FEIR contains no discussion that identifies the experts and controversy over the pre-1825 nature of the Ballona Wetlands. Pet. Op. Br. at 32; Grassroots Reply at 6.

Petitioners note that, instead of discussing the dispute, the FEIR broadened the definition of "restoration" to include both habitat restoration and creation. AR 8340–42 (citing 33 CFR §332.2). Petitioners admit that the DEIR states that the Project goals are to "restore, enhance and create estuarine and associated habitats". AR 214, 271. (Emphasis added.) However, 33 CFR section 332.2 separately defines "establishment (creation)". Even if CDFW may re-define federal regulatory terms, the DEIR is clear that Alternative 1 intends to restore tidal wetland in Area A and north Area B. AR 323. The FEIR fails to identify what portions of the Project constitute creation of tidal wetland in the amended FEIR Section 2.2.1.1 (The Definition of "Restoration"). *See* AR 8340. Pet. Op. Br. at 32-33.

Petitioners conclude that the practical implication of improperly defining "restoration" is that the public fails to appreciate that the Project will destroy rare alkali meadow and saltpan in favor of habitat that has not existed at the Ballona Wetlands for over 2,000 years. AR 10664, 11534, 11540, 11542. Responsible agencies not familiar with the Project may mistakenly believe that it constitutes restoration, not creation. This hazard is particularly acute for Coastal Commissioners who may only have time to review the FEIR's executive summary and must determine whether the Project fits within allowable activities in wetlands under the Coastal Act. Pub. Res. Code §30233(a)(6) (permitting diking and filling for "restoration purposes" in wetlands). As a result, the FEIR fails as an informational document. Pet. Op. Br. at 33.

The court does not agree. The FEIR clarifies that "restoration" means both reestablishment of natural processes and ecological functions and habitat creation or enhancement. AR 8341. That is sufficiently accurate, if not precise. "[I]n reviewing an EIR's discussion, [courts] do not require technical perfection or scientific certainty." Sierra Club, *supra*, 6 Cal.5th at 515. The "overriding issue on review is thus whether the lead agency reasonably and in good faith discussed a project in detail sufficient to enable the public to discern from the EIR the analytic route the . . . agency traveled from evidence to action." SoMa, *supra*, 33 Cal.App.5th at 331 (citation omitted).

Additionally, the EIR's reference to historic estuarine and tidal wetland is not entirely inaccurate. Petitioners do not assert that the Ballona Wetlands have always been closed to the Pacific Ocean, and the studies they cite acknowledge that there have been times during which the wetlands were open to the ocean, and thus open to tidal influence. AR 3247 (Ballona Lagoon system would be open to the ocean "during periods of significant rainfall"), 10664 ("The Ballona estuary/lagoon continued to experience...intermittent tidal conditions resulting from breaching during high flows"), 11533 ("access to the ocean depended on hydraulic forces during any given year"). To the extent that the FEIR's project description requires substantial evidence that the Ballona Wetlands have been subject to tidal ebbs and flows, it exists.

More important, as CDFW argues (Opp. at 28), the mere fact that the FEIR describes the Project as bringing about a return of tidal ebbs and flows is not an actionable violation of CEQA. An EIR's failure to meet CEQA's informational requirements is prejudicial only if it deprives the public and decision makers of "substantial relevant information" regarding the likely environmental impacts of the proposed project. Neighbors for Smart Rail, *supra,* 57 Cal.4th at 463. Information about whether the Ballona Wetlands historically was or was not subject to tidal influence is not relevant to an understanding of the Project's environmental impacts; the nature and extent of those impacts are determined based on environmental conditions at the Project site as they exist now. Guidelines §15125 (baseline for analyzing a project's environmental impacts generally should reflect existing conditions).

As CDFW argues, the public and decision makers might be interested in knowing that the Project is creating a new condition of tidal influence at the Ballona Wetlands as opposed to restoring a condition that was not there most of the time. But that distinction is meaningless for purposes of analyzing the Project's environmental impacts. Regardless of whether the wetlands historically were closed or open to tidal ebbs and flows, or whether the FEIR describes the Project as creating tidal influence or restoring it, the nature and extent of the Project's impacts on the present baseline environmental conditions at the Reserve are the same. *See* Opp. at 28.

The FEIR's reference to the Project as a restoration, and its definition of "restoration" to include both reestablishment and creation or enhancement, is not a misleading project description.

3. The Flood Control Design

The FEIR's failure to include the correct flood control design is the principal issue of this case. Petitioners argue that the FEIR fails to include in the project description the vastly larger flood control levee design required by the Corps. This prejudiced the public's review of the Project, particularly the true scope of the Project's habitat fragmentation. This failure also impermissibly deferred the required analysis of the larger flood control levees. Pet. Op. Br. at 14.

a. The Pertinent Facts

The Corps and CDFW initially prepared a joint DEIR/draft EIS. On August 22, 2012, the Corps referred CDFW to the Corps' O&M Manual for the required design discharges for the Project. AR 20009. The Corp representative stated that the design standard is based on the approved report for the original project, which he could not find because it dated back a lot of years. AR 20009. He attached the O&M Manual sheets and data tables and stated that the Project design should follow the discharges noted. AR 20009. The O&M Manual listed the design discharge as 46,000 cfs. AR 20014.

On February 28, 2017, the Corps asked CDFW what the "authorized discharge" is for the Project's channel. AR 19860. The Corps had learned that LACFCD[7] modified the original project that the Corps had designed and built and appeared to have raised the levees. AR 19860. The Corps had not confirmed why this was done and whether it was intended to increase the design discharge. AR 19860.

On March 20, 2017, the Corps noted that it had found some additional documents regarding design discharge. AR 19859. According to these documents, any changes to the channel should be designed for a future SPF of "unrestricted channel flow." AR 19859, 18829. The Corp had not found any documents to update the design discharge values, and they should be 68,000 cfs. AR 19859.

On April 3, 2017, CDFW informed the Corps that CDFW previously identified the design discharge as 46,000 based on the flow rate in the O&M Manual and the Corps' previous email. AR 19859. A review of the 1959 and 1963 LACFCD design drawings for the levee modifications indicated a design discharge of 49,500 cfs. AR 19859. The hydrology report referenced in the Corps' email referred to a future, unrestricted SPF of 68,000 cfs but that did not match the Ballona Creek channel as constructed. AR 19859. CDFW also understood that the channel upstream of the Reserve could not contain a flow of 68,000 cfs. AR 19859.

The Corps replied that the Ballona Creek channel was designed for the SPF discharge, which changed over time as a result of development in the watershed. AR 19793. Based on a 1979 feasibility study, the SPF values were approved, and the table indicates a discharge of 68,000 cfs. AR 19793, 19596. The Corps would not go back and redesign the Project for the original design discharge of 46,000 cfs. AR 19793. To change the authorized level of protection for a flood risk project, CDFW would have to have a new feasibility study that used risk-based

[7] LACFCD is the non-federal sponsor for LACDA and therefore any applications for a Section 408 permit must be submitted by LACFCD. AR 25109.

probabilistic methodology and procedures, and it would have to be presented to Congress for reauthorization. AR 19793. Even in that circumstance, the Section 408 permitting process follows almost the same methods of approval, and the outcome would still require a design discharge of 68,000 cfs. AR 19793.

On April 21, 2017, a CDFW employee sent an internal email to another CDFW employee that the 68,000 cfs flow rate was presenting a real problem. AR 19596. The County believed (but would not say in writing) that the 68,000 cfs is unreasonable because it is a hypothetical scenario that could not happen. AR 19596. The 68,000 cfs standard may require re-visiting a few chapters, raising the levee height, and all the calculations that go with it. AR 19596. He asked the other employee what he had remaining up his sleeve to deal with this problem. AR 19596.

Four days later, on April 24, 2017, CDFW's engineers informed a State Coastal Conservancy employee that they ran a hydraulic model based on a discharge of 68,000 cfs. AR 19580. The model showed that the south levee would be shallowly overtopped upstream of Lincoln Blvd, but that the rest of the channel would convey 68,000 cfs. AR 19580. The State Coastal Conservancy forwarded this information to the Corps. AR 19580.

In September 2017, the same month that the DEIR was issued, the Corps sent CDFW a formal letter that the Project's Section 408 permit application was being withdrawn. AR 18321. While CDFW had provided preliminary engineering design information, it did not provide the detailed engineering information needed for a preliminary technical analysis of the application. AR 18321. CDFW did not anticipate providing the required information for approximately two years, and the Corps would reinitiate review of the previously submitted Section 408 permit application and restart the EIS process upon its receipt. AR 18321.

On April 6, 2019, the Corps informed CDFW that it would not issue a final EIS until after CDFW submitted additional design information for the Project and the Corps had a chance to review it. AR 18513. CDFW estimated that it could take 2.5 years to draft and provide that information and decided to separate its EIR from the Corps' EIS to avoid an extended delay for the certification of the EIR. AR 99022, 103951.

On October 19, 2019, the State Coastal Conservancy requested then-Senator Kamala Harris to process a WRDA request to lower the authorized flood control standard to 46,000 cfs as that is "the documented design flow rate of the existing channel." AR 25082-84. The WRDA request triggered emails between the Corps and LACFCD indicating that the State Coastal Conservancy did not consult either entity prior to submitting the request. AR 24801-03. In one email, the Corps said that it could not support the lower number without an "H&H analysis" and a decision document to support the lower number. AR 24812. Another Corps employee noted that the proposed WRDA language would reinforce the existing authorized design discharge of 46,000 cfs but that any modification of the Ballona Creek channel would still be subject to the Section 408 permit requirement of no increased flood risk, a matter which is independent of design discharge. AR 24811. Since the Project would reduce the existing capacity of the Ballona Creek channel, it would increase the flood risk. AR 24811.

On October 22, 2019, after a conference call, Public Works (LACFCD) informed the Corps that it had decided to support the higher discharge number as documented in the Corps' 1979 report. AR 24809. The project manager's notes explained that any change to the existing 68,000 cfs standard would require detailed analysis of changes in velocity, water surface profiles, flow distribution, scour analysis, sediment transport analysis, and upstream and downstream impacts of proposed alterations. AR 24809.

On January 29, 2020, the State Coastal Conservancy wrote to CDFW and the Corps that the reports with an SPF value of 68,000 cfs were created in 1978. AR 18070, 25092. If the Project modifies the flood control channel, it either should convey the SPF or the Corps and the County should make new models to update the SPF to reflect current conditions. AR 18070.

In response to Petitioner Protect's subsequent inquiry, the Corps explained that it would consider any information a Section 408 permit applicant provides whether to change the flood standard for the Ballona Creek channel. AR 18196. The Corps has not taken a position on whether the channel's SPF should be changed, and it expected CDFW to provide this information in mid- to late-2020. AR 18196. When the Corps issues a final EIS, it would include a preliminary decision regarding the SPF as well as for the Section 408 permit application. AR 18196.

b. Analysis

Petitioners contend that the FEIR analyzes a 46,000 cfs flood control design that CDFW knew would be infeasible. Its omission of the 68,000 cfs design from the project description in favor of the lower design standard minimized environmental impacts in violation of CEQA. Pet. Op. Br. at 14-15.

When the DEIR was published, CDFW knew that the Corps would require the 68,000 cfs flood control design. CDFW also knew that its own hydraulic model based on a discharge of 68,000 cfs showed that the south levee would be shallowly overtopped upstream of Lincoln Blvd with the rest of the channel would convey 68,000 cfs. AR 19580. By the date of the FEIR, CDFW knew that Public Works had decided to support the 68,000 cfs number and that any change to the existing 68,000 cfs standard would require a detailed analysis of changes in velocity, water surface profiles, flow distribution, scour analysis, sediment transport analysis, and upstream and downstream impacts of proposed alterations. AR 24809. CDFW also knew that the Corps had rejected its preliminary engineering design information and was willing to look at CDFW's additional engineering on this issue, but it would not change its view absent clear evidence of no increased flood risk. Further, CDFW knew that the 68,000 cfs standard may require re-visiting a few chapters, raising the levee height, and all the calculations that go with it. AR 19596.

The DEIR makes it appear that the 46,000 cfs standard for the Project had been approved by the Corps: "Based on preliminary direction from Corps staff, analyses of flood performance were based on the design flow rate of 46,000 cfs..." AR 1133 (emphasis added). Petitioners correctly argue that, by repeating an outdated Corps standard instead of disclosing the Corps' actual position, the DEIR is not a good faith effort at disclosure.

The DEIR only mentions the 68,000 cfs requirement in a conclusory footnote:

> "The Ballona Creek channel was designed in the 1930s, and documentation for the original design capacity is limited. LACFCD design drawings (1959) and as-builts (1963) for later work on the segment of the Ballona Creek channel within the Ballona Reserve indicated a design discharge of 49,500 cfs. Documentation for other, subsequent projects refers to a Standard Project Flood (SPF) flow of 46,000 cfs, which was first computed by the Corps in the 1950s. The SPF figure was later revised to identify a future, unrestricted SPF of 68,000 cfs. The authorized discharge will be confirmed by the Corps during the permitting process for the Project, but would not be higher than 68,000 cfs." AR 213 (emphasis added).[8]

[8] Petitioners suggest that the last sentence of the footnote wrongly implies that the permit would authorize something less than 68,000 cfs but that CDFW knew that 68,000 cfs is the

An EIR must make a reasonable effort to explain the nature and magnitude of a project's impacts. Friant Ranch, *supra*, 6 Cal.5th at 519. Pursuant to the 68,000 cfs standard, the Project's levees must be able to handle water forces approximately 50% more powerful than those analyzed in the FEIR. AR 213, 309, 19793, 19859. The design standard required by the Corps is left out of the FEIR's analysis. Instead, every metric, table, chart, and measurement of flow is based on the 46,000 cfs standard. AR 1134 (Table 3.9–7), 1144 (Figure 3.9–9), 1163 (Figure 3.9–10), 1162 (Figure 3.9–12), 1112, 1128, 7476, 7481, 7631, 7663.

CDFW argues that the FEIR states that the Project, and specifically the levees that will be constructed to protect against flooding from Ballona Creek, are designed to accommodate a flow rate through the creek of up to 46,000 cubic feet per second (cfs). AR 1112. The FEIR further states that 46,000 cfs is the same flow rate that was used for the original design of the Ballona Creek channel (AR 7475), that 46,000 cfs would exceed the peak flow for a 100-year event at this location (AR 7476), and that CDFW used that flow rate based on a directive from Corps staff (AR 1133). CDFW contends that these statements are accurate. Opp. at 11-12.

These statements are accurate.[9] However, the FEIR leaves the false impression that the Corps' decision to pull out of the joint EIR/EIS process was mutual. AR 8301 ("Corps and CDFW have elected to prepare stand-alone final environmental analysis..."); AR 13828 (CDFW explained that "the Corps wanted more design information before they would complete the EIS. CDFW won't work on that additional design information until we've certified the EIR."). The FEIR also falsely assures that "implementation of [the Project] would maintain existing, <u>authorized</u> LACDA project levels of flood risk management". AR 8328. The existing <u>authorized</u> levels are 68,000 cfs.

More important, the FEIR's mere mention of the correct Corps design standard of 68,000 cfs is insufficient to alert the public to potential impacts. The DEIR and FEIR mention the 68,000 cfs flow standard but still analyze flood control using the 46,000 cfs standard. AR 213, 309, 1112, 1128, 1133, 1134, 1144, 1163, 7476, 7481, 7631, 7663. One of the main Project objectives is "[e]nsuring that structural changes to [the Ballona Creek channel and levee system] satisfy Corps and LACFCD criteria for functional, operational, and maintenance purposes." AR 210, 213. The DEIR refers to hydraulic modeling for 46,000 cps (AR 1112, 1130-34), and the FEIR does not even mention the hydraulic modeling based on a discharge of 68,000 cfs referred to in CDFW's April 24, 2017 email to a State Coastal Conservancy employee. *See* AR 7475-76, 7481, 7631, 7663, 19580.

This does not assure the public that the Project will meet flood standards. As a result of the DEIR's and FEIR's reliance on the 46,000 cfs standard, Petitioners correctly argue (Pet. Op. Br. at 16) that environmental consequences remained hidden from public view. Petitioners describe this as a fragmented presentation giving conflicting signals. *See* Banning Ranch, *supra,* 2 Cal.5th at 941 ("a fragmented presentation is inadequate"). Pet. Op. Br. at 18. Fragmented or not, the public is not supposed to guess at the increased impacts from the larger flood control

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minimum standard required by the Corps. Pet. Op. Br. at 15-16.

[9] AR 1133 states that the 46,000 cps flow rate was based on "a preliminary direction from Corps staff". In an August 22, 2012 email, the Corps stated that "[t]he design should follow the discharges noted" in the O&M Manual. *See* AR 20009. The O&M Manual's discharge rate apparently was 46,000 cps. *See* AR 20014. Therefore, the statement of a preliminary direction from the Corps is accurate.

standard. A CDFW employee admitted that the 68,000 cfs standard may require re-visiting a few chapters, raising the levee height, and performing all the calculations that go with it. AR 19596. Yet, none of this was addressed in the FEIR. *See* Santiago County Water Dist. v. County of Orange, ("Santiago County") (1981) 118 Cal.App.3d 818, 829–30 (failure to include a required water pipeline in a mining project description was fatal to the informational purpose of CEQA as "some important ramifications of the proposed project remained hidden from view at the time the project was being discussed and approved").

Additionally, the levees crisscrossing both existing and proposed restored habitat consist of a 30-foot-wide vegetation free zone in which only grasses may be maintained and 15-foot-wide buffers allowing only limited small shrubs, all subject to invasive pest control for rodents and clearance for fire safety. AR 28443. These levees create potential wildlife impacts.

First, the levees limit the amount of habitat in the Reserve. Based on the 46,000 cfs design standard, the Project would require conversion to levees of over 36 acres of upland habitat around the saltpan or in the existing marsh in the southeastern portion of Area B. AR 28443. Because the proposed levee and berm systems (AR 348) permeate virtually every upland habitat area and much of the proposed salt marsh (AR 337), the amount of restored habitat is limited. *See* AR 826.

Second, there is a concern that the levees will exacerbate habitat fragmentation. AR 383, 8384, 9310. Coastal wetland habitats are typified by "a large expanse of low gradient open space that allows waterfowl and other wildlife to traverse unimpeded across the landscape and between habitats." AR 8384. The levees degrade habitat value for special-status bird species by fragmenting their foraging and breeding areas.

Third, because the levees are raised, activity on them could disturb prey species. AR 28461. Land Protection Partners ("LPP") noted: "Part of the reason that birds roost in open areas like salt pans is that they can see predators from a great distance. The berm and trail system would bring activity that would be perceived as dangerous closer to prey species, decreasing the value of the habitat for those species." Id.

Petitioners contend that the 68,000 cfs standard will require larger levees which would exacerbate all these impacts to wildlife habitat. As a result, the amount of soil that must be excavated to build the levees, the area that the levees must cover, the aesthetic impacts, and the impacts to flora and fauna are understated in the FEIR. Pet. Op. Br. at 16-17.

Whether or not this is true, the FEIR does not analyze the wildlife impacts of flood control under the 68,000 cfs standard, including whether larger levees will be required and whether they will impact habitat and impacts to prey, foraging, and nesting areas. The failure to do so thwarts public review of the full scope of both flood control and biological impacts, rendering the FEIR defective. *See* Santiago County, *supra*, 118 Cal.App.3d at 831.[10]

As Petitioners argue, the defects in the FEIR's project description surpass those in Stopthemillennium where the EIR provided "only conceptual drawings of a development that might not be built." 39 Cal.App.5th at 11 (emphasis added). Here, the FEIR is based on flood control design criteria that currently are infeasible under the Corps' requirements and cannot be built. The FEIR's inadequate depiction of the Project design underreports impacts, misleads the public, and thwarts the EIR process, rendering it inadequate as a matter of law. Pet. Op. Br. at 18-19.

CEQA requires an agency to evaluate the environmental effects of a project at the earliest

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[10] The FEIR also does not explain the additional aesthetic impacts resulting from the additional height, armoring, vegetation free zones, and levee slopes.

possible stage in the planning process. City of Redlands v. County of Sn Bernardino, ("City of Redlands") (2002) 96 Cal.App.4th 398, 410. Guidelines §15151 (EIR's inclusion of information is judged by what is reasonably feasible to include). Key to deciding the correct time for CEQA compliance is whether the agency has taken any action that "gives impetus to a planned or foreseeable project in a manner that forecloses alternatives or mitigation measures that would ordinarily be part of the CEQA review". Guidelines §15004(b)(2)(B). Kings County, *supra,* (1990) 221 Cal.App.3d 692, 738 (review must occur early enough in the planning stage of project to enable environmental concerns to influence its design). "[T]he line must be drawn neither so early that the burden of environmental review impedes the exploration and formulation of potentially meritorious projects, nor so late that such review loses its power to influence key public decisions about those projects." Save Tara v. City of West Hollywood, (2008) 45 Cal.4th 116, 130-31.

Review of the 68,000 cfs flood standard would not be premature. Even if CDFW might develop engineering studies that would persuade the Corps that a lower 46,000 cfs is acceptable, such studies did not exist at the time of the DEIR or the FEIR. Thus, the 68,000 cfs design requirement and levee expansion is a reasonably foreseeable condition – indeed, the most foreseeable condition – of the Project's flood control design. *See* League to Save Lake Tahoe v. Cnty. of Placer, (2022) 75 Cal.App.5th 63, 104 (lead agency may not be justified in rejecting another agency's standards when the EIR "offers no other scientifically based information" for rejecting them). Guidelines §15144 ("While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can."). An EIR must include analysis of environmental effects of future expansion or other action if it will likely change scope of project or its existing effects. Laurel Heights I, *supra*, 47 Cal.3d at 396 A review of the 68,000 cfs standard is required to determine if environmental concerns will influence its flood control design. *See* Kings County, *supra*, 221 Cal.App.3d at 738.[11]

CDFW argues that the Corps has yet to finally determine the flow rate (SPF) that will be required for the Project. The Corps plans to make that decision as part of the Section 408 permit application process and has indicated that it will consider any information submitted by CDFW regarding the need to change the SPF and then provide a "preliminary decision regarding the Corps review of the standard project flood" when it issues its final EIS. AR 18196. Opp. at 12.

CDFW cannot defer analysis of the 68,000 cfs design until completion of the Corps' NEPA process. *See* AR 213, 13828. The FEIR is required to provide an impacts analysis based on the required standard of 68,000 cfs SPF and not defer the analysis to the Corps' NEPA process. Guidelines §15020; *see* Stopthemillennium, *supra*, 39 Cal.App.5th at 19; Citizens for Quality Growth v. City of Mt. Shasta, (1988) 198 Cal.App.3d 433, 442, n. 8 (city could not refuse to consider the project's impacts on wetlands simply because the Corps has federal authority over

[11] Petitioners correctly distinguish this case from Dry Creek Citizens Coal. v. Cnty. of Tulare, ("Dry Creek") (1999) 70 Cal.App.4th 20, which upheld an EIR that analyzed the technical and environmental characteristics of a flood control infrastructure and imposed well-established criteria as conditions of approval. Id. at 35. In Dry Creek, the bypass channel proposed and evaluated in the EIR was properly described as having "a 10-foot-wide bottom and 2:1 slopes and a depth of 10 feet." Id. The court found that the general description of the diversion structures coupled with approval of final designs after approval did not violate any CEQA mandate. Id. at 36. Here, the FEIR fails to set out and analyze the design criterion of 68,000 cfs, not detail specifications. Pet Op. Br. at 19-20.

wetlands protection). Such an approach "would permit lead agencies to perform truncated and siloed environmental review, leaving it to other responsible agencies to address related concerns seriatim," has been expressly rejected by the California Supreme Court. Banning Ranch, *supra*, 2 Cal. 5th at 918, 941.[12]

CDFW argues that it engaged in a good faith disclosure and truthfully informed the public of the design of the Project and the levees based on a flow rate of 46,000 cfs. The DEIR also truthfully alerted the public to the possibility that the Corps eventually might require the use of a flow rate as high as 68,000 cfs. AR 213, 270, 309. In the event the Corps decides to require a higher flow rate, and if CDFW needs to redesign the levees in a manner that potentially would change the environmental impacts of the Project, then it may become necessary for CDFW to conduct additional environmental review. Unless and until that happens, the current FEIR fully and accurately apprises the public of the anticipated design, size and potential environmental consequences of the levees and the Project as a whole. Opp. at 14.

CDFW is wrong. As Petitioners argue (Grassroots Reply at 4), CDFW bears the burden of demonstrating that the Corps' 1979 standard of 68,000 cfs should be changed. AR 19793. Changing the SPF requires a new feasibility study of the watershed and then re-authorization of the SPF by Congress. Id. Even then, the Corps has made plain that Section 408 requires no increased flood risk, which is independent of design discharge. AR 24811. Since the Project would reduce the existing capacity of the channel, it would increase the flood risk and the Corps still will require 68,000 cfs. AR 24811. Even LACFCD supports the higher discharge number as documented in the Corps' 1979 report. AR 24809. While the Corps stated that it would consider anything presented by CDFW as part of its Section 408 permit application (AR 18196), it appears unlikely to change. In any event, it is reasonably foreseeable that the 68,000 cfs flow rate will be required.

CDFW argues that, even if the Corps requires a 68,000 cfs flow rate, it remains to be seen whether and to what extent that decision might necessitate any modifications in the design of the levees. Petitioners cite no evidence that "much larger levees" would be needed to accommodate the 68,000 cfs flow rate. In fact, the evidence is that the levees as currently designed can contain a flow rate of 68,000 cfs with some "overtopping" of the narrow jetty that separates the channel from Marina Del Rey. AR 19580, 211 (map of Project site showing the jetty between the Ballona Creek channel and Marina Del Rey). Opp. at 13, n. 5.

At trial, CDFW's counsel pointed to AR 7483 and argued that it shows that the levees will be around the Reserve perimeter with considerable flood plain in between. Any overtopping of the jetty in the southwest portion of west Area B (AR 337) would not call into question the design of the levees, which would be situated elsewhere. Counsel noted that one cannot assume that the levees would be required to be larger even with the 68,000 cfs. Given that the proposed levees would be capable of containing that higher flow rate, it cannot be assumed that a 68,000 cfs flow rate would require any redesign of the Project, let alone much larger levees. Opp. at 12-13.

CDFW adds that the record does not support a conclusion that it is reasonably foreseeable that any levee redesign would change the scope or nature of the Project's environmental effects. Given that the levees as currently designed would be capable of containing a flow rate of 68,000 cfs, it is not reasonably foreseeable that the any redesign would be so substantial as to require a new analysis of the environmental impacts of those levees. CDFW is under no obligation to

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[12] CDFW explained that it certified the FEIR prior to obtaining a Corps' EIS to avoid delay (AR 99022) but this is not a reason to certify an incomplete FEIR.

analyze the possible environmental impacts of a hypothetical levee redesign that may or may not become necessary. *See* Laurel Heights I, *supra*, 47 Cal.3d at 395 ("no purpose can be served by requiring an EIR to engage in sheer speculation as to future environmental consequences"). Opp. at 13-14.

CDFW's argument that the current levee design can handle 68,000 cfs is based on its own engineering analysis which the Corps found to be inadequate. AR 18321. CDFW's own employee stated that the 68,000 cfs flow rate presented a real problem that may require re-visiting a few chapters, raising the levee height, and all the calculations that go with it. AR 19596. Moreover, CDFW has the burden to show that the 68,000 cfs would not require higher levees and cannot overcome the FEIR's deficiencies by impermissibly placing the burden on Petitioners to prove a flood control design environmental impact that should have been addressed in the FEIR. CDFW, not Petitioners, was required to analyze in the FEIR the authorized 68,000 cfs flow rate and its impact on flooding, levee design, and wildlife and their habitats. Petitioners correctly add that the conclusion that the higher flow rate would spill over a jetty but that would not "call into question the design of the levees" is precisely the type of information that should be in the FEIR. *See* Protect Reply at 6.[13]

In sum, the FEIR fails to (1) state that the Corps currently intends to impose a 68,000 cps standard, (2) analyze the flood impacts of the Project under that flow standard, and (3) analyze the wildlife and habitat impacts of a levee design change under that standard. CDFW's failure to do so was a failure to proceed in the manner required by law. Protect the Historic Amador Waterways v. Amador Water Agency, ("Amador") (2004) 116 Cal.App.4th 1099, 1112.

4. The Project Description's Performance Criteria for Restoration

a. Pertinent Facts

(i). The HRMP Requirement

The DEIR explains that the Project incorporates certain design features intended to avoid or offset certain adverse impacts that could arise during project implementation, while also maximizing the anticipated beneficial environmental effects of the Project. AR 326. The DEIR expressly states that these Project design features are "not optional" and that its analysis of the Project's environmental impacts assumes that they will be implemented if the Project is approved. Ibid.

The DEIR's required mitigation measures (AR 326, 230-31, 328-29) include preparation and implementation of a HRMP, which shall be prepared before commencement of any restoration activities that involve vegetation or land disturbance. AR 328-29. Separate HRMPs may be required for different habitat types or species, and all restoration activities shall comply with an applicable HRMP. AR 328.

The purpose of an HRMP is to evaluate the progress made toward achieving the restoration goals for each of nine target habitat types, and to inform the need for adaptive management. AR 442-58. If progress toward performance criteria is not measurable or the habitat progresses toward

[13] CDFW's opposition's arguments concerning the flood control issue are not in the FEIR itself. "That a party's briefs to the court may explain or supplement matters that are obscure or incomplete in the EIR...is irrelevant, because the public and decision makers did not have the briefs available at the time the project was reviewed and approved." Vineyard, *supra*, 40 Cal.4th at 442-43; Friant Ranch, *supra*, 6 Cal.5th at 520 (explanations in a brief about the EIR are "directed at the wrong audience").

an alternative state, CDFW will evaluate the causes and whether performance criteria are being met to determine whether to intervene. AR 451.

The DEIR provides detailed instructions how an HRMP should be developed and what specific information should be included. AR 328-29. The HRMP shall identify (1) specific restoration activities and monitoring programs to implement during restoration and any long-term habitat management, (2) a timeline for the implementation of the monitoring program, with a work plan or schedule for long-term monitoring after the site has achieved applicable performance goals, and (3) specific protocols for monitoring. AR 328-29.

Performance criteria are first based on the primary ecological drivers of habitat development and function, the characteristic expression of such ecological drivers, and the primary values of the habitat. AR 444. A HRMP allows CDFW to revise performance criteria based on lessons learned in the Project's early stages. AR 442. The use of performance criteria relative to the conditions at reference sites should help overcome uncertainties related to habitat development and the regional impact of stochastic (random observation) events. AR 444. When the course of habitat development is relatively uncertain or when monitoring parameters are highly variable, CDFW may assess performance relative to conditions in suitable reference habitats in the region. AR 443.

The DEIR states that the purpose of a HRMP is to evaluate the progress made toward achieving the goals of the restoration and to inform the need for adaptive management, all as described in DEIR Section 2.2.2.6. AR 442-58. The DEIR further provides that a HRMP shall identify (a) specific restoration activities (*e.g.*, revegetation, removal of non-native plants, weeding, reseeding) and a monitoring program and any long-term habitat management as described in DEIR Section 2.2.2.6, (b) a timeline for the long-term monitoring after the site has achieved performance goals, and (c) specific protocols for monitoring. AR 329. The DEIR also identifies performance criteria that must be satisfied for the nine habitat types that are the focus of the Project, including through the restoration and monitoring activities identified in a HRMP. AR 444-51.

Special-status plant and wildlife species will be subject to focused monitoring efforts. AR 443. This would help identify trends in abundances and habitat use and inform the need for active management of the species or habitats in which they reside. AR 443. Separate habitats or species have separate criteria and may require separate HRMPs. AR 328, 445.

The DEIR's Stormwater Management Plan proposes that LACFCD would be responsible for the vegetation management in the levees and maintenance zones. AR 5437. In the event buried armoring is exposed after a storm, natural processes would be allowed to rebury or revegetate those areas. AR 5438-39.

(ii). <u>The Conceptual Plan</u>

The 148-page Conceptual Plan appendix in the DEIR provides further guidelines for HRMP preparation with the principle of adaptive management. AR 5265, 5273. "Adaptive management" is an iterative process whereby restoration practices are guided by best available technologies and hypothesis testing, with implementation and monitoring to evaluate results. AR 5279. An adaptive management plan will include triggers for remedial action to achieve the performance criteria for the various habitats. AR 5279.

Some aspects of the restoration plan involve restoration in the sense of recovering historical conditions. AR 5277. However, most aspects of the plan involve reestablishment of natural processes and either habitat creation where none existed or habitat enhancement (modification of existing conditions). For convenience, the Conceptual Plan's reference to "restoration" includes all of them. AR 5277.

The biological components of the Conceptual Plan, combined with hydrological and geomorphological design components, will inform the final design and implementation of the proposed restoration. AR 5273. Because there is not enough information to make a decision in some cases, the Conceptual Plan uses "should" rather than "shall" or "will" to show the uncertainty. AR 5273.

The Conceptual Plan outlines creation, restoration, an enhancement goals and objectives to both increase and improve tidal wetland plant, as well as flood control and water quality improvement. AR 5276. The public access objective includes preserving and increasing public access in a manner compatible with sensitive habitats and special-status species in the Reserve. AR 5278.

The Conceptual Plan explains that mitigation efforts often use rigid performance criteria to determine the success or failure of a project. AR 5323. To provide flexibility avoid a rigid framework to determine success, the plan uses the term "success criteria" instead of "performance goals." AR 5323. That said, regulatory agency permitting processes will refine the terms of the plan where regulatory agencies impose additional performance and monitoring requirements. AR 5318, 5323. The restoration plan's approach may also change based on funding constraints and regulatory requirements. AR 5316.

Triggers for adaptive management should be based on significant deviation from achieving performance goals. AR 5324. When CDFW's monitoring activities identify any deviations from the performance goals, an evaluation of the causes should be undertaken to determine if intervention is warranted. AR 5324. For instance, if saltpan or seasonal wetland habitats fail to meet hydrology performance goals, changes to the grade of the site may be necessary. AR 5325. If it is determined that a change will cause unacceptable disturbances to other habitats or animal populations in the Reserve, it may be necessary to reevaluate the performance goals. AR 5325. Any proposed modification to the performance goals or methods for achieving them should be subject to quantitative monitoring and analysis specifically designed to evaluate the effectiveness of such modifications. AR 5324. All decisions of adaptive management should be documented. AR 5325.

For upland habitat, reference habitats elsewhere in the region may provide a standard to assess project performance. AR 5320. If it is determined that trends in vegetation establishment or use by bird species are not on track to meet performance goals, an assessment will be conducted to determine if the deviations stem from circumstances unique to the Project site or on a regional scale. AR 5365. The Conceptual Plan describes the process to use to identify appropriate reference sites, potential candidates, and the factors to assess them. AR 5320-22. In general, any site with remnant or restored wetlands which demonstrates desirable qualities such as high diversity of native species or populations of rare plants or wildlife should be considered as a potential reference site. AR 5321. Because of the range of habitats in the Reserve, a range of potential reference sites may be necessary. AR 5327, 5338, 5345.

For tidal marshes, if marsh vegetation is not on track to meet long-term goals, corrective actions may include additional planting of tidal marsh species to increase the rate of vegetation establishment, the introduction of soil amendments to alter soil physical or chemical properties, or the addition of temporary irrigation or modifications to the tidal regime to improve plant growth or hinder the establishment of invasive species. AR 5332. For bird use of tidal marsh vegetation, corrective actions may include modifications to the management of vegetation, soil properties, or tidal regimes to create appropriate habitat structure for birds or to promote increased use of tidal marsh habitat by benthic (bottom of a lake) invertebrates or fish species. AR 5332.

b. The Project Description Incorporates Mitigation Requirements

Petitioners contend (Pet. Op. Br. at 24) that the incorporation of mitigation measures for potentially significant impacts in the FEIR project description (AR 828–29) distinguishes the FEIR from cases upholding an EIR against challenges to project components that were not relied upon to reduce impacts to less than significant levels. Because the FEIR's performance criteria and HRMP function to reduce the impacts of bulldozing hundreds of acres of habitat -- which the EIR admits are potentially significant without effective restoration -- they must be sufficiently definite and enforceable to ensure that the impacts remain less than significant. *See* Guidelines §15126.4(a)(1)(B).[14] CDFW does not disagree. *See* Opp. at 21.

CEQA requires an EIR to propose and describe mitigation measures to minimize a project's significant environmental impacts. Pub. Res. Code §§ 21002.1(a), 21100(b)(3); Guidelines §15126.4(a)(1). "Mitigation" is defined to mean avoidance of impacts, minimizing impacts, rectifying, reducing, or eliminating impacts, and compensating for impacts by replacing or providing substitute resources. Guidelines §15370; Mountain Lion Foundation v. Fish & Game, (1996) 16 Cal.4th 105, 119. Mitigation measures must be feasible—capable of being successfully accomplished in a reasonable amount of time, considering economic, environmental, social, and technological factors—and enforceable. Pub. Res. Code §21061.1; Guidelines §15126.4(a)(1)-(2).

Formulation of mitigation measures should not be deferred to a future date, but their specific details may be developed after project approval when it is impractical or infeasible to include those details during the project's environmental review, if the agency also (1) commits itself to the mitigation, (2) adopts specific performance standards the mitigation will achieve, and (3) identifies the type(s) of potential action(s) that can feasibly achieve that performance standard and that will considered, analyzed, and potentially incorporated in the mitigation measure. Guidelines §15126.4(a)(1)(B). Compliance with a regulatory permit or other similar process may be identified as mitigation if compliance would result in implementation of measures that would be reasonably expected, based on substantial evidence in the record, to reduce the significant impact to the specified performance standards. Guidelines §15126.4(a)(1)(B).

To take advantage of the exception to deferred mitigation in Guidelines section 15126.4(a)(1)(B), the agency must commit to specific performance criteria to measure efficacy of the mitigation. King & Gardiner Farms, LLC v. County of Kern, ("King & Gardiner") (2020) 45 Cal.App.5th 814, 856. A failure to set forth specific performance criteria constitutes a procedural violation of CEQA. *See* id. at 858. "Essentially, the rule prohibiting deferred mitigation prohibits open-ended performance criteria....If the measures are open-ended, such that they afford the applicant a means of avoiding mitigation during project implementation, it would be unreasonable to conclude that implementing the measures will reduce impacts to less than significant levels." Center for Biological Diversity v. Dept. of Fish & Wildlife, (2015) 234 Cal.App.4th 214, 240. Similarly, mitigation measures cannot be intentionally vague; the agency must explain details such as how the mitigation measure will be implemented. Gray v. County of Madera, (2008) 167

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[14] At trial, Petitioners' counsel explained that their challenge to performance criteria may either be viewed as a challenge to the project description or to the mitigation "baked into" the FEIR.

Cal.App.4th 1099, 1118. Improper deferred mitigation is a failure to proceed in the manner required by law. Communities for a Better Environment, *supra,* 184 Cal.App.4th at 89-90.

For construction projects, as opposed to comprehensive zoning or general plan amendments, CEQA demands greater specificity "because the effects of construction can be predicted with greater accuracy." Guidelines §15146(a). Conceptual elements of a construction project may be permissible only in an unusual circumstance when precise details cannot feasibly be provided before approval and would "be likely subjects of supplemental review before a final design was approved." Stopthemillennium, *supra,* 39 Cal.App.5th at 13. Deferring the formulation of definite project features short circuits the informational purpose of CEQA. "When properly drafted, an EIR furnishes both the road map and the environmental price tag for the project so that the decision maker and the public both know how much they and the environment will have to give up in order to take that journey." Id. at 14. An indefinite description deferring formulation of project components "render[s] this 'price tag' unascertainable." Ibid. Pet. Op. Br. at 23.

c. Analysis

Petitioners contend that the FEIR lacks clear, enforceable guardrails limiting CDFW's discretion to scale back habitat restoration goals because the HRMP and the performance criteria are not binding commitments. Because species recovery hinges on effective restoration, the HRMP and performance criteria for various habitat types in Tables 2–12 through 2–20 do "all the heavy lifting" for reducing Project impacts. Without binding restoration objectives, the FEIR conceals the extent of impacts before mitigation, precludes comment on impacts, and obscures the need for additional mitigation. Pet. Op. Br. at 27.

The HRMP is merely conceptual, and the actual plan would be prepared only after Project approval. AR 326–28. In fact, the DEIR frankly states its intention to circumvent "the impression of a rigid framework for assessing the project's performance" that is required for mitigation measures. AR 5323–24. As a result, the HRMP admits that performance criteria are subject to change based on regulatory requirements without assuring the public that these changes will not reduce the performance criteria. Id. Given the Corps' insistence on larger flood control design, the failure to incorporate constraints against changing the restoration criteria alone is cause to invalidate the FEIR. *See* Stopthemillennium, *supra*, 39 Cal.App.5th at 23–24 ("[E]ven the limits imposed are vague and ambiguous."). Pet. Op. Br. at 25, 27.

The DEIR also admits that, even after a final HRMP is developed after Project approval, "it is likely that some aspects of the [HRMP] will be changed based on funding constraints[.]" AR 5316. The FEIR is distinguishable from cases upholding EIRs against allegations of uncertain funding because the project description claims that changes in funding could alter restoration goals. The FEIR cannot insist that habitat restoration is an integral Project objective while also reserving the ability to jettison those restoration goals based on funding. Once CDFW commits to the wholesale destruction of hundreds of acres of habitat, it must be legally bound to a restoration plan regardless of future penny-pinching. *See* King & Gardiner, *supra,* 45 Cal.App.5th at 860 ("Once the project reaches the point where activity will have a significant adverse effect on the environment, the mitigation measures must be in place."). Pet. Op. Br. at 25-26.

The DEIR further expands CDFW's authority to nullify the performance criteria by allowing changes based on unspecified "reference habitats" without establishing standards for the suitability of such reference habitats or ensuring such comparisons would not erode the initial criteria. AR 443. The DEIR grants CDFW discretion to choose the lowest-scoring, most degraded sites as reference habitats to lower the bar for performance criteria and gut Project restoration objectives. AR 443. The DEIR contemplates basing restoration goals on reference sites that are "either highly degraded or are the subject of on-going restoration efforts and may not function in the same way as undisturbed wetlands in the region." AR 5320. Moreover, the DEIR puts no limits on whether the lessons learned from reference sites would dilute or strengthen the initial performance criteria. AR 9576. If the lessons from cherry-picked reference habitats are that certain species cannot be easily re-established after their habitat has been bulldozed, this is a loophole for the HRMP to jettison the obligation to take corrective action for special-status species. AR 443-44. Pet. Op. Br. at 26; Protect Reply at 11-12.

Petitioners add that that the FEIR's indefinite project description infects its analysis of biological impacts. Without clear and binding standards and limits on CDFW's discretion to modify them, the FEIR's biological analysis is deficient. The DEIR recognizes potentially significant impacts to many species and habitats (AR 828–29) and numerous performance criteria are measured relative to pre-construction conditions. AR 445 (Tidal Marsh Birds), 446 (Tidal Channel Fish), 447 (Mudflat Macroinvertebrates and Birds), 449 (Salt Pan Birds), 450–51 (Upland Scrub Birds). After the Project destroys unique wetlands, the FEIR does not target species for restoration criteria, instead promising that biological impacts will be less than significant because the Project will expand habitat for all species (which is not possible since so many habitat types would be obliterated if the Project proceeds). Yet, even slight alterations to the initial performance criteria would allow CDFW to declare "mission accomplished" when habitats do not rebound to pre-restoration conditions. Pet. Op. Br. at 27-28.

Finally, Petitioners argue that the indefinite project description thwarts public comment. Several commenters protested the lack of clear, binding restoration objectives. USFWS commented that "[w]ithout clear restoration objectives, the overall intended benefits of the project for wildlife are difficult to evaluate" and recommended that specific restoration objectives be tied to specific performance criteria. AR 8386. Petitioner Land Trust commented that the DEIR employs the term "adaptive management" as a "euphemism for deferred planning." AR 9004. Performance objectives are subject to change without defined parameters and "there is no framework for stakeholders to understand what new information is expected and what decision-points will factor into the specific adaptive measures that will occur." Id. Land Trust recommended performance objectives for each species of special concern, including maps and tables of habitat acreage. AR 8952. Pet. Op. Br. at 28.

Although these commenters illustrated their argument by reference to different species or habitat types, their common theme was that the public had no basis to know (1) the ultimate performance criteria for habitat restoration and species monitoring, (2) the basis on which the performance criteria would be amended, and (3) the corrective actions that would be required if restoration falls short of the performance criteria. Informed public and agency input is "the strongest assurance of the adequacy of an EIR" (Sutter Sensible Planning, Inc. v. Bd. of Supervisors, (1981) 122 Cal.App.3d 813, 823), and the FEIR's indefinite project description evades informed public comment. Pet. Op. Br. at 29.

CDFW dismisses as unmeritorious Petitioners' contentions that (a) the FEIR fails to adequately describe the Project because it fails to provide details for the contents of each HRMP and instead defers the formulation of those details until after the Project is approved and (b) the FEIR improperly defers identification of necessary mitigation measures by failing to commit to specific performance criteria in a HRMP. Opp. at 19.

The court agrees with CDFW that the FEIR does not improperly defer the formulation of the details of each HRMP. The DEIR provides detailed instructions how a HRMP should be developed and information about the proper contents of a HRMP, including the specific performance criteria against which a HRMP must assess the progress of the restoration. While the DEIR does not state the precise terms and conditions of any individual HRMP, those details necessarily must account for the specific characteristics of the habitat or group of habitats to which the HRMP will apply, including the nature of the habitat (*e.g.*, tidal marsh, mudflat, salt pan, dune, grassland) and the wildlife or plant species that occupy it. Given that the design and implementation of the proposed restoration is subject to review and approval by other regulatory agencies (AR 5273), wildlife and plant habitats change and evolve over time, and the start date for the restoration activities is uncertain, it would have been speculative for CDWF to attempt to formulate a detailed HRMP for any species or habitat. CEQA does not require that a lead agency engage in such guesswork. *See* Treasure Island, *supra,* 227 Cal.App.4th at 1054 ("the EIR cannot be faulted for not providing detail that, due to the nature of the Project, simply does not now exist"). Opp. at 20-21.[15]

The court also agrees with CDFW that the FEIR does not improperly defer mitigation by failing to identify specific performance criteria for a HRMP. The DEIR identifies specific and detailed performance criteria for evaluating the effectiveness of the restoration process (AR 444-51), and expressly requires that a HRMP incorporate any applicable criteria (AR 328). Separate criteria are established for each relevant habitat type (*e.g.*, tidal marsh, mudflat, saltpan, dune, grassland), for different time frames, and for different species and habitat features such as morphology and water quality. For example, separate and distinct performance criteria for tidal marsh habitats are identified for vegetation, birds, and fish, and in each case separate criteria are stated for years 1 to 3, 4 to 7, and 8 to 10. AR 445.

The Conceptual Plan's description of the adaptive management process also identifies specific measures that can be implemented if the Project is not making sufficient progress towards performance criteria. For example, if vegetation development in a tidal marsh area is not on track to meet the applicable criteria, "[p]otential corrective actions may include additional planting of tidal marsh species..., the introduction of soil amendments to alter soil physical or chemical properties, or the addition of temporary irrigation or modifications to the tidal regime." AR 5332. Similarly, if the extent to which birds are using a tidal marsh area is not on track to meet the performance criteria, "[p]otential corrective actions may include modifications to the management of vegetation, soil properties, or tidal regimes to create appropriate habitat structure for birds," and

[15] Petitioners argue that Treasure Island bears little resemblance to this case. The indefinite aspects in Treasure Island of street configuration, building height, and landscape design (227 Cal.App.4th at 1053) were not impact-reducing features of the project in the way that restoring bulldozed coastal habitats are in this case. Additionally, there was a robust framework in Treasure Island that "maintain[ed] tight control" on development, including both fixed and conceptual elements, while imposing "quantitative standards" addressing location, height, mass and setbacks. Id. at 1053–54. The Treasure Island decision noted that future revisions "quite likely will be the subjects of supplemental review before the final Project design is implemented". Id. at 1054. Here, the FEIR authorizes CDFW to change the goals of the Project with no quantitative standards or framework for supplemental review. Finally, the Treasure Island court acknowledged that indefinite aspects of a project description must not interfere with public comment. Id. at 1048. Protect Reply at 14. The court agrees that Treasure Island is factually distinguishable and stands only for a general proposition that an EIR need not provide detail that does not exist.

further suggests actions to manage the presence of possible bird predators. Ibid.

CDFW is correct that Petitioners largely ignore these specific performance criteria and instead focus on CDFW's lack of commitment to them. Yet, the DEIR provides that a HRMP shall be prepared prior to the commencement of any restoration activities that will result in any vegetation or land disturbance, that such a HRMP shall include the performance criteria set forth in DEIR Section 2.2.2.6, and that all restoration activities shall comply with an approved HRMP. AR 328. By committing itself to having a concrete plan in place for meeting applicable performance criteria, and by expressly committing to conduct those activities in compliance with that plan, CDFW has demonstrated its commitment to meeting those criteria. *See* Sacramento Old City Assn. v. City Council, ("Sacramento Old City") (1991) 229 Cal.App.3d 1011, 1029 (agency adequately demonstrates its commitment to performance criteria for mitigation where "future action to carry a project forward is contingent on devising means to satisfy such criteria"). Opp. at 22-23.

The inclusion of these specific performance criteria distinguishes cases from cases where mitigation was improperly deferred because no specific performance criteria were imposed. *See* San Joaquin Raptor, *supra*, 149 Cal.App.4th at 670 (mitigation for special-status species improperly deferred because "no specific criteria or standard of performance is committed to in the EIR"; the fact that future management plans would be prepared after consultation with wildlife agencies did not cure the error since no adequate criteria or standards were set forth); King & Gardiner, *supra*, 45 Cal.App.5th at 859 (mitigation measure requiring oil companies to develop a plan to reduce municipal and industrial water use by a specified date was improperly deferred mitigation).

CDFW also correctly argues that there is no reason why any regulatory agencies with jurisdiction over natural resources affected by the Project -- *e.g.*, the Fish and Game Commission, State Water Resources Control Board, or California Coastal Commission -- might insist on weakening criteria designed to avoid harm to the very resources those agencies are committed to protecting. To the extent that these regulatory agencies might require changes in the performance criteria, the Conceptual Plan contemplates only that the agencies would require "additional performance and associated monitoring requirements". AR 5318. In other words, the DEIR contemplates that these other agencies may require more rigorous performance criteria. Moreover, Petitioners' concern that other regulatory agencies might require a weakening of the performance criteria does not suggest CDFW's lack of commitment to those criteria. An EIR's commitment to performance criteria cannot be rendered ineffective by the possibility that another agency may require something else. Opp. at 23-24.

Petitioners' claim that the DEIR provides for changes to a HRMP based on "funding constraints" is incorrect. The Conceptual Plan includes a reference to funding constraints, but not in the section relating to the HRMP and its performance criteria and adaptive management elements. The funding reference appears in a DEIR section discussing the general "restoration approach" for the restoration plan and the fact that "several alternatives are being considered". AR 5316. The court agrees with CDFW that this reference to funding for restoration has no bearing on mitigation once restoration occurs. Opp. at 23, n. 8

CDFW addresses Petitioners' argument that the FEIR's commitment to performance criteria is illusory because those criteria might be modified. CDFW argues that Petitioners' speculative concerns fail to provide any basis for disregarding CDFW's express commitment to meeting the performance criteria. Opp. at 23.

As for the possibility that CDFW might modify performance criteria based on an improved understanding of habitat development or species requirements, the Conceptual Plan's adaptive management process provides for modifications to the performance criteria only in limited circumstances and subject to strict guidelines. When CDFW's monitoring activities identify any deviations from the performance criteria, the Plan generally requires that appropriate corrective action be taken to ensure that the applicable criteria are met rather than allowing any modifications to those criteria. AR 5324-25. The Plan does provide for an exception where the Project is "on track to meet long-term goals" (*e.g.*, for years 8 to 10), where corrective action may not be necessary and modifications to interim goals (*e.g.*, for years 1 to 3) might be appropriate based on an improved understanding of habitat development. *See, e.g.*, AR 5355-56. But no changes to long-term performance criteria would be permitted under this exception; there would be no eroding or diluting of the Project's ultimate restoration goals. Opp. at 24.

The Conceptual Plan also allows for modifications to performance criteria where deviations from those criteria are attributed to circumstances unique to the Project site as opposed to on a regional scale. AR 5365. The Plan states that it may be useful to assess performance relative to suitable reference habitats elsewhere in the region. AR 5318, 5320. CDFW notes that Petitioners do not object in principle to the use of reference sites to evaluate habitat development and only contend that the FEIR fails to establish standards for identifying suitable reference habitats. However, the Conceptual Plan includes a detailed description of the process by which appropriate reference sites should be selected. AR 5320-22. The Plan states that "any site with remnant or restored wetlands which demonstrate desirable qualities such as high diversity of native species or populations of rare plans or wildlife should be considered as a potential reference site." AR 5321. The Plan lists potential reference sites in Los Angeles, San Diego, Orange, Ventura and Santa Barbara counties, and identifies specific factors that should be taken into account in evaluating the similarity of any potential reference sites to the Project site, including ecological functions, climate and hydrology, anthropogenic disturbances, vegetation types, soil and non-soil substrates and access by fish and wildlife. AR 5321. The Plan also notes that it may be necessary to use multiple reference sites given the range of habitat types planned for the Project site (AR 5322) and identifies potential reference sites for particular habitat types (AR 5327 (tidal marsh), 5338 (mudflat), 5345 (salt panne). Opp. at 24-25.

CDFW argues that, even in those limited situations where the Conceptual Plan allows for modifications to the performance criteria, CDFW would not have unfettered discretion. The Plan would allow for changes to the performance criteria only in cases where it would not be possible to correct a deviation from the criteria without causing "unacceptable disturbance to other habitats or animal populations" at the Reserve. AR 5324-25. The Plan further requires that any modification to the performance criteria will be subject to "quantitative monitoring and analysis specifically designed to evaluate the effectiveness of such modifications" (AR 5324), and that the rationale for any decision to modify the criteria will be "documented in a central location" (AR 5325). Any such modification also must be "supported by data collected at the [Reserve] or the reference sites or from advances in our understanding of coastal habitat restoration." AR 5369. Contrary to Petitioners' assertions, therefore, the FEIR appropriately limits CDFW's discretion to modify the performance criteria, both by allowing such changes only when there is no other viable course of action and by establishing procedural guardrails to ensure that any such changes are fully justified and documented. Opp. at 25.

The court agrees with CDFW in part. While the DEIR permits CDFW to modify performance criteria based on an improved understanding of habitat development or species requirements, the Conceptual Plan generally provides for modifications to the performance criteria only in limited circumstances and subject to strict guidelines. AR 5324-25. The court also agrees that the DEIR is entitled to permit modifications to performance criteria where deviations from those criteria are attributed to circumstances unique to the Project site, that the use of reference sites to evaluate habitat development at the Project site is appropriate, and that the Conceptual Plan includes a detailed description of the process by which appropriate reference sites should be selected.

Stopthemillenium, *supra*, 39 Cal.App.5th at 1, is a different factual circumstance. There, the EIR described the proposed project as a mixed-used development in Hollywood, California but did not provide such basic details as what buildings would be built or where they would be built. Instead, it provided only "conceptual drawings" of one "illustrative" development scenario. Id. at 9-11. The EIR also discussed two possible scenarios in addition to the "illustrative" scenario, but only for the stated purpose of establishing the "maximum environmental impacts" that could result from construction of the project. Ibid. Rather than describing the development that actually would be built, the EIR merely discussed different possible developments that might or might not be constructed. Id. at 18. The Stopthemillenium court held that these scenarios failed to describe a stable or finite proposed project. Ibid. Opp. at 19-20.

Unlike Stopthemillenium, the FEIR in this case includes detailed discussions of all aspects of the restoration Project. The DEIR provides an in-depth description of the restoration process which will include the removal of the existing levees of the Ballona Creek channel, realigning of the Ballona Creek to improve tidal circulation, and other actions to restore tidal wetlands and promote greater habitat diversity. AR 349-82. The DEIR provides maps, drawings, and other graphic representations of the completed Project. Id. The DEIR discusses the flood risk and stormwater management activities that are part of the Project, including the construction of levees along Fiji Way in Area A and Culver Boulevard in West Area B and various other water control structures. AR 382-96. It provides maps showing the locations and various characteristics of the levees. AR 382-96. The DEIR discusses the steps that will be taken to improve public access to the Reserve and the wetlands, including new visitor entrances, pedestrian trails, elevated boardwalks and bicycle paths. AR 396-414. Again, the DEIR provides maps, drawings and other depictions of these public access amenities. Id. Finally, the DEIR includes detailed discussions and drawings of the infrastructure and utility modifications that will be required, including the decommissioning of certain gas wells and relocation of a gas pipeline (AR 414-22), the timeline for the two phases of restoration (AR 422-42), and monitoring and adaptive management programs that will track the progress of the restoration toward specific performance criteria and determine whether any corrections might be warranted (AR 442-57). Opp. at 20.[16]

However, Petitioners are correct in one respect. The project description does not adequately commit CDFW to adopting and implementing specific performance criteria when it provides CDFW with authority to reduce restoration goals based on disturbance to other habitats without any supplemental environmental review. CDFW contends that its corrective actions to achieve the HRMP's performance criteria are constrained by the requirement that it find that achieving the adopted criteria would cause "unacceptable disturbances to other habitats or animal populations[.]" AR 5325. Yet, the cited language illustrates CDFW's authority to reduce performance criteria:

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[16] Petitioners argue that Stopthemillennium remains informative because it affirmed the principle that CEQA requires analysis of the impacts of a defined project rather than a "set of environmental impacts". Protect Reply at 13-14. True, but that is not what the FEIR does.

> "However, some aspects of habitat or biotic community development may require more significant changes. For instance, if salt panne or seasonal wetland habitats fail to meet hydrology performance goals, changes to the grade of the site may be necessary. Similarly, if fish die-offs occur due to low dissolved oxygen levels, modification of tidal circulation patterns may be necessary. Any actions requiring grading or other major site alterations should receive increased scrutiny before implementation. <u>If it is determined that such changes will cause unacceptable disturbances to other habitats or animal populations at the BWER, it may be necessary to reevaluate the restoration goals.</u> All decisions related to adaptive management, including changes in management activities, alteration of the site, shifts in target habitats or performance goals, and the rationale for each decision, should be documented in a central location. . ." AR 5325 (emphasis added).

Thus, the Conceptual Plan authorizes "shifts in target habitats or performance goals" if CDFW determines that corrective action to meet those performance criteria would "cause unacceptable disturbance to other habitats or animal populations" (AR 5325) and it does so without a commitment to supplemental environmental review.

The Conceptual Plan also recognizes that, if saltpan or wetlands habitats fail to meet hydrology goals, or if fish die because of low dissolved oxygen levels, "some aspects of habitat or biotic community development may require more significant changes." AR 5325. The DEIR cautions that any additional grading or other major site alterations "should receive increased scrutiny before implementation." <u>Ibid</u>. As Petitioners conclude, this language permits CDFW unilaterally reduce the performance criteria to provide more attainable goals if hydrology or dissolved oxygen performance goals are not met and CDFW decides that it needs to perform grading/bulldozing.

Thus, the FEIR allows CDFW to bypass CEQA's procedures requiring public comment on modification of habitat restoration criteria. Guidelines §15162. Land Trust objected to this issue when it asserted that the DEIR uses the phrase "adaptive management" as a "euphemism for deferred planning", protesting that "there is no framework for stakeholders to understand what new information is expected and what decision-points will factor into the specific adaptive measures that will occur." AR 9004. Protect Reply at 13. The prejudice resulting from this deferred mitigation is that the public has no basis to know what corrective actions will be required if restoration falls short of the performance criteria. Whether analyzed as a defective project description or improperly deferred mitigation, this violates CEQA.

CDFW's argument that it would not arbitrarily change the HRMP to undermine its own restoration efforts and defeat the purpose of its own Project ignores the fact that the errors are in the FEIR, not in CDFW's intentions. Assuming CDFW will make its best efforts at habitat restoration, the FEIR violates CEQA by authorizing material changes to the HRMP without a framework for approval or future environmental review. This ability to change restoration goals renders the environmental cost of the Project unascertainable (<u>Stopthemillennium</u>, *supra*, 39 Cal.App.5th at 13) and stultifies public participation (<u>San Joaquin Raptor</u>, *supra*, 149 Cal.App.4th at 656).

In <u>Preserve Wild Santee v. City of Santee</u>, ("<u>Santee</u>") (2012) 210 Cal.App.4th 260, 281, mitigation for the endangered Quino Butterfly was found to be improperly deferred where "the timing and specific details for implementing other Quino management activities discussed in the draft habitat plan are subject to the discretion of the preserve manager based on prevailing environmental conditions" because these activities were not guaranteed to occur at any particular time or manner. Similarly, CDFW's ability to change performance criteria without committing to additional environmental review is improperly deferred mitigation.

At trial, CDFW's counsel argued that changes in performance criteria are narrowly tailored with "guardrails", it is impossible for CDFW to guess what the impacts will be if the performance criteria change, and any significant change will require additional review under CEQA. In response, although conceding that a commitment to supplemental review might suffice, Petitioners' counsel noted that the FEIR contains no assurance that CDFW will conduct additional review without being sued. The court agrees, and it also believes that this defect can be easily rectified by a commitment to additional environmental review.

5. <u>The Lack of a Vegetation Map</u>

a. <u>Pertinent Facts</u>

The FEIR proposes that LACFCD will maintain the levees, including vegetation free zones and maintenance zones. AR 5438-39. In addition, there will be certain areas where the levees will be armored with rock, which may or may not become exposed, but will be allowed to rebury itself naturally. AR 5439.

Per the Corps Guidelines' chapter on the treatment of levees and floodwalls, vegetation must be controlled to limit those habitat characteristics that encourage the creation of animal burrows. RJN Ex. A, p. 3-1. Any project's operations and maintenance manual must include an annual maintenance program to control animal burrows and vegetative growth. RJN Ex. A p. 5-1. The repair of animal burrows is a separate requirement. RJN Ex. A p. 5-2.

The DEIR identifies the vegetation contemplated for each of the habitats (*e.g.*, mudflat, tidal saltmarsh, lower marsh, and mid-marsh) after the Project's completion. AR 337, 445, 448-50. Each habitat has its own set of performance criteria and timeframes for meeting them. AR 445-51. For example, the vegetation performance criteria for tidal marshes provides that there be a minimum of five native species, although one or two may predominate. AR 445. The DEIR also lists the acreage of the basic habitats that will be created. AR 351.

Counsel for the Los Angeles Audubon Society ("Audubon Society") commented that the final distribution of vegetation types has not been established, which shows that the Project is about creating tidal wetlands and not uplands. AR 28417. The levees will have a vegetation free zone along the levee core in which only perennial upland grasses can be planted. AR 28443. This zone extends 15 feet beyond the toe of the levee core, after which a zone of limited vegetation should extend another 15 feet. AR 28443. As a result, the levee would have 30 feet of limited vegetation and 30 feet of grass. AR 28443. It appears that CDFW and the Corps have not agreed on the vegetation that will be allowed on the levees. AR 28443. CDFW should not have rushed to release the DEIR without a basic map of vegetation types to be created. AR 28443.

USFWS recommended that areas requiring frequent vegetation maintenance be mapped as "developed" or "invasive monoculture" based on the lower habitat value. AR 8385 (AF1-13). CDFW agreed to insert a footnote into Table ES-2 to clarify that areas mapped as upland habitat include both native upland habitat and invasive monoculture. AR 8393. The footnote was added to Table 2-3, not Table ES-2, but the actual acreage of maintained habitat was not disclosed and apparently will be quantified later. AR 351.

b. <u>Analysis</u>

Petitioners argue that, as pointed out by experts LPP, while the DEIR presents general categories of habitat, it does not provide final or proposed vegetation maps. AR 11520, 11540–41. Rather, the actual planting plan will be developed later. AR 328. The need for a specific planting plan is particularly acute because the levees have Corps maintenance requirements of mowing and rodent burrow control that are inconsistent with habitat restoration. AR 11560 (015-91).

Petitioners note that expert Longcore commented that the Corps' maintenance regulations for the levees would require at least 36 acres in which rodents are excluded and specific vegetation required. AR 11541. Petitioners argue that, since the Corps does not allow burrowing rodents or owls to inhabit flood control levees, there is a significant impact from the Project. Given the direct impacts of the Corps' maintenance requirements for levees, a specific planting plan is necessary. The FEIR must lay out an actual vegetation map as clearly as possible to allow experts to intelligently evaluate and opine about the impacts to endangered and protected species. Pet. Op. Br. at 29.

Petitioners add that CDFW cannot avoid preparing a vegetation map simply because it would be inconvenient; it can refuse to do so only when practical considerations prohibit devising such a measure in the planning process. Without such a map, the FEIR's claim that the Project will not have a significant impact on any endangered or protected species lacks substantial evidence and fails as an informational document for experts to properly evaluate and comment on the impacts. "An EIR is inadequate if '[t]he success or failure of mitigation efforts...may largely depend upon management plans that have not yet been formulated, and have not been subject to analysis and review within the EIR.'" Santee, *supra*, 210 Cal.App.4th at 281 (citation omitted). Pet. Op. Br. at 29; Grassroots Reply at 9-10.

Petitioners' contention that the FEIR must have a vegetation map is based on an argument that the failure to provide such a map is improperly deferred mitigation. CDFW is correct that this contention is undermined by Petitioners' failure to present the FEIR's evidence on the impacts of the Corps' prohibition of burrowing rodents on flood control levees and show why the FEIR's consideration of them is inadequate without a vegetation map. Opp. at 27.

CDFW also is correct that the FEIR does not defer the formulation of a planting plan. The performance criteria contain detailed information about the vegetation contemplated for each of the various habitats within the Project site. *See* AR 445 (tidal marsh), 448 (brackish marsh, seasonal wetland, salt pan), 449 (riparian), 450 (dune, upland scrub, and grassland). The DEIR also includes a map showing the planned locations of those habitat types. AR 337. Opp. at 26.

Petitioners acknowledge that there are specific habitat performance criteria but argue that the specific plant species targeted for restoration are not identified. For example, the performance criteria for tidal marsh are a minimum of five native species "although one or two may predominate." AR 445. These broad performance criteria fail to identify what species will be planted and appear to lump lower marsh, mid marsh, and upper marsh habitat together. Grassroots Reply at 9.

Petitioners fail to show that the FEIR is required to identify specific plants for specific habitat locations. Unlike Santee, this is not a matter where (a) "the timing and specific details for implementing" management activities are left to the discretion of an official, (b) there is no guarantee that these activities will occur, and (c) the success of mitigation will depend upon what the habitat plan will require for management of one or more species. *See* 210 Cal.App.4th at 281. Rather, Petitioners merely raise an issue whether CDFW's commitment to vegetation management should be in the form of specific performance requirements or a convenient map. The FEIR provides that categories of plant species will be required at specific habitats and Petitioners have not shown that specific vegetation must even be identified, let alone on a vegetation map.

Petitioners suggest that a vegetation map is required to evaluate the Project's impacts on the Borrowing Owl. *See* Pet. Op. Br. at 29-30. CDFW responds that there is substantial evidence that the Project will not have a significant impact on the Borrowing Owl, including (a) a map of the Burrowing Owl habitat that currently exists at the Project site (AR 736), (b) a map showing the locations of the types of habitat that will exist after the completion of the Project (AR 337), and (c) a chart showing the pre- and post-restoration acreages of each of those different types of habitats (AR 351). The DEIR finds that any temporarily impacted habitat for the Burrowing Owl would be replaced at a ratio of approximately 7:1, ensuring that the Project would not result in any net loss of foraging habitat for this species and in fact would have a net beneficial impact. AR 794. CDFW is entitled to rely on the opinions of its own staff on matters relating to wildlife conservation. *See* Browning-Ferris Industries v. City Council, (1986) 181 Cal.App.3d 852, 866 ("An agency may also rely upon the opinion of its staff in reaching decisions, and the opinion of staff has been recognized as constituting substantial evidence"). Opp. at 27.

In reply, Petitioners note that CDFW responded to a comment that the levees will comply with the Corps regulations but nevertheless "it is expected that some portions would provide foraging, prey base and other functions for Burrowing Owl." AR 11622 (015-107). Petitioners argue that the response fails to demonstrate that CDFW evaluated and mitigated the impact of the Corps' regulations on vegetation and animal burrowing on the levees. Grassroots Reply at 11. Petitioners add that the 7-1 replacement of Burrowing Owl burrows may mitigate nesting impacts but there is no explanation how the Project will mitigate the loss of rodents and other prey for the Borrowing Owl along the levees. AR 11568-69. Grassroots Reply at 10-11.

Aside from the fact that Petitioners cite a response to comment for which CDFW is not required to provide detail (*see post*), Petitioners' argument about how the impacts of the Corps regulations prohibiting borrowing rodents on levees were evaluated and mitigated strays afield from their contention that the FEIR must provide a vegetation map. Without a showing what evidence the FEIR has on these issues, and that they are significant matters, there is no requirement for a map, no matter how beneficial it would be for experts to review. Petitioners fail to show that a vegetation map is required.

6. The Range of Alternatives

a. Governing Law

An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. Guidelines §15126.6(a). The EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination. Guidelines §15126.6(c).

"[T]he mitigation and alternatives discussion forms the core of the EIR." In Re Bay-Delta, Etc., ("In Re Bay-Delta") (2008) 43 Cal.4th 1143, 1162. An EIR's alternatives analysis generally must analyze and weigh the costs and benefits of various alternatives. Failure to do so violates the informational requirements of CEQA. Preservation Action Council v. City of San Jose, (2006) 141 Cal.App.4th 1336, 1355. "An EIR must discuss project alternatives even when it concludes the project's significant environmental impacts will be avoided or substantially reduced by mitigation measures." Protect Our Water v. County of Merced, (2003) 110 Cal.App.4th 362, 371.

The rule of reason governs the nature or scope of the alternatives to be discussed. In Re Bay-Delta, *supra*, 43 Cal.4th at 1163. The "discussion of alternatives need not be exhaustive" and perfection is not required. Foundation for San Francisco's Architectural Heritage v. City and County of San Francisco, (1980) 106 Cal.App.3d 893, 910. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. Guidelines §15126.6(d). The project goals and objectives define the feasibility of alternatives; the more specific the goals are, the more limited are the alternatives. *See* Save San Francisco Bay Assn. v. San Francisco Bay Conservation, (1992) 10 Cal.App.4th 908, 922. The EIR is inadequate if it does not show "solid evidence of meaningful review" of the alternatives. Id; Pub. Res. Code §21080.5(d)(3)(A). A mere conclusion that there are no feasible alternatives without further explanation is inadequate; the reader has no opportunity to compare the project's problems with those for project alternatives. *See* People v County of Kern, (1974) 39 Cal.App.3d 830, 841-42. A petitioner challenging the agency's selected alternatives must show that the alternatives are manifestly unreasonable. Federation of Hillside & Canyon Assns. v. City of Los Angeles, (2000) 83 Cal.App.4th 1252, 1265.

b. The Rejection of Freshwater Alternatives

The DEIR sets forth a list of Project objectives. The objectives include establishing natural processes in the Reserve that support estuarine and associated habitats, such as through improving tidal circulation, lowering residence time of water, ensuring a more natural salinity gradient, and "creating dynamic hydrological interactions between the Ballona Creek Channel, wetlands within the Ballona Reserve, and the Santa Monica Bay." AR 271-72.

Petitioners argue that the DEIR's mischaracterization of the Ballona Wetlands as historically a predominantly tidal marsh improperly impacts the range of alternatives. Because the objectives expressly require tidal inundation and increasing tidal influence, all freshwater alternatives fail to meet them. Id. If the actual goal is restoration, then the FEIR was required to evaluate freshwater alternatives. Pet. Op. Br. at 33.

In We Advocate Thorough Environmental Review v. County of Siskiyou, ("WATER") 78 Cal.App.5th 683, the County of Siskiyou prepared an EIR for the reconstruction of a water-bottling plant that had not been running for a number of years. The EIR objectives included "1. operate a beverage bottling facility...to meet increasing market demand, 2. to site the proposed facility as the Plant previously operated by [Dannon]...etc.." Id. at 691–92. The court found that the EIR's objectives were "so narrow as to preclude any alternative other than the Project." Id. at 692. In taking this artificially narrow approach, the county transformed the EIR's alternatives into an empty formality, which produced a flawed EIR. Id. Pet. Op. Br. at 34.

Petitioners argue that, similar to WATER, the Project objectives are stated in a manner to foreclose any alternative that does not create interactions between the Ballona channel, wetlands within the Reserve, and the Santa Monica Bay. All freshwater alternatives for restoration were rejected in large part because the FEIR artificially narrowed the objectives based on the mischaracterization of the Ballona Wetlands as a tidal marsh. The FEIR failed to consider that freshwater alternatives -- which would not require the excavation of rare saltpan habitat or burying alkali meadow with flood control berms -- would avoid significant short and long-term environmental impacts. Guidelines §15126.6. Pet. Op. Br. at 34-35.

Specifically, the DEIR claims that Alternative 10 -- a freshwater alternative -- would be infeasible because it would necessitate a series of "pumps or other actively managed infrastructure" that would involve staff time and costs to operate on a frequent basis. AR 538. As such, it would not meet a major Project goal of self-sustaining habitats. AR 538. Yet, there is no requirement that an alternative fully accomplish all project objectives. California Native Plant Soc'y v. City of Santa Cruz, (2009) 177 Cal.App.4th 957, 991. Pet. Op. Br. at 35.

Petitioners argue that Alternative 10 is feasible despite the DEIR's claim to the contrary. Playa Vista, just to the east of Ballona Wetlands, pumps and treats a significant amount of groundwater to comply with a clean-up and abatement order of underlying pollution and to keep its methane mitigation systems operational. *See* AR 10157, 10175-79, 10181. Playa Vista is or was permitted to discharge 950,000 gallons per day to the freshwater marsh outside Area B. AR 10181. Groundwater diverted to the freshwater marsh discharges to the Ballona channel, and then to the Pacific Ocean, providing little or no benefit to the Reserve. AR 363. Simply closing the tidal flap gate and allowing the flows to spill into the Ballona Wetlands would greatly increase the amount of freshwater enjoyed by the Ballona Wetlands. *See* AR 362 (flap gate closes during storms). As for Areas A and C, the FEIR does not analyze what infrastructure is required to supply freshwater to those areas. No analysis supports a conclusion that building and maintaining such infrastructure would be more expensive than building massive levees and performing ten plus years of adaptive management and monitoring. Pet. Op. Br. at 35.

The DEIR states that Alternative 10 would not "maintain or improve flood protection" (AR 538) which is an unsupported conclusion that contradicts the previous paragraph that Alternative 10 would maintain the authorized LACDA flood risk management (id). The flap gate closes during periods of high flow in Ballona Creek, causing any storms greater than a one-year storm event to collect in the freshwater marsh. AR 392. As a result, Petitioners argue that the DEIR's bare conclusion appears to be contradicted by the evidence. Pet. Op. Br. at 35-36.

The DEIR also argues that a freshwater alternative would require the raising of Culver Boulevard and Jefferson Boulevard within the Reserve onto a causeway (elevated bridge), costing an "additional $200,000,000." AR 538–39, 5276. This estimate is based on the need for a causeway up to 20 feet high. AR 5726. Missing from the FEIR is an analysis of the current flooding potential of the existing Culver Boulevard and Jefferson Boulevard. It also is unclear why a causeway must be built for a freshwater alternative instead of just raising the road elevation as for other alternatives. *See* AR 5721. Pet. Op. Br. at 36; Grassroots Reply at 8.

Petitioners conclude that, even if a freshwater alternative would be more costly, that is not by itself a valid reason to deem it infeasible. *See* Watsonville Pilots Assn v. City of Watsonville, (2010) 183 Cal.App.4th 1059, 1087 (alternatives that would avoid or substantially lessen significant impacts must be considered even if they would be more costly). To reject an alternative as infeasibly expensive, the agency needs evidence that the additional costs of an alternative render it impracticable. Uphold Our Heritage v. Town of Woodside, ("Uphold Our Heritage") (2007) 147 Cal.App.4th 587, 599. The costs of a freshwater alternative and the financial savings of not constructing massive levees should have been compared against the costs of the Project. Pet. Op. Br. at 36.

The DEIR refers to Alternative 10 as the "Manipulated Wetlands Alternative" because it would create freshwater and brackish marsh by pumping water into the Ballona Wetlands from other locations and then rely on gates or other water structures to continuously manage the way water moves through the Wetlands. AR 537. The need to artificially manipulate the wetlands in this fashion stems from the fact that Ballona Creek flows through a concrete flood control channel with a permanent opening to the Pacific Ocean. AR 537. As a result, the historical conditions that once naturally supported large amounts of non-tidally influenced freshwater and brackish marsh at the Reserve no longer exist. AR 537.[17]

As CDFW explains (Opp. at 29-30), the Project objective of establishing natural processes in the Reserve that support estuarine habitats was not based on a characterization of the Ballona Wetlands as historically a predominantly tidal marsh. Rather, it was based on CDFW's objective of creating (or restoring) tidal wetlands habitats. This objective is grounded in the facts that tidal wetland restoration is a key priority in the Southern California Wetlands Recovery Project regional strategy, such habitats are rare in the region, the Reserve has long been identified as a significant regional opportunity for estuarine wetlands restoration, and the Project is the only opportunity to restore a large tidal wetland in Santa Monica Bay. AR 8349.

Framing Project objectives in this manner is not a violation of CEQA. "Although a lead agency may not give a project's purpose an artificially narrow definition, a lead agency may structure its EIR alternative analysis around a reasonable definition underlying purpose and need not study alternatives that cannot achieve that basic goal." In Re Bay-Delta, *supra*, 43 Cal.4th at 1166. Unlike WATER, *supra*, 78 Cal.App.5th at 683, CDFW did not define the Project objectives artificially narrowly to preclude any other alternative other than Alternative 1. In fact, the DEIR's two other restoration Alternatives (Alternatives 2 and 3) met enough of the Project objectives to warrant further consideration. AR 316-20. Opp. at 30.[18]

The DEIR states that CDFW decided not to consider Alternative 10 as feasible because it would not meet most of the basic Project objectives, including that it (a) would not maintain or improve flood protection and instead would rely on mechanical pumping of freshwater into the system, thus introducing a new risk of flood due to mechanical failure (AR 537-38),[19] (b) would require raising portions of Culver Boulevard and Jefferson Boulevard to allow the flow of water between different areas of the wetlands (AR 537-38), (c) would not create self-sustaining habitats and instead would depend on pumps to manage the wetlands (AR 538), and (d) would not account for sea-level rise and thus additional construction and reconfiguration potentially would be required to mitigate its impacts (AR 538). The impracticality of cost was an additional reason for rejecting Alternative 10 because raising Culver Boulevard and Jefferson Boulevard would substantially increase the restoration cost per acre compared to alternatives that did not require any raising of those roadways and potentially would create new significant environmental impacts. AR 538-39, 5721.

The court will defer to CDFW's choice of alternatives unless Petitioners show that Alternative 10 is both (a) feasible and (b) adequate (meaning that it is capable of attaining most of the basic project objectives). Save Our Access—San Gabriel Mountains v. Watershed Conservation Authority, (2021) 68 Cal.App.5th 8, 32. Even if a proposed alternative is both

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[17] As CDFW's counsel argued at trial, the wetlands in Area A are gone and the Project is intended to bring back the salt marsh from the early 1800s.

[18] Petitioners argue that if the underlying goal is restoration, then stating the Project purpose in a way that precludes restoration of freshwater alternatives violates CEQA. Grassroots Reply at 6-7. As the court discussed with counsel at trial, this argument ties the freshwater alternative to the term "restoration", a matter which the court has resolved in CDFW's favor. *See ante.*

[19] This explains the apparent inconsistency between the DEIR's statement that Alternative 10 could maintain the authorized levels of flood risk management and the statement in the next paragraph that Alternative 10 "would not maintain or improve flood protection." AR 538. The court interprets the DEIR's language to mean that Alternative 10 would maintain the authorized flood protection but would run the risk of mechanical breakdown during a major storm.

feasible and capable of attaining most of the basic project objectives, the agency's exclusion of it will be upheld unless the chosen alternatives are not a reasonable range of alternatives. Id.[20]

Petitioners do not show that Alternative 10 meets these requirements. Petitioners do not explain why the introduction of pumps would not create a flood risk of mechanical failure, do not deny that the raising the boulevards would represent a significant modification to infrastructure, cite no evidence that the wetlands habitats would be self-sustaining, and have not demonstrated how Alternative 10 would accommodate sea-level rise. Petitioners also have not demonstrated that the FEIR's chosen range of alternatives is unreasonable. Opp. at 32-33.[21]

7. The FEIR's Analysis of Environmental Impacts

Petitioners argue that the EIR failed to quantify or analyze impacts to existing wildlife. The FEIR's justification for the Project is not tied to any specific metrics but rather a general promise that more net habitat will be created which will offset the destruction of habitat in the Reserve in the meantime. Pet. Op. Br. at 36-37.

> "Even when a project is intended and expected to improve conditions in the long term—20 or 30 years after an EIR is prepared—EIR must inform decision makers and the public about the short-term environmental costs of achieving that desirable improvement. These costs include not only the impacts involved in constructing the project, but also the environmental impacts that will result from the project's initial years of operation. Though we might rationally choose to endure short- or medium-term hardship for a long-term, permanent benefit, deciding to make that tradeoff requires some knowledge about the severity and duration of the near-term hardship. An EIR stating that in 20 or 30 years the project will improve the environment, but neglecting, without justification, to provide any evaluation of the project's impacts in the meantime, does not 'giv[e] due consideration to both the short-term and long-

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[20] Petitioners reply that, if the purpose of the Project is limited to the creation of estuarine environment in Southern California, the FEIR must consider alternative locations in Southern California where the Project would have less significant impacts. *See* Guidelines §15126.6 (f)(2). *See* AR 11532. Grassroots Reply at 7. This would be true if Petitioners identified any such alternative location and showed that it was feasible and adequate.

[21] Petitioners argue that the FEIR fails to determine perform a cost comparison of Alternative 10 with the Project's Alternative 1 in determining that the former is financially infeasible. *See* Uphold Our Heritage, *supra,* 147 Cal.App.4th at 599. Neither the FEIR nor the appendices contain an estimate of the costs of Alternative 1's excavation of 2.4 million cubic yards of soil, constructing flood control levees up to 20 feet tall and occupying 36 acres, and the long-term habitat reconstruction and monitoring activities to provide a basis of comparison to the cost of Alternative 10. Grassroots Reply at 7-8.

The DEIR explains that Alternative 1 would cost between $1.5 and $1.8 million per restored acre for approximately seven acres of restored road whereas Alternative 10 would add between $143 and $200 million to the cost of restoration. AR 538-39. While this might seem dispositive, the DEIR does not address Alternative 1's cost of excavation and levee construction and compare it to Alternative 10's pumping costs. Without additional evidence, the cost comparison between Alternative 10 and Alternative 1 is incomplete and not by itself a reason to deem Alternative 10 infeasible.

term effects' of the project," (Guidelines §151262, subd.(a)), and does not serve CEQA's informational purpose well." Neighbors for Smart Rail, *supra*, 57 Cal.4th at 455 (emphasis added).

a. Procedural Failure

The purpose of an EIR is to identify the project's significant impacts, identify alternatives, and indicate the manner in which they may be mitigated or avoided. Pub. Res. Code §21002.1(a). An EIR must demonstrate that the significant environmental impacts were adequately investigated and discussed so the lead agency has sufficient information to make a decision that "intelligently takes account of environmental consequences." Guidelines §15125(c); San Francisco Ecology Center v. City and County of San Francisco, (1975) 48 Cal.App.3d 584, 594.

The amount of discussion for a particular environmental impact should be proportionate to its severity and probability of occurrence. Guidelines §15146. The EIR must consider every fair argument that can be made about the possible significant effects of a project and must also explain its reasons for deciding whether a project's impacts are significant. Amador, *supra*, 116 Cal.App.4th at 1107. The findings of the agency must indicate the analytic route that the agency took from the evidence to the findings and must be supported by substantial evidence in the record. *See* Pub. Res. Code §21081.5; Guidelines §15093(b). *See also* Whitman v. Board of Supervisors, (1979) 88 Cal.App.3d 397, 414 (EIR was deficient in failing to discuss environmental impacts of pipeline that would have to be built to transport oil if exploratory oil well was successful).

CEQA does not require a lead agency to conduct every test or perform all research, study or experimentation recommended or demanded by commentators (Guidelines §15204(a)), and extensive surveys are not always required. *See* Association of Irritated Residents v. County of Madera, (2003) 107 Cal.App.4th 1383 1396 (in light of field study showing no quality natural habitat or the presence of sensitive species on site, "protocol-level" biological survey using Fish and Game guidelines was not required). Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. Guidelines §15151.

Whether the EIR includes sufficient detail of an environmental impact is a mixed question of law and fact generally subject to independent review. Friant Ranch, *supra*, 6 Cal.5th at 516. The underlying factual determinations in the agency's analysis are subject to a more deferential standard of substantial evidence. Id.

The law governing an EIR's response to comments differs from the law for its evaluation of environmental impacts. A lead agency must provide written responses to comments that "describe the disposition of each significant environmental issue" raised by commenters. Pub. Res. Code § 21091(d)(2)(B); Guidelines §15088(a). There must be good faith, reasoned analysis and major environmental issues raised in variance with the lead agency's position must be addressed in detail giving reasons why specific comments and suggestions were not accepted. Id. Although conclusory statements will not suffice, the level of detail contained in the response may correspond to the level of detail provided in the comment. Id. Thus, a response to a general comment may be equally general. Guidelines §15088(c). The agency's responses "need not be exhaustive," and it is enough that they demonstrate a "good faith, reasoned analysis." Los Angeles Conservancy v. City of West Hollywood, (2017) 18 Cal.App.5th 1031, 1040. In addition, the agency may appropriately respond to comments by referring to relevant parts of the EIR. Id. at 1040.

CDFW notes that Petitioners' opening brief makes claims about wildlife impacts based only of a series of arguments that CDFW failed to adequately respond to comments received during the public comment period. Opp. at 33-34.

Petitioners respond that their opening brief used CDFW's responses to comments to show that the FEIR lacks substantial evidence for its evaluation of biological impacts. The opening brief explains that the FEIR fails to quantify or analyze impacts to existing wildlife, fails to analyze or disclose impacts of habitat fragmentation, fails to analyze or disclose GHG emissions from soil excavation, and fails to mitigate impacts to specific species. Grass Reply at 13. The issue is not CDFW's inadequate responses to comments *per se* but rather that the EIR lacks substantial evidence to support the inadequate responses. Grass Reply at 13, 15.

In quoting and citing to CDFW's responses to comments, Petitioners fail to properly present an issue that the FEIR fails to adequately address biological impacts. Petitioners fail to discuss the FEIR's evidence or analysis of the issues addressed and show that it is inadequate or lacks substantial evidence. As a result, the court will analyze whether the responses to comments, which need not be exhaustive, are a "good faith, reasoned analysis" of any significant environmental issue raised by the commenter. *See* <u>Los Angeles Conservancy v. City of West Hollywood</u>, *supra*, (2017) 18 Cal.App.5th 1031, 1040.

b. <u>Impacts to Wildlife</u>

<u>USFWS Comments AF1-5 and AF1-6</u>

USFWS commented that the Project lacks clear objectives for the restoration. AR 8384 (AF1-5). CDFW responded that DEIR Section 1.1.2 defines the Project objectives and includes a detailed description of CEQA objectives. AR 8390.

USFWS also relayed its concern about the large extent of temporal impacts to vegetated areas (about 336 acres for 10 years) relative to the gain in aquatic/wetland habitats (about 61 acres). AR 8384 (AF1-6). CDFW responded: "As summarized in the Abstract and in Draft EIS/EIR Section ES.1, Background and Project Overview, all aquatic resources within the Project Site are degraded and the wetlands are among the most degraded wetlands in California. Without restoration, the degraded conditions would increase." AR 8391.

Petitioners describe CDFW's responses as evasive. In addition to not quantifying losses and gains, CDFW's reliance on Section ES.1 misrepresented the evidence. Section ES.1 states that "all wetland habitats within the Ballona Reserve are <u>impaired</u>...a <u>portion</u> of the Ballona Reserve has been identified as 'among the most degraded wetlands in California' using standardized wetland condition protocols." AR 208 (emphasis added). "Habitat" is not the same as "aquatic resources," "impaired" is not the same as "degraded," and "all" is not the same as "a portion." Pet. Op. Br. at 37; Grass Reply at 13.

DCFW's opposition contends that the responses were more than adequate given the non-specific nature of USFWS' comments. CDFW initially addressed comment AF1-5 by referencing the clearly defined objectives identified in Section 1.1.2 of the DEIR. AR 8390. CDFW then addressed comment AF1-6's suggestion that the gain in aquatic/wetland habitats was too small to justify the impacts to vegetated areas, noting the currently degraded nature of the aquatic resources and wetlands within the Project site and pointing out that the degraded conditions would get worse without restoration. AR 8391. CDFW also referred to DEIR Section 3.4.7.2, which describes the beneficial impacts of the Project for aquatic and wetland habitats, including the establishment of approximately 137 acres of tidal marsh in a region that has experienced severe loss of tidal marsh due to coastal development. AR 895. Opp. at 34-35.

Petitioners argue that the response still failed to explain how long it would take to establish such habitat and what the current impacts would be and how long they would last. AR 895. Simply stating that 137 acres of tidal marsh is expected to result at some point in the future does not allow for a proper cost/benefit analysis of temporal impacts. Grass Reply at 14.

The general response to AF1-5 was appropriate. As for AF1-6, Petitioners ignore the habitat performance criteria set forth in AR 445-51. Nonetheless, Petitioners are correct that DCFW's response did not address the commenter's point that the short-term impacts to vegetated areas appear to outweigh the gain in aquatic/wetland habitats.

USFWS Comments AF1-19 and AF1-20

USFWS commented that the performance criteria for the ten-year monitoring program "seem inconsistent" with the purpose of restoring ecological functions and services within the Project area. AR 8386 (AF1-20).

USFWS also commented: "Although the proposed project will restore about 154 acres of fully tidal salt marsh, the performance criteria set low expectations for wildlife within restored habitats. By the end of ten years, the abundance and diversity of wildlife (fish, birds, macroinvertebrates) is expected to meet pre-project levels. In addition, tidal marsh will support at least one breeding bird species. These criteria seem inconsistent with the purpose of the project to restore ecological functions and services within the project area." AR 8386 (AF1-20). Pet. Op. Br. at 37-38.

Finally, USFWS commented that the overall intended benefits of the Project for wildlife are difficult to evaluate because the Project lacks clear restoration objectives related this purpose. AR 8386 (AF1-19). "The project includes a 10-year monitoring program to 'document trends in habitat development and to assess progress toward meeting restoration objectives.' We were not able to locate specific restoration objectives related to the project purpose of restoring ecological functions and services in the project area. Without clear restoration objectives, the overall intended benefits of the project for wildlife are difficult to evaluate." AR 8386 (AF1-19). Pet. Op. Br. at 38.

CDFW responded that the adverse impacts and net gains in habitat area described in the DEIR provide comparable changes and ultimately net restoration. AR 8395. DEIR Section 2.2.2.6 and Tables 2-12 through 2-20 provide specific quantitative criteria to track restoration performance. AR 8395. As for overall wildlife benefit, the restoration would re-establish high value rare coastal habitat. AR 8396. Metrics such as species richness and abundance should also exceed pre-Project conditions after eight to ten years. AR 8396. "The habitat acreages at each time step have not been quantified due to the uncertainty of how certain habitats (e.g., brackish, willow, seasonal wetlands) may evolve," and "the Project would provide more salt marsh habitat compared to the No Project Alternative at each time step," without analyzing the actual impacts to wildlife. AR 8396.

Petitioners argue that CDFW's response about net gains in habitat area lack any specific criteria or timeframe. AR 8395. By relying solely on the amount of suitable <u>habitat</u> being created, CDFW claims all harm to <u>existing wildlife</u> will be offset. The public is entitled to know what that short-term harm will be and how long it will last. Pet. Op. Br. at 38.

CDFW's opposition points out that the response to comment AF1-19 refers to DFEIR Section 2.2.2.6, Tables 2-12 through 2-20, and CDFW's explanation how those tables show that the Project would result in net restoration. AR 8395. Those tables set forth specific performance criteria for each relevant habitat type, as well as the timeframes for meeting those criteria. AR 445-51. As for AF1-20, CDFW's response did not rely solely on "net gains in habitat area." It also noted that the performance criteria for wildlife call for "species richness and abundance" in the restored habitats to exceed pre-restoration levels by the end of the ten-year monitoring period. AR 8396. Opp. at 35.

Petitioners reply that DEIR Section 2.2.2.6 only vaguely refers to "some adverse impacts on habitats for special-status species due to the construction of levees, trail construction, and other earthwork," claiming that this will be offset by some unspecified amount at some unspecified time in the future "by the Project's immediate and long-term conservation benefits." AR 896.[22] Grass Reply at 14. Petitioners also reply that CDFW's claim that the Project would both create more habitat and result in greater "species richness and abundance" is a conclusion not supported by substantial evidence. Grass Reply at 15.

Again, Petitioners are ignoring the habitat performance criteria. AR 445-51. While the responses did not specifically address short-term wildlife impacts, they were sufficiently proportionate to the comments. In particular, the general conclusion about species richness corresponds to the general nature of the comment. *See* Guidelines §15088(a).[23]

<u>Comment I15-56</u>

A commenter noted: "So even if the bulldozing re-arrangement at Ballona appears to be working fairly well say in the year 2030 (which I highly doubt but for sake of argument), what will happen to the species who lose their habitat due to massive bulldozing and berm-building operations in the meantime?" AR 11914 (I15-56). Pet. Op. Br. at 38-39.

CDFW's response was: "As identified in Draft EIS/EIR Section 3.4, salvaged wildlife species will be relocated to adjacent or nearby suitable habitat that is not subject to site disturbances, or has been previously restored as planned under the Project. CFDW does not propose as part of the Project or any alternative to hold or retain any animals for any longer than it takes to relocate them within the Ballona Reserve." AR 11929 (I15-56).

Petitioners note that the FEIR proposed as a mitigation measure: "Attempts shall be made by the biologist to salvage (either by trapping or other appropriate means) all native wildlife species of low mobility that may be killed or injured prior to and during Project-related vegetation or ground disturbances" (AR 13113), and "Salvaged species should be relocated to adjacent suitable habitat not subject to site disturbances. Any relocation efforts would include assessment to determine areas with the Ballona Reserve that would be most appropriate to receive species. Any non-native flora or fauna can be abated by the biologist through any legal means available to CDFW." AR 13114. Pet. Op. Br. at 39.

Petitioners rely on the comment letter of Longcore and his colleague that "[s]imply 'moving' the wildlife out of the path of immediate harm is not a mitigation measure because any suitable destination site <u>would very likely already be occupied</u>." AR 11574 (emphasis added). Petitioners argue that CDFW's response demonstrates that it failed to analyze this displacement impact and simply claimed that trapping and relocating animals is better than doing nothing. AR 11629. If a mitigation measure identified in an EIR would itself cause significant environmental

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[22] Petitioners' citation is incorrect. DEIR Section 2.2.2.6 is located at AR 442-58.

[23] USFWS further commented: "We are concerned that the extent of disturbance to wildlife from proposed operations and maintenance will be much greater than is currently represented in Figure 2–42." AR 8387 (AF1-21). CDFW correctly notes that Petitioners failed to present the substance of CDFW's response to this comment, which need not be considered further. *See* Opp. at 35, n. 12.

impacts, those impacts must be discussed in the EIR in less detail than the project's significant impacts. Guidelines §15126.4 (a)(1)(D). CDFW completely avoided analyzing the environmental impact the mitigation measure of trapping/relocating wildlife would have on wildlife occupying such habitat. CDFW also failed to analyze the impact of the displacement of animals that flee the habitat destruction without being trapped, and what effect such displacement will have on those animals and surrounding ecosystems to which they flee. Pet. Op. Br. at 39-40.

At trial, the court discussed with counsel the standard of the court's review if Petitioners contend that CDFW's response to a comment shows that the FEIR conducted no analysis of the environmental impact as opposed to whether the analysis was inadequate. The issue of an EIR's failure to address an environmental impact is a mixed question of law and fact generally subject to independent review, with the underlying factual determinations subject to a more deferential standard of substantial evidence. Friant Ranch, *supra*, 6 Cal.5th at 516. Comment I15-56 and CDFW's response do not show the FEIR's failure to address the issue of species relocation but rather only its sufficiency. Thus, the court's review is as a response to comment, not a failure to evaluate an environmental impact.

CDFW correctly points out that Petitioners offer no argument regarding the adequacy of the response to comment. Opp. at 36, n. 13. The response to the general comment was sufficient.[24]

Comment (F8-6)

A commenter stated that "we are concerned that once their habitat disappears, animals from Area C North will be driven into our neighborhood." AR 8669 (F8-6).

CDFW responded by acknowledging that redistribution of wildlife could occur "during the restoration period" and then stating that the presence and movement patterns of any wildlife that might occupy Area C are "likely already affected by the existing paved surfaces and areas of fill/dirt associated with existing parking lots and activities associated with the baseball fields and the SoCalGas well pads and staging areas." AR 8695. CDFW then stated that the various bird species that occasionally forage in Area C would be expected to redistribute "elsewhere within the Project site or within their range for the duration of restoration activities", and also pointed out that following the restoration, new native upland habitat would be available to support a return of wildlife to Area C. AR 8695.

Petitioners contend that CDFW's response admitted that it has not analyzed this impact, simply stating that "redistribution of wildlife...may occur." AR 8695. Pet. Op. Br. at 40.

CDFW's opposition notes it responded with as much detail as could reasonably be expected given the cursory nature of the comment. Because the comment did not state concerns about any specific types of wildlife possibly entering into residential areas, CDFW indicated that it could not respond in any greater detail. AR 8695. CDFW argues that Petitioners offer no explanation why

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[24] CDFW's opposition notes that another commenter generally asserted that relocating wildlife could have adverse impacts on species that already occupy the destination site and cautioned that "[r]elocation should only be undertaken as a last resort and then must be properly planned." AR 11574 (015-112). CDFW's response agreed with the commenter that the relocation of wildlife should occur only as a last resort and noted that, as provided by Mitigation Measure BIO-1b-ii, any such relocation would occur only where ground or vegetation disturbance cannot practicably be avoided. AR 11628; *see* AR 13113 (describing MMBIO-1b-ii). Opp. at 35-36. It is unclear why CDFW's opposition refers to this comment and response because Petitioners do not mention it.

the response was inadequate. Opp. at 36-37. The court agrees.

USFWS Comment AF1-27

USFWS commented that there are "several additional species occurring within the project site" that were not listed in Table 3.4-4, including the federally threatened Snowy Plover. Please include these additional species in Table 3.4-4 or clarify why they are excluded." AR 8387 (AF1-27).

CDFW responded that, although the Western Snowy Plover is a regular migrant through the Reserve and only an overwintering visitor in a non-breeding capacity, it has been added to Table 3.4–4. AR 8399.

Petitioners contend that CDFW failed to respond to the comment about the additional missing species. Pet. Op. Br. at 40.

The only species USFWS identified as omitted from the list was the Western Snowy Plover. AR 8387. CDFW appropriately responded with the same level of specificity. The response was sufficient.

USFWS Comment AF1-29

USFWS commented: "The analysis of direct and indirect effects of the project lacks sufficient detail to determine if individual species will benefit or be impacted by the project over the long term." AR 8388 (AF1-29).

CDFW responded by referring to DEIR Section 4.4.6 which states that "the direct and indirect impacts are based on the content identifying aquatic and non-aquatic habitat and species presence or suitable habitat throughout the document." AR 8399 (emphasis added). Conversion of habitat types are tallied in great specificity. Id. Pre-construction species surveys will be required to reassess species presence and location. Id. The response also refers to Table ES-3 (Summary of Environmental Consequences), which contains a section on Biological Resources that provides a detailed summary of direct and indirect, and temporary and permanent, biological impacts. AR 8399, 258–61. CDFW also stated that there will be additional detail provided in consultation with the Corps. AR 8399. Finally, it was unclear what specific pages in the DEIR concern the commenter and CDFW was unable to provide a more detailed response. Id.

Petitioners contend that the response does not analyze impacts on individual species, only their habitats, and assumes without analyzing that if new habitat is created in the future after destruction of existing habitat, those species will return. Table ES-3 merely lists the "permanent loss" and "net gain" of habitat for each listed species, with no analysis of how long it will take to realize the net gain, nor how much wildlife will be destroyed by bulldozing. AR 258–61. Finally, CDFW stated that there will be additional detail provided in consultation with Corps, but no such detail is provided in the EIR. AR 8399. Pet. Op. Br. at 40-41.

CDFW's opposition describes the USFWS comment as conclusory. The substance of CDFW's response addressed the Project's impacts on individual species, citing DEIR Section 3.4.6's 130-page discussion of the Project's potential impacts both on habitats and individual species. AR 8399, 762-899. As an example, Section 3.4.6 states that there is a limited potential for El Segundo Blue Butterfly to collide with equipment used in restoration activities that could kill or injure adult butterflies, but the application of certain Project design features is expected to avoid any such impacts. AR 775-76. As another example, Section 3.4.6 observes that restoration-related ground disturbance could result in the direct mortality of Silvery Legless Lizards but explains how the application of certain design features and mitigation measures would reduce that impact to a less than significant level. AR 781-83. CDFW's response also referred to Table ES-3 that summarizes that the Project will have mitigable potential impacts on federally-listed and/or special status species. AR 8399, 258. Opp. at 37-38.

CDFW's opposition points out that it is no surprise that the Project potentially could have impacts on wildlife given the large ground and vegetation disturbance that will be involved in the restoration process. However, contrary to Petitioners' assertions, CDFW carefully analyzed the potential direct impacts on individual species and their habitats, and developed design features and mitigation measures that are expected to limit them to a less than significant level. Moreover, the FEIR's analysis demonstrates that the Project's net impact on many of those species will be beneficial given the new and improved habitat that will be available following restoration. For example, the DEIR concludes that the Project will result in net gains in the quality and quantity of habitat for such protected species as the Silvery Legless Lizard (AR 228), Belding's Savannah Sparrow (AR 228), Least Bell's Vireo (AR 230), special-status marsh birds (AR 232), and the Southern California Salt Marsh Shrew and South Coast Marsh Vole (AR 233). Opp. at 38-39.

The response to USFWS' general comment was sufficient.[25]

EPA Comment AF2-9

EPA recommended that CDFW "discuss the anticipated net improvement for each alternative, taking into consideration baseline conditions, known direct, indirect, and temporary impacts, and the performance goals," and "consider adding more robust performance goals for special status species and their associated habitats." AR 8405 (AF2-9).

CDFW responded: "Given the stated intention that restoration performance goals focus broadly on habitat development, species composition, and ecosystem functions rather than on specific acreages or specific species, CDFW has elected not to revise the Draft EIS/EIR in response to this comment." AR 8409.

Petitioners fail to make any argument about the adequacy of CDFW's response to this comment. Pet. Op. Br. at 41.

c. Habitat Fragmentation

Petitioners note that the Project includes approximately 3.6 miles of bicycle paths that loop on top of the levees. AR 406. In addition, the Project provides an additional 29,000 feet of pedestrian-only trails, including 2,000 linear feet of elevated boardwalk directly adjacent to the wetlands. AR 412. Based on such facts, both USFWS and LPP objected that the public access plan would significantly increase habitat fragmentation, resulting in significant adverse impacts. Pet. Op. Br. at 41.

USFWS Comment AF1-10 and LPP Comment O15-87

USFWS noted in an October 2015 letter to the Corps: "Construction of these levees and berms is not typical of a marsh plain and will introduce an elevation and visual barrier for wildlife where no such disruption exists." AR 46735.

USFWS later commented: "We remain concerned that the increased fragmentation will

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[25] Petitioners also note that USFWS commented: "For many species there is little connection made between the mitigation measures and how they will reduce impacts to less than significant", and provided then specific examples. AR 8388 (AF1-29). Pet. Op. Br. at 41. Neither Petitioners nor CDFW's opposition set forth CDFW's response or whether it was adequate.

limit wildlife movement and subject a greater proportion of the remaining wildlife within Ballona Wetlands to noise and disruption associated with recreation and maintenance activities along the new berms, lowering the overall quality of remaining habitat from its current condition." AR 8384 (AF1-10).

In response to USFWS, CDFW cited the benefits of the Project and DEIR Section 2.2.23, which indicates that bike and pedestrian paths will no longer run along Ballona Creek but would be located farther up channel along the top of the elevated levees, minimizing the disruption to wildlife from recreational use. The pedestrian boardwalks also would be elevated by approximately five feet to avoid direct and indirect effects on wildlife. AR 8392.

LPP expressed concerns that "[t]he berm and trail system would bring activity that would be perceived as dangerous closer to prey species, decreasing the value of the habitat for those species." AR 11559 (O15-86). LPP recommended buffer areas of 50–250 meters to avoid disturbance of wetland species. AR 11599 (O15-87).

In response to LPP, CDFW cited other responses and stated that the DEIR analyzed potential impacts of the trail on habitat fragmentation, as well as the amount of area proposed for the trail system. AR 11608. The response also cited DEIR Fig. 2-1 showing the trails as "developed", with the exception of the boardwalks which would allow the presence and use of habitat beneath. AR 11608.

Petitioners contend that CDFW's response cites a list of potential direct and indirect impacts, not an analysis. AR 762. In addition, CDFW cites DEIR Figure 2–1 to claim that, with the exception of the boardwalks, the paths are identified as developed. AR 11608. Neither the responses nor the FEIR calculate the acreage of habitat in the buffer zone, failing to inform the public on how much habitat will be degraded by the presence of bicyclists and joggers. Pet. Op. Br. at 41.

In addition, USFWS pointed out that the proposed boardwalks are not even identified in Figure 2–1 and that the boardwalks "will result in a greater extent of permanent impacts." AR 8385. CDFW responded that it was not required to show the boardwalks as "developed areas...because the habitat would exist under the boardwalk trails." AR 8393. This again fails to analyze the impact on wildlife and habitat fragmentation caused by people standing a mere five feet above the habitat. AR 407. USFWS and LPP were not only concerned with the paths and boardwalks themselves, but degradation of habitat adjacent to the paths and boardwalks. AR 8384, 11559. Pet. Op. Br. at 42.

Petitioners ignore the fact that CDFW's responses to these comments discussed how the flat and gradually sloping design of the new levees would decrease habitat fragmentation, thereby reducing the "high degree" of fragmentation that currently exists at the Reserve. AR 8391-92. CDFW also noted that the new trails would run along the perimeter of the Reserve,[26] thus minimizing any disruption of wildlife or habitats within the Reserve. AR 8392; *see also* AR 348 (map showing proposed new trails).

In response to O15-86, CDFW explained that the DEIR analyzes fragmentation as a possible impact. AR 11608. DEIR Section 3.4.6 analyzed the potential impacts to wildlife due to increased human activity associated with reopening the Reserve for passive recreation and

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[26] Petitioners note that, contrary to CDFW's contention, the trails will not be along the perimeter of the Reserve, but rather on the tops of the levees, which cut between Area A and Area C, and through Area B. AR 348, 374. Grass Reply at 12. True, but the trails still will run on top of the levees.

determined that indirect impacts could result from the increased human activity. AR 11583-84. That analysis concluded that such impacts could be reduced to a less than significant level through the application of certain design features and mitigation measures. AR 11584.

LPP's comment regarding the need for a buffer proposed only a general range of distances for a sufficient buffer (AR 11559), and CDFW's response appropriately responded with the same level of detail. CDFW acknowledged that a buffer is appropriate and referred the commenter to DEIR Section 3.4.6 which prescribes a distance of 250 feet for passerine birds and 500 feet for raptors. AR 11609. The responses were adequate.

USFWS Comment AF1-12

USFWS stated: "The location of boardwalks and pedestrian paths identified in Figure 2-23 do not correspond with the developed areas identified on Figure 2-1 and will result a [*sic.*] greater extent of permanent impacts." AR 8385 (AF1-12).

CDFW responded that the boardwalk trails and pedestrian paths are shown in DEIR Figure 2-23 as part of the public access plan. They are not shown in Figure 2-1, which shows the proposed habitats. AR 8393. The proposed boardwalks would be elevated above habitats by approximately five feet, thus avoiding any direct or indirect impacts on wildlife in the underlying habitat and allowing unimpeded movement of wildlife below those boardwalks. AR 8393. CDFW also noted that the boardwalks would cover only a small percentage of the Project site. AR 8392.

Petitioners contend that CDFW's response only addressed why the boardwalks are not identified on Figure 2-1 and ignored USFWS' concern about the possible impacts on surrounding wildlife. Pet. Op. Br. at 42.

CDFW rebuts this argument, noting that the response directly addressed that concern in discussing the elevation of the boardwalks and the ability of wildlife to move unimpeded below them, also noting that the boardwalks would cover only a small percentage of the Project site. Opp. at 40. The response fully addressed the issues raised by the commenter.

LPP Comment O15-87

LPP commented that trails depress the breeding density of sensitive open-land bird species and recommended a buffer. AR 11559 (O15-87).

CDFW responded that it will mitigate the impacts to nesting birds by providing a buffer zone around nesting, generally a distance of 250 feet for passerine birds and 500 for raptors. AR 11609.

Petitioners argue that, to the extent that CDFW disagrees with comments of USFWS and LPP, the FEIR must disclose and discuss the disagreement between experts in a manner that the public and decisionmakers can intelligently evaluate the issue. Guidelines §15151 (c); Banning Ranch, *supra*, 2 Cal.5th at 940–41. While the DEIR admits that habitat fragmentation is an area of known controversy, it fails to mention or summarize CDFW's disagreement with USFWS and other respected experts. AR 222. CDFW's conclusory statements in the response to comments fail to adequately explain the controversy, or rebut expert opinion with evidence, rendering the EIR inadequate as an informational document. Pub. Res. Code §21005. Pet. Op. Br. at 43.

Petitioners are attempting to argue that the FEIR's analysis of nesting bird impacts is insufficient when the only issue raised is whether the response to LPP's comment was adequate. It was.[27]

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[27] Petitioners argue that CDFW's response to USFWS that the mitigation could, not would,

d. Greenhouse Gases Impacts

The DEIR acknowledged that carbon is sequestered into the plant and stored as carbon stock and some portion of the carbon removed from the atmosphere is returned to the atmosphere through several processes, including respiration, decay, and disturbance. AR 1032. CDFW also acknowledged: "When salt marsh converts to mudflat, aboveground biomass is lost and soil sequestration halts, but soil carbon stored prior to the conversion remains sequestered within the mudflat. In contrast, when wetlands are diked or drained, the belowground carbon stock can be released as CO_2." Id.

In asserting that there would be no significant GHG impact, the DEIR stated: "A recent assessment has indicated that under Alternative 1, the Ballona Wetlands would be expected to remove 13,100 to 40,300 MT of CO2 (minus emissions) from the atmosphere by the year 2100." AR 1040. "Although methane has a larger warming potential than CO2, the amount of brackish marsh assumed for Alternative 1 would be small enough that emissions would not outweigh the carbon sequestered in the salt marsh, even with conservative assumptions." Id.

One commenter raised concerns about whether Project-related bulldozing could release massive or dramatic amounts of sequestered carbon. AR 9600-601 (O6-11). The commenter added: "The soils, soil microbes and plants of the Ballona Wetlands are a key example of a vast carbon storage system...This proposed project has a major negative impact on the area's environment: it will release a dramatic carbon load, long sequestered in the soils, into the atmosphere. But the DEIR/DEIS fails to facilitate careful and informed decision-making on this issue." AR 9601(O6-12).

CDFW responded that land use practices offer an opportunity for carbon sequestration. AR 9619 (O6-12). However, the Project would not release a carbon load previously sequestrated in the soils. DEIR Section 3.7 assessed that the wetland restoration would increase the soil's ability to function as a carbon sink and the carbon sequestered after completion would more than compensate for any carbon released beforehand. AR 9619.

Another commenter stated: "Wetlands - with their plants and life-filled soils - provide some of the best ways to sequester carbon. But the project's proposed 'realignment' of creeks; lowering of land; bulldozing; excavating over two million cubic yards of soil (and removing plants and animals in the process) could completely destroy this fragile ecosystem." AR 12627 (I60-3).

According to Petitioners, CDFW's response to I60-3 referred to the same response as O6-12. AR 9619. Pet. Op. Br. at 44. This cite appears incorrect.

Petitioners argue that CDFW failed to analyze the amount of sequestered carbon and methane that would be released through the excavation of the Ballona Wetlands. CDFW failed to analyze "the severity and duration of the near-term hardship" from GHG impacts, merely claiming any such impacts will eventually be offset by more wetlands. *See* Neighbors for Smart Rail, *supra,* 57 Cal.4th 439, 455. Pet. Op. Br. at 44-45.

Petitioners note that "[e]ven when a project is intended and expected to improve conditions in the long term—20 or 30 years after an EIR is prepared— the EIR must inform decision-makers and the public about the short-term environmental costs of achieving that desirable improvement.

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mitigate impacts constitutes an admission that CDFW's finding lacks substantial evidence. AR 8400. *See* Pub. Res. Code §21081(a)(1), (b); Guidelines §§ 15091, 15093. Pet. Op. Br. at 43. This argument is not tied to any USFWS comment (Petitioners do not cite AF1-30) and the existence of substantial evidence is not at issue for a response to comment.

These costs include not only the impacts involved in constructing the project, but also the environmental impacts that will result from the project's initial years of operation." Neighbors for Smart Rail, *supra*, 57 Cal.4th at 455 (emphasis added). *See* Grass Reply at 15.

Petitioners fail to cite any authority that short-term GHG impacts – which by definition affect climate change on a long-term basis -- must be addressed in an EIR. Additionally, as with the other environmental impacts, Petitioners are limited to contesting the adequacy of CDFW's response to comments about carbon sequestered in the soil because they have not presented the FEIR's evidence on carbon sequestration. CDFW's response clear that the soil at the Project site after restoration would be capable of sequestering and storing a greater amount of carbon than whatever amount might be released during the restoration process. Although Petitioners argue that CDFW's response was required to quantify the amount of carbon emissions that could result from Project-related soil disturbance, the general nature of the comments did not require it to do so. "CEQA does not require a lead agency to conduct every test, perform all research, or provide all information. Guidelines §15204(a); *see* Laurel Heights I, *supra*, 47 Cal.3d at 415. CDFW reasonably responded with the same level of detail.

c. Impacts on the Foraging Habitat of the White-Tailed Kite and Other Raptors

Petitioners argue that the FEIR was required to analyze the loss of White-Tailed Kite foraging habitat as a potentially significant impact. The White-Tailed Kite (a California protected species) has been observed at the Reserve. AR 11569; *see also* AR 11545, 47, 49. As noted in the CEQA Checklist, a project can have a significant impact on a listed species from either direct impacts or habitat modification. *See* Guidelines App. H, IV(a) (Biologic Resources Checklist). The Project will massively reduce the foraging habitat of the White-Tailed Kite and other raptor species that rely on upper marsh and grasslands for foraging. AR 11569. The Project not only will reduce foraging habitat on a short-term basis but will result in the permanent loss of 76 acres of upland habitat, not including the loss of habitat acreage for the bike and pedestrian trails and levees. AR 11570. The loss of the "exceedingly important foraging area" referred to in the DEIR may have a significant unmitigable impact on the White-Tailed Kite and other raptors. AR 743. Pet. Op. Br. at 45.

As with other environmental impacts, Petitioners fail to set forth the FEIR's evidence and analysis of the White-Tailed Kite. As a result, Petitioners are limited to contesting the adequacy of CDFW's response to comments about impacts to the White-Tailed Kite.

The Audubon Society commented that, because the Project will reduce upland habitats by 76 acres, the restoration of native vegetation at the Project site could cause a reduction in the population of rodents that are the preferred prey of White-Tailed Kites, and therefore no longer provide it with suitable foraging habit. AR 11569-70 (O15-108).

In response, CDFW stated that the replacement of hundreds of acres of invasive plants with annual and perennial grasslands will provide an important improvement to foraging habitat, despite a study noting a distinct reduction of raptor density in restored areas. AR 11569, 11623. Without conceding that there may be a significant impact, CDFW admitted that "the restoration effort may not benefit all raptors equally." AR 11623. As for the direct loss of 76 acres of upland habitats, CDFW claimed: "There would be no net loss of nesting or foraging habitat following restoration. Although a portion of suitable upland foraging habitat would be converted to tidal marsh, the marsh also would provide suitable foraging habitat for these species, and thus no net loss of foraging habitat is expected." AR 11623. CDFW concluded that "[u]nder CEQA, projects are not required to balance current and future raptor foraging capacity." AR 11623.

Petitioners argue that this response was an impermissibly conclusion. *See* People v. County of Kern, (1974) 39 Cal.App.3d 830, 841. Pet. Op. Br. at 45. CDFW's response was not conclusory. The response pointed out that the Project would provide an important improvement to foraging habitat for many raptor species because several hundred acres of invasive monoculture would be replaced with annual and perennial grasslands. AR 11623. The Audubon Society's own comment identified these grasslands as a habitat potentially "rich in rodent prey" for the White-Tailed Kite. AR 11569. CDFW's response also stated that, after restoration, the site would continue to support small mammals such as mice and voles, which are an important foraging species for raptors such as the White-Tailed Kite. AR 11623. For these reasons, CDFW concluded that the Project site would experience an "overall lift" in raptor foraging habitat quality when restored. AR 11623.[28] CDFW's response was a good faith, reasoned analysis that addressed the issue raised by the commenters.

The Audubon Society also commented that the Project would reduce by 76 acres the amount of upland foraging habitat for special-status upland birds. AR 11570-71 (O15-109). CDFW's response acknowledged that the Project would convert a portion of upland habitat to tidal marsh but pointed out that the newly created marsh would continue to provide suitable foraging habitat. AR 11623. CDFW also noted that the enhancement of existing non-native habitats would expand the available foraging habitat, citing DEIR Table ES-2 and Table 2-3 that showed the habitat acreages that would be created and enhanced by the Project. AR 11623-24, 255, 351. Table 2-3 shows that the Project would create 53.6 acres of new high marsh habitat, which the commenters themselves identified as an example of potentially suitable foraging habitat for the White-Tailed Kite. AR 11569. For these reasons, CDFW's response concluded that "no net loss of foraging habitat is expected." AR 11623.

Petitioners characterize CDFW's response as stating that (a) the lower marsh will continue to provide foraging habit and (b) the improvement to upland habitat will off-set the loss of foraging habitat. AR 11623. Petitioners argue that there is no evidence that upland species will use lower marsh for foraging. AR 11571. There also is no evidence that the density of small animals, such as voles, would increase to mitigate the loss of 24–28% of the available upland foraging habitat. Nevertheless, CDFW reaches the unsupported conclusion that there will be no net loss of nesting or foraging habitat. AR 11624. Pet. Op. Br. at 45; Grass Reply at 12.

The court disagrees. CDFW's response provided a good faith, reasoned analysis that fully addressed the issue raised by the Audubon Society, together with factual information supporting the conclusions.

Petitioners finally argue that, according to sea level rise maps, significant portions of Area

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[28] The Audubon Society relied in part on a study which CDFW characterized as suggesting that the replacement of annual grassland with native perennial grassland generally could reduce native raptor populations. AR 11569. The Audubon Society suggested that CDFW undertake a separate study to evaluate how the Project might impact the abundance of prey for the White-Tailed Kite. AR 11569-70. CDFW's response described the study cited by the Audubon Society as "interesting" but rejected any duty to account for potential post-restoration changes in the rodent density of restored areas. AR 11623.

Petitioners argue that, if the response reflects a disagreement between experts, CDFW's opinion is unsupported by facts or studies. Grass Reply at 12. CDFW correctly notes that a lead agency is not required to conduct every study or analysis that commenters might recommend. Guidelines §15204(a). Opp. at 42-43. CDFW also can rely on its own expertise for evidence.

A and B will be converted from low marsh to mudflats by 2050, and to open water by 2100. AR 453-57. Mudflats and open water do not provide habitat for the White-Tailed Kite and many other terrestrial bird species. *See* AR 11569 (listing habitat for the White-Tailed Kite). Thus, even more "exceedingly important foraging" habitat will be lost. AR 743. As a result, CDFW's claim that the Project will not have significant near or long-term impacts for the White-Tailed Kite is not supported by substantial evidence. Pet. Op. Br. at 46.

The Audubon Society's comments did not raise any issue relating to sea-level rise, so CDFW was under no obligation to address that issue in its response to those comments. Moreover, "the purpose of an EIR is to identify the significant effects of a project on the environment, not the significant effects of the environment on the project." Ballona Wetlands Land Trust v. City of Los Angeles, (2011) 201 Cal.App.4th 455, 473. Any loss of foraging habitat at the Project site that might occur as a result of sea level rise would be an effect of the environment on the Project and is not a significant environmental issue that merited a response. Opp. at 44.[29]

f. Prejudice

"[T]he purpose of CEQA is to inform government decision makers and their constituency of the consequences of a given project, not to derail it in a sea of administrative hearings and paperwork." Long Beach Savings & Loan Assn. v. Long Beach Redevelopment Agency, (1986) 188 Cal.App.3d 249, 263. The petitioner must show that any defect in the responses to comments was prejudicial—*i.e.*, "it deprived the public and decision makers of substantial relevant information about the project's likely adverse impacts." Neighbors for Smart Rail, *supra*, 57 Cal.4th at 463. "[I]nsubstantial or merely technical" errors or omissions are not grounds for relief under CEQA. Ibid.

CDFW argues that it diligently and in good faith prepared more than 4,000 pages of responses to a deluge of comments consisting of over 8,000 separate postcards, e-mails, and letters. Petitioners and their representatives alone submitted over 2,500 pages of comments. If a handful of CDFW's responses were not as exhaustive or thorough as they could have been, Petitioners have not demonstrated that the 4,000+ pages of responses failed to adequately serve the disclosure purpose central to the EIR process. Opp. at 45.

The court agrees. Petitioners have failed to demonstrate that any of CDFW's responses to comments were prejudicial.

G. Conclusion

The Petition is granted in part. CDFW was required to disclose and analyze the proper flood control design parameters in the DEIR and FEIR and its failure to do so was a failure to proceed in the manner required by law. Additionally, the project description does not adequately commit CDFW to specific performance criteria when it provides CDFW with authority to reduce restoration goals based on disturbance to other habitats without any supplemental environmental review and when it permits performance criteria changes to provide more attainable goals if hydrology or dissolved oxygen performance goals are not met. In all other respects, the Petition

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[29] At trial, CDFW's counsel explained that the maps at AR 453-57 show that the Project will slow sea-level rise. Petitioners' counsel argued that the appendix comparing the No Project Alternative with Alternative 1 (AR 7685) shows a vulnerability for impact to the lower portion of the Reserve that should have been addressed in the FEIR, but Petitioners cite no expert opinion on this issue.

is denied.

A writ shall issue directing CDFW to set aside the FEIR and any Project approvals, prepare and certify a legally adequate EIR for the Project if it chooses to proceed, and suspend any Project activity that could result in an adverse change or alteration to the physical environment until CDFW complies. An injunction shall also issue prohibiting CDFW from taking any action pursuant to the Project until it complies with CEQA.

Petitioner Defend's counsel is ordered to prepare a proposed judgment and writ of mandate, serve them on CDFW's counsel and other Petitioners' counsel for approval as to form, wait ten days after service for any objections, meet and confer if there are objections, and then submit the proposed judgment and writ along with a declaration stating the existence/non-existence of any unresolved objections. An OSC re: judgment is set for June 29, 2023 at 9:30 a.m.

Dated: May 17, 2023

Superior Court Judge

From: Julie Valdez <julievaldez@bryantrubber.com>
Date: October 27, 2023 at 3:01:08 PM PDT
To: "Brody, Richard@Wildlife" <Richard.Brody@wildlife.ca.gov>
Cc: Alejandra Garcia <georgiesmomy@yahoo.com>, Culver Marina Little League <culvermarinall@gmail.com>, Leo32santos <Leo32santos@gmail.com>
Subject: Culver Marina Little League

WARNING: This message is from an external source. Verify the sender and exercise caution when clicking links or opening attachments.

Hi Brody,

As a Board Member of Culver Marina Little League for over 5 years, I can attest to the following:

Culver Maria Little League has been a fixture of our community since 1956. Youth sports including baseball and softball are important to the character and development of our children. Moreover, our League services the low-income residents, including the Mar Vista Housing Projects and the immediate surrounding area. Any disruption to the League's baseball season and fields could create a hardship and danger for many of our at-risk kids.

For over 6 decades. Culver Marina has provided full/part/payment plan scholarships and free equipment/uniforms for under privileged children of our area. Approximately 60-75% of our overall membership receive assistance in some capacity. The surrounding Little Leagues do not have the hardships as we do, but we strive to provide for our community.

We appreciate and respect the land managed by the Department of Fish and Wildlife.

Thankful,

Julie Valdez
Human Resources Manager | California Office
Direct: (310) 997-1559

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California Fish and Game Commission
Wildlife Resources Committee (WRC) Work Plan
Scheduled Topics and Timeline for Items Referred to WRC

Updated December 4, 2023

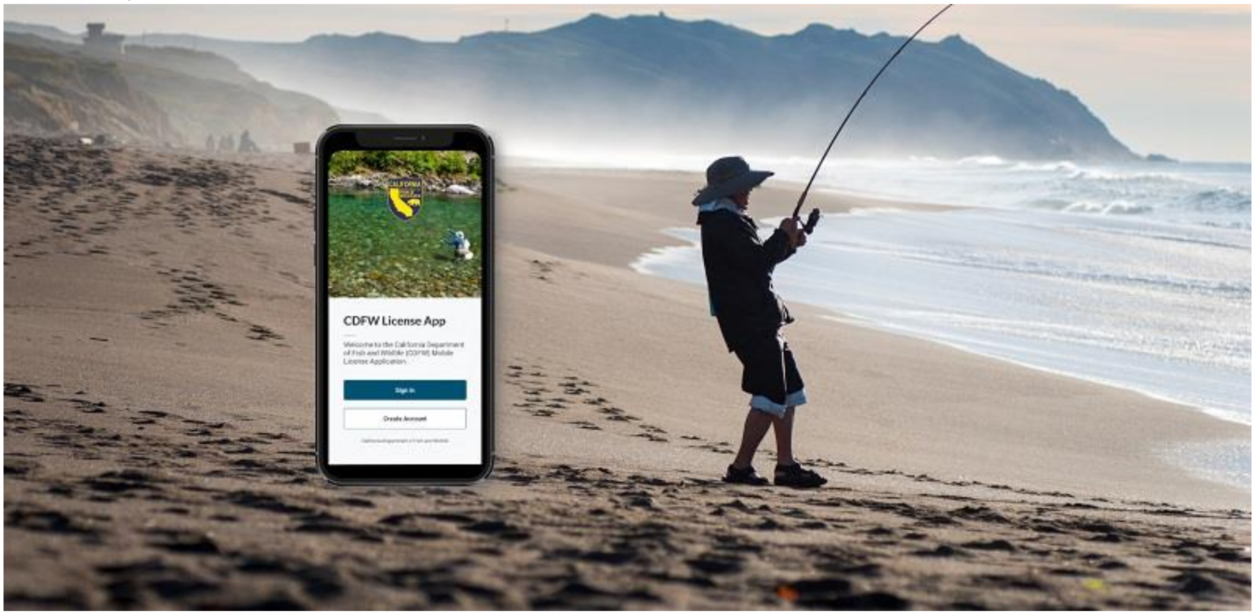
Note: Proposed changes to topics/timing are shown in blue underscore or strike-out font

TOPICS	CATEGORY	Jan 2024	May 2024	Sep 2024
Periodic and Annual Regulations				
Upland (Resident) Game Birds	Regulatory		X	X/R
Mammal Hunting	Regulatory		X	X/R
Waterfowl Hunting	Annual Regulatory		X	X/R
Central Valley Sport Fishing	Annual Regulatory		X	X/R
Klamath River Basin Sport Fishing	Annual Regulatory		X	X/R
Inland Sport Fishing	Regulatory	X/R		X
Regulations & Legislative Mandates				
Falconry	Referral for Review			
Restricted Species	Regulatory			
Discussions and Updates				
Take of Nongame Mammals	Referral for Review	X	X	X
Shotgun Wads (plastic pollution)	Referral for Review	X	X	X/R
Waterfowl Hunting in Southampton Bay	Referral for Review	X	X	X/R

KEY: X Discussion scheduled X/R Recommendation potentially developed and moved to FGC

CDFW Introduces License Application for Mobile Devices

March 20, 2024



Media Note: A link to download fishing and mobile app **video** *is available at the bottom of the page.*

The California Department of Fish and Wildlife (CDFW) is pleased to announce the launch of the CDFW License App for mobile devices.

The new application allows residents and nonresidents to display California sport fishing licenses and validations on their mobile phones and other mobile devices in lieu of a physical license.

Users may also download and view various CDFW online resources, including hunting and fishing regulations booklets, the Fish Planting Schedule and access the Online License Sales and Services website.

Users can download the application on their mobile devices through the Apple App Store or Google Play Store or by accessing the direct download links from CDFW's License App web page.
Following the successful rollout of the CDFW License App, hunting licenses and related hunting validations will be added to the mobile display options as early as mid-2024.

"We sometimes think progress moves too slowly, but the Department of Fish and Wildlife has moved full-speed ahead in making fishing licenses valid for 365 days and has modernized the licensing process by going digital," said Assemblymember Jim Wood (D-Healdsburg), author of the original legislation, Assembly Bill (AB) 817, responsible for the change to a 365-day license and mobile licensing display. “I couldn’t ask for a better partner in implementing this new process. I look forward to CDFW’s goal of growing its digital footprint in other licensing areas.”

Wood’s AB 817, introduced in 2021, was widely embraced throughout the fishing community by national and statewide Recruit, Retain, Reactivate (R3) advocates, conservation organizations and CDFW.

The Coastal Conservation Association of California (CCA CAL), which works to protect the interests of recreational saltwater anglers and healthy marine habitats, also supported the legislation.

“The CDFW License App represents the culmination of efforts that will benefit license holders for many years,” said Wayne Kotow, executive director of CCA CAL.

Nathaniel Arnold, acting chief of CDFW’s Law Enforcement Division, said, “Wildlife officers expect the app will provide additional opportunities for the angling public to have their licenses conveniently in possession when checked.”

The rollout of the CDFW Licensing App aligns with the goals of CDFW’s R3 initiative to transform hunting and fishing barriers into opportunities. This app will allow California anglers to easily obtain, access and display their sport fishing licenses on their mobile devices, providing a convenient and paperless solution that promotes responsible fishing practices, ensures compliance with regulations, and enhances overall fishing experiences for individuals in both urban and remote areas.

More information about the app and Frequently Asked Questions can be found on the CDFW’s License App web page, which includes video tutorials covering the app’s various functionalities.

Mobile app and fishing video is available for download from the CDFW FTP site.

CDFW Seeks Artists to Enter Annual California Duck Stamp Art Contest

March 20, 2024

CDFW Photo by Travis VanZant: Mallard at Yolo Wildlife Area.

The California Department of Fish and Wildlife (CDFW) invites artists to submit their original artwork to the 2024-2025 California Duck Stamp Art Contest. Submissions will be accepted May 6 through June 14.

The artwork must depict the species selected by the California Fish and Game Commission, which for the 2024-2025 hunting season is the mallard. One of the most abundant ducks in the world, and the most abundant duck in North America, these familiar foragers can be seen in practically any environment with fresh water. The males are easily recognized by their iridescent green head and yellow bill, while both males and females have a patch of bright blue on their wings. They are swift and agile in the air, cruising at speeds of around 50 miles per hour and having the ability to take off almost vertically from water.

The winning artwork will be reproduced on the 2024-2025 California Duck Stamp. The top submissions are traditionally showcased at the Pacific Flyway Decoy Association's art show, which is scheduled to take place in July.

The contest is open to U.S. residents 18 years of age or older as of March 20, 2024. Entrants need not reside in California. Current and former CDFW employees are ineligible. All entries must be accompanied by a completed participation agreement and entry form. These forms and the official rules are available online at wildlife.ca.gov/duck-stamp/contest.
The design is to be in full color and in the medium (or combination of mediums) of the artist's choosing, except that no photographic process, digital art, metallic paints or fluorescent paints may be used in the finished design. Photographs, computer-generated art, art produced from a computer printer or other computer/mechanical output device (air brush method excepted) are not eligible for entry and will be disqualified. The design must be the contestant's original hand-drawn creation. The entry design may not be copied or duplicated from previously published art, including photographs, or from images in any format published on the Internet.

Entries will be judged in June. The judges' panel, which will consist of experts in the fields of ornithology, conservation, and art and printing, will choose first, second and third-place winners, as well as honorable mention.

Since 1971, CDFW's annual contest has attracted top wildlife artists from around the country. All proceeds generated from stamp sales go directly to waterfowl conservation projects throughout California. In past years, hunters were required to purchase and affix the stamp to their hunting license. Now California has moved to an automated licensing system and hunters are no longer required to carry the physical stamp in the field (proof of purchase prints directly onto the license). However, CDFW still produces the stamp, which can be requested by interested individuals at wildlife.ca.gov/licensing/collector-stamps.

State of California
Department of Fish and Wildlife

Signed Original on File
Received April 8, 2024

M e m o r a n d u m

Date: April 4, 2024

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: April 2024 Request for Changes to the Fish and Game Commission's Timetable for Anticipated Regulatory Actions

The Department of Fish and Wildlife (Department) requests the following schedule changes to the Fish and Game Commission's (Commission's) 2024 regulatory timetable for amendments to Title 14, California Code of Regulations (CCR):

1. Move the proposed rulemaking, "Possession of Wildlife and Wildlife Rehabilitation" from the TBD calendar to a June 2024 Notice. This proposal aims to strike and replace Section 679 with new subsections 679.1, 679.2, 679.3, 679.4, 679.5, 679.6, 679.7, 679.8, and 679.9, a manual, and associated forms. These proposed changes overhaul how the Department administers the wildlife rehabilitation program. The proposed rulemaking schedule following notice is discussion at the August 2024 meeting and adoption at the October 2024 meeting.

2. Add a new rulemaking, "White Sturgeon Harvest and Reporting" requesting to publish notice at the June 2024 meeting, amending sections and associated forms in sections 1.74, 5.79, 5.80, 27.90, 27.92, 701, and adding 701.1. These changes would provide options for Commission consideration for a revised management of the White Sturgeon Sport Fishery: with a catch and release only option, a limited entry harvest tag option. and a real-time quota option. The proposed rulemaking schedule following notice is discussion at the August 2024 meeting and adoption at the October 2024 meeting.

If you have any questions or need additional information, please contact Regulations Unit Manager, Ona Alminas, at (916) 902-9222 or Regulations@wildlife.ca.gov.

ec: Chad Dibble, Deputy Director
Wildlife and Fisheries Division

Nathaniel Arnold, Acting Chief
Law Enforcement Division

Jay Rowan, Branch Chief
Fisheries Branch

Scott Gardner, Branch Chief
Wildlife Branch

Ona Alminas, Env. Program Manager
Regulations Unit
Wildlife and Fisheries Division

Fish and Game Commission:

David Thesell, Program Manager
Fish and Game Commission

California Fish and Game Commission: Perpetual Timetable for Anticipated Regulatory Actions

April 11, 2024

Items proposed for change are shown in blue underlined or strikeout font

Subject of Rulemaking	Title 14 Section(s)	FGC Teleconference March 26, 2024	MRC San Clemente Area March 19, 2024	TC San Jose April 16, 2024	FGC San Jose April 17, 2024	FGC San Jose April 18, 2024	FGC Teleconference May 15, 2024	WRC Yreka May 16, 2024	FGC Mammoth Lakes June 19, 2024	FGC Mammoth Lakes June 20, 2024	MRC Santa Rosa Area July 18, 2024	TC Fortuna August 13, 2024	FGC Fortuna August 14, 2024	FGC Fortuna August 15, 2024	WRC San Jose Area September 12, 2024	FGC Sacramento October 9, 2024	FGC Sacramento October 10, 2024	MRC Sacramento November 7, 2024	TC San Diego Area December 10, 2024	FGC San Diego Area December 11, 2024	FGC San Diego Area December 12, 2024	WRC Southern California January 15, 2025	FGC Sacramento February 12, 2025	FGC Sacramento February 13, 2025
Central Valley Sport Fishing (Annual)	7.40(b)(4), (43), (66), (80)					D	A				E 7/16													
Klamath River Basin Sport Fishing (Annual)	7.40(b)(50)					D	A							E 8/15										
Waterfowl (Annual)	502					A				E 6/30														
Inland Sport Fish Bag Limits, Gear, and Low-Flow Information	2.30, 5.50, 7.50, 8.00					N			D	~~D~~				A								E 1/1		
Pre-Existing Structures in Marine Protected Areas (MPAs), Marine Managed Areas (MMAs)	632			E 4/1																				
Special Hunt Permit Issuance and Drawings in ALDS	702, 715						A				File withdrawn. Sufficiently related changes to be considered and potentially adopted at a future meeting.													
Mitigating Risks for Cervid Importation and Movement	257.5, 475, 676, 681, 712, 714						A				File withdrawn. Sufficiently related changes to be considered and potentially adopted at a future meeting.													
Klamath River Dam Removal Sport Fishing	7.40(b)(50), 7.50(b)(73)			E 4/1																				
Department Lands [1, 2]	540, 550, 551, 630										E 7/1													
Recreational California Halibut Emergency (First 90-Day Extension)	28.15	EE 2/29																						
Recreational California Halibut Emergency (Second 90-Day Extension	28.15	E 2/29							EE 5/29															
Recreational California Halibut Updates	28.15								E 5/29															
Recreational Sea Urchin Bag Limit Exemption	29.06			E 4/1																				
Exotic Game Mammals / Wild Pig Validation	250, 251.5, 252, 257.5, 258, 350, 352, 353, 368, 375, 376, 377, 378, 379, 401, 465.5, 679 708.13										E 7/1													
White Sturgeon Emergency	5.79, 5.80, 27.90, 27.92						EE 5/15																	
White Sturgeon Emergency (First 90-Day Extension)	5.79, 5.80, 27.90, 27.92					A	E 5/15					EE 8/12												
White Sturgeon Emergency (Second 90-Day Extension)	5.79, 5.80, 27.90, 27.92								A	~~A~~		E 8/12							EE 11/10					
White Sturgeon Certificate of Compliance	5.79, 5.80, 27.90, 27.92					N			D	~~D~~				A					E 11/10					
Recreational Fishing Regulations for Federal Groundfish	27.20, 27.25, 27.30, 27.35, 27.40, 27.45, 27.50, 28.27, 28.28, 28.29, 28.47, 28.48, 28.49, 28.54, 28.55, 28.56	A		E 4/1 (X)																				
Fisheries Logbook Forms and Fishing Block Charts	120.7, 122, 165, 180, 190, 197, 705.1				N				~~D~~	D			A									E 1/1		
California Halibut and White Seabass Gillnet Fisheries Management Measures	174.1				N				~~D~~	D			A									E 1/1		
Possession of Wildlife and Wildlife Rehabilitation	679.1, 679.2, 679.3, 679.4, 679.5, 679.6, 679.7, 679.8, 679.9								N					D			A							
White Sturgeon Harvest and Reporting	1.74, 5.79, 5.80, 27.90, 27.92, 701, 701.1								N					D			A							
Mammal Hunting for 2024-2025 Seasons [5]	362, 363, 364, 364.1, 554, 555, 555.1, 708.14					A					E 7/1													

Future Rulemakings: Schedule to be Determined

Subject of Rulemaking	Title 14 Section(s)	FGC Teleconference March 26, 2024	MRC San Clemente Area March 19, 2024	TC San Jose April 16, 2024	FGC San Jose April 17, 2024	FGC San Jose April 18, 2024	FGC Teleconference May 15, 2024	WRC Yreka May 16, 2024	FGC Mammoth Lakes June 19, 2024	FGC Mammoth Lakes June 20, 2024	MRC Santa Rosa Area July 18, 2024	TC Fortuna August 13, 2024	FGC Fortuna August 14, 2024	FGC Fortuna August 15, 2024	WRC San Jose Area September 12, 2024	FGC Sacramento October 9, 2024	FGC Sacramento October 10, 2024	MRC Sacramento November 7, 2024	TC San Diego Area December 10, 2024	FGC San Diego Area December 11, 2024	FGC San Diego Area December 12, 2024	WRC Southern California January 15, 2025	FGC Sacramento February 12, 2025	FGC Sacramento February 13, 2025
Santa Cruz Harbor Salmon Fishing (FGC Petition 2016-018)	TBD																							
European Green Crab (FGC Petition 2017-006)	TBD																							
Possess Game / Process Into Food	TBD																							
American Zoological Association / Zoo and Aquarium Association	671.1																							
Night Hunting in Gray Wolf Range (FGC Petition #2015-010)	474																							
Shellfish Aquaculture Best Management Practices	TBD																							
Ridgeback Prawn Incidental Take Allowance	120(e)																							
~~Possession of Wildlife and Wildlife Rehabilitation~~	~~679~~																							

KEY

FGC = California Fish and Game Commission MRC = FGC Marine Resources Committee WRC = FGC Wildlife Resources Committee TC = FGC Tribal Committee OAL = Office of Administrative Law

EM = Emergency **EE = Emergency Expires** E = Anticipated Effective Date (**RED "X" = expedited OAL review**) EUF = Effective Upon Filing w/ Secretary of State

N = Notice Hearing D = Discussion Hearing A = Adoption Hearing V = Vetting R = Committee Recommendation

1 = Considers FGC Petition 2017-008 2 = Considers FGC Petition 2018-003 3 = Considers FGC Petition 2020-015 4 = Considers FGC Petition 2021-020 5 = Considers Petition 2021-017

California Fish and Game Commission
Potential Agenda Items for the May and June 2024 Commission Meetings

April 11, 2024

The next Commission meetings are scheduled for May 15, 2024 via teleconference and June 19-20, 2024 in Mammoth Lakes and via webinar/phone. This document identifies potential agenda items for the meetings, including items to be received from staff and the California Department of Fish and Wildlife (Department).

As will be discussed under Agenda Item 27C (next meetings), the Commission will consider moving marine items to the second day of the June 2024 meeting and the wildlife and fisheries items to the first day; the potential change is reflected in the order of agenda items listed here.

Wednesday, May 15

1. Approve: Special hunt permit issuance and drawings continuation notice
2. Approve: Mitigating risks for cervid importation and movement continuation notice
3. Adoption: Central Valley sport fishing
4. Adoption: Klamath River Basin sport fishing
5. Adoption: Emergency closures of sport fishing in Klamath River Basin for spring-run Chinook salmon
6. General public comments for items not on the agenda

Wednesday, June 19: Wildlife- and inland fisheries-related

1. Commission executive director report
2. Department reports (Department director and Law Enforcement Division)
3. Notice: Possession of wildlife and wildlife rehabilitation (pending approval under Agenda Item 27B)
4. Notice: White sturgeon harvest and reporting beginning in 2025 (pending approval under Agenda Item 27B)
5. Adoption: Extension of white sturgeon emergency regulations
6. Discussion: White sturgeon regular rulemaking to continue emergency regulations
7. Discussion: Inland sport fishing
8. Determine whether listing white sturgeon (*Acipenser transmontanus*) as threatened under the California Endangered Species Act (CESA) may be warranted
9. Action on wildlife and inland fisheries petitions for regulation change
10. Action on wildlife and inland fisheries non-regulatory requests from previous meetings
11. Department presentation on bighorn sheep, deer and mountain lion
12. Department presentation on the Private Lands Wildlife Habitat Enhancement and Management Area Program

13. Commission Wildlife Resources Committee report
14. Department Wildlife and Fisheries Division, Department Ecosystem Conservation Division reports
15. General public comments for items not on the agenda

Thursday, June 20: Marine-related and administrative items

16. Justice, equity, diversity and inclusion plan update
17. Commission policies review
18. Discussion: California halibut and white seabass gillnet fisheries management measures
19. Discussion: Fisheries logbook forms and fishing block charts
20. Receive and consider a restricted species application to possess transgenic squid
21. Receive, consider and potentially act on experimental fishing permit application #2024-01 for testing on-demand fishing systems in box and king crab fisheries in northern California
22. Action on marine petitions for regulation change
23. Action on marine non-regulatory requests from previous meetings
24. Commission Marine Resources Committee report
25. Department Marine Region report
26. Administrative items (legislation, rulemaking timetable, next meeting)
27. General public comments for items not on the agenda (second day)
28. Executive (closed) session

BEFORE THE
FISH AND GAME COMMISSION
STATE OF CALIFORNIA

In the Matter of the Appeal of the Denial of the Restricted Species Exhibiting Permit Renewal Application of:

ATTILA MOLNAR,

Appellant.

Agency Case No. 21ALJ02-FGC

OAH No. 2023080229

PROPOSED DECISION

Thomas Heller, Administrative Law Judge (ALJ), Office of Administrative Hearings (OAH), State of California, took this matter under submission on December 18, 2023.

Patrick M. Ciocca, Esq., represented appellant Attila Molnar (Molnar).

David Kiene, Esq., represented the California Department of Fish and Wildlife (Department).

SUMMARY

Molnar appeals the Department's denial of his July 2019 application to renew his Restricted Species Exhibiting Permit. The permit authorized Molnar to possess and exhibit a variety of venomous snakes, exotic mammals, and other animals regulated by the Department as restricted species. The Department denied Molnar's renewal application in December 2020 after finding he committed multiple violations of the regulations regarding restricted species. Molnar contends the violations were technical and justified and do not warrant the denial of his renewal application under the totality of the circumstances.

The evidence supports the Department's action. Molnar possessed and exhibited a monkey for at least one year without assigning a unique identifier to the animal, possessed four species of venomous snakes not authorized by the permit, and imported and possessed four endangered snakes after his permit expired. The violations are grounds for denial of the renewal application, and the totality of the circumstances warrants that result. Therefore, the Department's denial of the renewal application is affirmed.

FACTUAL FINDINGS

Background and Procedural History

1. Molnar is a veterinarian who owns and operates All Animals Veterinary Hospital (All Animals) in Calabasas, California. He also collects exotic animals. In or about 2014, the Department first issued Molnar a Restricted Species Exhibiting Permit (Permit No. 3194) authorizing him to possess and exhibit a variety of venomous

snakes, exotic mammals, and other "restricted species" listed in California Code of Regulations, title 14, section 671 (Section 671). Molnar exhibited some of these animals at All Animals, at schools and in other educational settings, and at private homes.

2. The Department renewed Molnar's permit annually for several years. In the last such renewal on July 23, 2018, the Department authorized Molnar to possess and exhibit 26 species of venomous snakes, an American alligator, a dwarf caiman, and several exotic mammal species through July 23, 2019. The permit included conditions that Molnar "may import, export, transport, or possess only those species listed . . . for commercial and/or educational exhibition purposes," and he "may add new species to the inventory only with the prior written approval of the Department or as specified in the permit." (Department's Response to Appeal, Exhibit B (March 25, 2021) (Response).)

3. On July 23, 2019, the Department received Molnar's application to renew the permit for another year. The application included an edited list of species showing several changes to Molnar's animal collection, and a list of additional animals Molnar intended to acquire in the next 12 months. Between August and October 2019, Department investigators inspected All Animals several times and identified alleged violations related to Molnar's collection. In September 2019, the Department also asked Molnar to submit a résumé and letter of recommendation describing his qualifying experience for the permit. Molnar submitted several letters of recommendation to the Department that described his qualifying experience.

4. On December 18, 2020, the Department sent Molnar a notice of denial of the renewal application. The denial letter stated the Department's decision was based on findings that Molnar committed multiple violations of the regulations regarding

restricted species. On January 11, 2021, Molnar timely appealed the denial to the Fish and Game Commission (Commission) and filed a written statement in support of the appeal. On March 25, 2021, the Department filed a response with the Commission arguing that the denial should be affirmed. One of the Department's arguments for affirming the denial was that Molnar's statement in support of the appeal was not signed under penalty of perjury. On March 31, 2021, Molnar filed a copy of the same statement correcting that error.

5. On August 8, 2023, the Commission submitted a request to OAH to schedule a hearing on Molnar's appeal. After OAH granted the request, the Department moved to vacate the hearing, arguing that a hearing was not authorized under California Code of Regulations, title 14, section 671.1 (Section 671.1). Molnar's counsel did not oppose the motion but requested time to file a supplemental brief. An OAH staff member directed Molnar's counsel to file any such brief by September 15, 2023, and Molnar's counsel complied.

6. On September 27, 2023, Presiding Administrative Law Judge (PALJ) Matthew Goldsby vacated the hearing date and ordered the Department to file any response to Molnar's supplemental brief by October 4, 2023. The Department filed a response requesting reconsideration of the order authorizing Molnar's supplemental brief. In an order dated October 9, 2023, PALJ Goldsby denied the Department's request for reconsideration and deemed the matter submitted.

7. Thereafter, on December 4, 2023, the ALJ ordered the filing of exhibits to Molnar's written statement in support of the appeal that were missing from the submissions to OAH. Molnar's counsel filed the missing exhibits on December 18, 2023, and the matter was deemed resubmitted on that date.

Department's Contentions

8. In its Response to Molnar's appeal, the Department contends the Commission should affirm the denial of the renewal application because Molnar: (a) did not sign the statement in support of his appeal under penalty of perjury; (b) failed to microchip or otherwise uniquely identify a monkey and provide documentation of the identifier to the Department within 10 business days of receiving the animal; (c) imported and possessed four venomous snake species not authorized under his permit; and (d) imported and possessed four endangered snakes after his permit expired. The Department's original denial letter to Molnar also cited other alleged violations, but the Department's briefing in response to Molnar's appeal does not analyze those other alleged violations.

9. Regarding the statement in support of the appeal, Molnar initially did not sign it under penalty of perjury as required. (See § 671.1, subd. (c)(7)(B).) Molnar corrected the error on March 31, 2021, but only after the Department argued the appeal should be dismissed due to error. The Department contends the error justifies the Commission dismissing Molnar's appeal without reaching the merits.

10. Regarding the monkey, Lieutenant Kory Collins and Captain John Laughlin of the Department's Law Enforcement Division inspected All Animals on August 30, 2019. The Department's Response to Molnar's appeal attaches a report of Collins stating Molnar showed Collins and Laughlin a squirrel monkey (*Saimira sciureus*) during the inspection. (Response, Exhibit E.) According to the report, Molnar stated he acquired the squirrel monkey in October 2018, but he had not implanted a microchip in the animal or otherwise uniquely identified it (e.g., with an identifying tattoo).

11. According to Department records, the first indication that Molnar microchipped the squirrel monkey was in a revised inventory of animals that Molnar submitted on October 7, 2019, while his renewal application was pending. The revised inventory included the number and a bar code for the microchip that Molnar implanted in the animal. (Response, Exhibit G.)

12. Regarding the four unpermitted snake species, Collins inspected All Animals again on September 6, 2019. Collins reported he found Molnar to be in possession of four venomous snake species that were not listed on Molnar's permit. Specifically, Molnar had two Malabarian pit vipers (*Trimeresurus malabaricus*), one red adder (*Bitis rubidda*), two Ethiopian mountain adders (*Bitis parviocula*), and one Schulze's pit viper (*Parias schultzei*). Molnar's permit did not authorize him to possess these six animals.

13. Regarding the four endangered snakes, Collins and Laughlin inspected All Animals again on October 23, 2019, and they observed a wooden shipping container labeled "Live Animals" and "Live Reptiles, Venomous." According to Collins's report, Molnar stated he received a shipment of four Mangshan vipers (*Protobothrops mangshanens*) from overseas on October 19, 2019, several months after Molnar's permit expired. Collins asked Molnar why he had acquired the additional snakes, and Molnar replied he purchased them from someone in Germany approximately two years earlier and had just received them. Molnar stated the snakes are very difficult to acquire, and it takes a long time to obtain the required shipping paperwork. Mangshan vipers require Convention on International Trade in Endangered Species (CITES) paperwork because their wild populations are endangered. Before Molnar's permit expired, it authorized him to possess just one Mangshan viper. Molnar showed Collins and Laughlin the four new snakes, which were in individual containers.

14. According to the Department, Molnar's alleged violations evidence "a complete disregard for permitting laws intended 'to reduce the depletion of wildlife populations.'" (Response, p. 10 [quoting Fish & Game Code, § 2116.5].) Therefore, if the Commission does not dismiss the appeal, it should sustain the Department's denial of the renewal application on the merits.

Molnar's Contentions

15. Molnar contends he has worked with the Department for years assisting in seizures of illegal reptiles, mammals, and birds; identifying reptile species; treating confiscated exotic animals for free; and housing exotic and native wildlife as evidence for the Department. But starting in August 2019, Molnar became the subject of "a campaign of harassment" by Laughlin that led to the denial of his renewal application. (Molnar Appeal and Statement, p. 1 (Jan. 11, 2021) (Appeal).) Molnar never had a complaint against his permit, and Laughlin and Collins did not note any animal husbandry or safety problems at All Animals. Nonetheless, they demonstrated "dishonest, aggressive behavior" in front of Molnar's clients and staff. (*Id.* at p. 2.) Molnar contends he always provided up-to-date information to the Department, and he adhered to the regulations regarding reporting. But the entire process has been confusing, difficult, and "made worse by the behavior of officers who were supposed to guide me." (*Id.* at p. 5.)

16. Regarding the written statement accompanying his appeal, Molnar contends the initial lack of a signature under penalty of perjury was a technical error that does not justify denying his appeal. He remedied the error immediately upon learning of it.

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17. Regarding the squirrel monkey, Molnar contends the animal was "technically on loan" from another animal handler when Collins and Lauglin inspected All Animals on August 30, 2019. (Molnar's Supplementary Brief, p. 4 (Sept. 15, 2023) (Supplementary Br.).) Molnar "had never taken official possession of the monkey," and when the animal was given to Molnar, it was "hypoglycemic and extremely weak." (*Ibid.*) According to Molnar, the monkey needed treatment in Molnar's capacity as a veterinarian before Molnar could or would consider taking it on as a personal animal. Molnar was not going to take on the monkey as his own before he knew it was fit for his individual possession. Putting a microchip in the monkey "was out of the question, due to its weakened state." (*Ibid.*)

18. According to Molnar, there were times that the monkey's health improved, and Molnar was able to show the animal in schools and other educational settings. At Laughlin's insistence and against Molnar's professional judgment, Molnar microchipped the animal and submitted the microchip information to the Department in October 2019. The monkey died in May 2020 due to metabolic disease.

19. Regarding the four species of snakes not listed in the permit, Molnar was awaiting approval of his renewal application at the time of the inspection on September 6, 2019. The list of species Molnar intended to acquire in the next 12 months that was part of the application included all four species of snakes (see Supplementary Br., Attachment A), and Molnar was qualified for approval of that request. Moreover, Molnar was under the mistaken belief that possession of these species, which were similar to vipers he was permitted to possess, was "essentially allowed under the Department's rules." (*Id.* at p. 6.) Therefore, possession of the four species of snakes is a "technical violation" that should be judged in light of the totality of Molnar's actions with regard to his restricted species permit. (*Ibid.*)

20. Regarding the Mangshan vipers, Molnar contends he ordered the snakes from a captive breeder in the Czech Republic long before the permit expired. The vipers should have arrived in 2018 when Molnar was properly permitted, but they were "waylaid by European regulations." (Supplementary Br., p. 7.) When the vipers arrived, Molnar had already applied to the Department to renew his permit. Although the pending application admittedly did not authorize Molnar to possess the snakes, Molnar was concerned for the animals' safety and well-being. Therefore, Molnar retrieved the vipers from Los Angeles Airport and took them "immediately" to another Department permittee who was authorized to possess these species. (*Ibid.*) According to Molnar, he acted as "little more than courier of these snakes to a properly permitted holder," and doing anything less would have put the snakes at risk. (*Ibid.*) While this may be a "technical violation," Molnar asserts his action was understandable and "even commendable." (*Id.* at p. 8.)

21. Overall, Molnar contends the Department is disregarding his good record as a permittee and his long record of service to the Department. He describes himself as a devoted veterinarian who has given completely of himself for the betterment of the animals that come to his facility for treatment. In Molnar's view, the violations do not justify denial of the renewal application.

Analysis of Contentions

22. The record supports Molnar's contention that his initial failure to sign the statement supporting his appeal under penalty of perjury was an oversight. Molnar corrected the error immediately after perceiving it, and he did not change the statement when he signed it on March 31, 2021. The Department also presented no evidence or argument that the error prejudiced the Department. These facts weigh

against the Department's contention that Molnar's appeal should be dismissed without reaching the merits.

23. The record does not support Molnar's contention that he only possessed the squirrel monkey in his capacity as a veterinarian. According to the letters of recommendation he submitted to the Department in late 2019, Molnar regularly exhibited the squirrel monkey to others in a variety of settings during the preceding two years. One letter states, "[f]or the last two years [Molnar] has . . . enchanted us with his baby squirrel monkey, that accompanied him almost at all times." (Appeal, Exhibit 4 [letter from Matt Kiosea, DVM].) Other letters similarly state Molnar acquired or started exhibiting the monkey about two years earlier, i.e., in late 2017. (*Id.* [letters from Nicole Yorkin, George Hees, Kimberly Ward, Michael Budnitsky, and Julian Sylvester].) In contrast, Molnar reportedly told Laughlin and Collins he acquired the monkey in October 2018. According to the letters, Molnar exhibited the squirrel monkey at All Animals, in school classrooms, at a wildlife learning center, and at private houses for children and adults. The monkey also appeared "several times in various promo shoots" in the entertainment industry. (*Id.* [letter from Julian Sylvester].)

24. Molnar would not be expected to exhibit what he contends was an "extremely weak" and "technically on loan" animal under veterinary care so widely, especially at locations other than his veterinary hospital. Considering the evidence, it is unlikely Molnar was acting only as the squirrel monkey's veterinarian from when he received the animal in October 2018 (as Molnar told Collins and Laughlin) or in late 2017 (as stated in the letters) until the inspection in late August 2019. This weighs against Molnar's contention that he was justified in not assigning a unique identifier to the monkey during that period.

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25. There is no material factual dispute that Molnar possessed four species of venomous snakes not listed in his permit. Molnar told the Department he intended to acquire these species of snakes in his July 2019 renewal application, but he acquired and possessed a total of six specimens of these four species before obtaining Department approval, which the Department never gave. Molnar downplays the violation as technical and based on a mistaken understanding of the regulations, but he does not dispute the violation itself.

26. Regarding the Mangshan vipers, the record does not support Molnar's contentions that he gave the vipers to another permittee "immediately" and acted as "little more than a courier" for them. Molnar himself told Collins and Laughlin he picked up the vipers from the airport on October 19, 2019, and the vipers were still at All Animals when Collins and Laughlin inspected the facility four days later on October 23, 2019. There was no "immediate" transfer to another permittee, and no evidence suggests Molnar would have transferred the snakes to another permittee at all absent the inspection.

27. The record also does not support a finding that Laughlin conducted a "campaign of harassment" against Molnar as alleged. Laughlin and Collins inspected All Animals several times over a two-month period and found violations related to Molnar's animal collection. The number of inspections was reasonable in light of the nature and gravity of the violations found. Molnar's submissions on this appeal do not prove his claims of Department harassment, dishonesty, or other misconduct.

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LEGAL CONCLUSIONS

Legal Standards

1. "The Fish and Game Code authorizes the Department to issue written permits to possess any wild animal designated as a restricted species, upon a determination that no detriment will be caused to agriculture, native wildlife, the public health and safety, or the welfare of the animal. (Fish and Game Code, § 2150, subd. (a)(1)." (*Young v. California Fish and Game Commission* (2018) 24 Cal.App.5th 1178, 1193.) Under Section 671.1, "[i]t is unlawful for any person to import, export, transport, maintain, sell, dispose of, or use for any purpose any animal restricted by Section 671 except as authorized in a permit issued by the department." (§ 671.1, subd. (a).) The animals restricted by Section 671 "are not normally domesticated in this state," and they are listed as restricted species "to prevent the depletion of wild populations and to provide for animal welfare," or "because they pose a threat to native wildlife, the agriculture interests of the state or to public health or safety." (§ 671, subd. (b).) The restricted species include all non-human primates, all species of vipers, and each of the other species identified in Molnar's permit and renewal application. (*Id.*, subd. (c).)

2. A restricted species exhibiting permit, such as the permit issued to Molnar, may be "[i]ssued to any person who is a resident or nonresident who is in the business of exhibiting animals at least half-time, for commercial and/or educational purposes, and who possesses the qualifications listed in subsection 671.1(c)(1)." (§ 671.1, subd. (b)(6).) For such a permit, "[t]he permittee may import, transport, and possess only those species specified on the department approved permit." (§ 671.1, subd. (c)(5)(A)(1).)

3. "The department may deny the issuance of a permit or amendment of an existing permit if: [¶] 1. the applicant or permittee has failed to comply with terms and conditions of a permit or any provision of the Fish and Game Code or regulations adopted pursuant thereto . . . ." (§ 671.1, subd. (c)(5)(A)(1).) "Any applicant or permittee who is denied a permit . . . may appeal that denial . . . by filing a written request for an appeal with the commission." (*Id.*, subd. (c)(7).) "The commission's president may appoint a commissioner, a current or former executive director of the commission, a current employee of the commission, or a member of the state bar of California in the active practice of law to serve as a hearing officer." (*Id.*, subd. (c)(7)(A).)

4. "[A] person requesting an appeal (appellant) shall submit a written statement to the commission that specifically identifies the legal and factual grounds for challenging the department's action." (§ 671.1, subd. (c)(7)(B).) The appellant's written statement "shall be signed by the appellant under penalty of perjury." (*Ibid.*) "[T]he department may submit a response to the commission, with a copy sent to the appellant, along with any supporting documentary evidence and/or declarations under penalty of perjury." (*Id.*, subd. (c)(7)(C).) If the Department submits a response, "the appellant may submit a reply to the commission signed by the appellant under penalty of perjury . . . that addresses arguments and evidence raised in the department's response." (*Id.*, subd. (c)(7)(D).) Thereafter, "the hearing officer may request additional information, including testimony under oath, from either party, and may permit either party to present additional information or rebuttal if the hearing officer determines such to be helpful in reaching a correct decision." (*Id.*, subd. (c)(7)(E).)

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5. “No later than 60 days after receipt of all submittals and any additional information or rebuttal permitted by the hearing officer . . ., the hearing officer shall prepare and submit a proposed decision to the executive director of the commission. The decision shall contain proposed findings and reasons for the commission’s action.” (§ 671.1, subd. (c)(7)(G).)

Analysis

6. The Department’s contention that Molnar’s appeal should be dismissed without reaching the merits is unpersuasive. Molnar’s initial failure to sign the statement supporting his appeal under penalty of perjury does not justify dismissing the appeal. The error was inadvertent, Molnar corrected it immediately, and the Department presented no evidence of prejudice from the error. (Factual Finding 22.)

7. The Department’s contentions on the merits are more persuasive. The preponderance of the evidence proves the violations analyzed in the Department’s Response. (See Evid. Code, § 115 [“Except as otherwise provided by law, the burden of proof requires proof by a preponderance of the evidence.”].) First, Molnar failed to microchip or otherwise uniquely identify the squirrel monkey and provide documentation of the identifier to the Department as required. Under Section 671.1, “[e]very . . . non-human primate . . . that is possessed under a restricted species permit shall be identifiable by an approved unique identifying method and reported to the department for inclusion in a registry.” (§ 671.1, subd. (c)(3)(J).) “Approved methods include microchips, tattoos or any other alternative method that is approved by the department. . . . [¶] . . . Each permittee must provide an animal’s unique identification to the department within 10 business days of receipt or transfer of an animal, the birth or death of an animal, or change in unique identification for an animal.” (*Ibid.*)

8. Molnar violated these requirements by possessing the squirrel monkey for at least one year (according to Molnar) and up to two years (according to the letters of recommendation) before implanting a microchip in the animal and informing the Department of the microchip in October 2019. Furthermore, Molnar's contention that he possessed the animal solely in his capacity as a veterinarian during that entire period is unpersuasive. Molnar exhibited the squirrel monkey in a manner consistent with possession of the animal in Molnar's personal capacity. (Factual Findings 23-24.) Molnar's contention that the squirrel monkey was too fragile to microchip also does not justify the violation. Molnar could have used a different unique identifier (e.g., a tattoo) even if that were true.

9. Second, Molnar violated his permit and Sections 671 and 671.1 by possessing four species of venomous snakes (totaling six animals) not listed in his permit. Molnar's permit states he may "possess only those species listed" in the permit. (Response, Exhibit B.) Sections 671 and 671.1 include the same limitation. (§§ 671, subd. (a); 671.1, subd. (b)(6).) In his renewal application, Molnar identified the four species of snakes as species he intended to acquire within the next 12 months, but Molnar acquired the snakes without waiting for Department approval, which never came.

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10. Third, Molnar violated Section 671, subdivision (a), by importing and possessing four Mangshan vipers after his permit expired. Molnar picked up the endangered snakes from the airport on October 19, 2019, about three months after the expiration of his permit. Molnar contends he ordered the snakes two years earlier, but that does not justify the violation. Molnar could have cancelled the shipment after his permit expired or informed Department staff of the snakes' impending arrival and arranged for another permitted facility to take them. Molnar also did not transfer the snakes to another permittee "immediately" as he contends; he only did so after Collins and Laughlin identified the violation. (Factual Finding 26.)

11. The violations described above authorized the Department to deny Molnar's renewal application. (§ 671.1, subd. (c)(5)(A)(1).) Considering the violations and the totality of the circumstances, denial is the correct result. Molnar committed multiple violations of the regulations related to restricted species. The violations were neither justified nor merely technical as Molnar contends. They resulted in Molnar possessing more restricted species than he was allowed to possess under his permit, and in the Department having incomplete information about Molnar's animal collection. Molnar's submissions on appeal also demonstrate limited acceptance of responsibility for the violations.

12. Molnar's lack of prior disciplinary history is a mitigating factor, as is his apparent assistance to the Department in other matters involving exotic animals. But those mitigating factors are not enough to justify granting the renewal application. Molnar was only a permittee for a few years before committing the violations, and the nature and gravity of the violations do not support renewal of the permit. Molnar contends his abilities and contributions as an exotic animal veterinarian weigh in favor of renewal, but his veterinary skills and practice are not at issue in this appeal. In

addition, there is no provision in Section 671.1 for the issuance of a restricted species exhibiting permit on a probationary basis. The Commission is presented with the binary choice of either affirming or reversing the Department's denial of Molnar's renewal application. Considering the entire record on appeal, affirming the Department's action is the correct result.

ORDER

The Department's denial of Attila Molnar's Restricted Species Exhibiting Permit Renewal Application is affirmed.

DATE: 02/07/2024

Thomas Heller (Feb 7, 2024 16:20 PST)

THOMAS HELLER

Administrative Law Judge

Office of Administrative Hearings