DEPARTMENT OF THE ARMY PERMIT

Permittee: California Department of Wildlife; Attention: Timothy Chorey

Project Name: Regional General Permit No. 78 Reauthorization for the California Department of the Fish and Wildlife Fisheries Restoration Grant Program

Permit Number: SPL-2019-00120-CLH

Issuing Office: Los Angeles District

Note: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To reauthorize the implementation of salmonid habitat enhancement and restoration projects conducted under the California Department of Fish and Wildlife Fisheries Restoration Grant. Program (FRGP) in various coastal streams within Los Angeles District from San Luis Obispo County to San Diego County, California, implemented through the California Department of Fish and Wildlife's (CDFW) Fisheries Restoration Grant Program (FRGP). Projects would be identified on an annual basis and would apply one or more of the habitat restoration treatments described in the *California Salmonid Stream Habitat Restoration Manual* (CDFW Manual). Projects may include

- In-stream habitat improvements, including cover structures (divide logs, digger logs, spider logs, and log/root wad/boulder combinations), boulder structures (boulder weirs, vortex boulder weirs, boulder clusters, and single- and opposing-boulder wing-deflectors), log structures (log weirs, upsurge weirs, single- and opposing-log wing-deflectors, and Hewitt ramps) and placement of imported spawning gravel may be utilized in certain locations. Techniques and practices are identified in part VII of the Manual. Techniques for placement of spawning gravel are identified on page VII-46 of the Manual.
- Unanchored large woody debris may be used to enhance pool formation and improve stream reaches, particularly on first- through third-order streams. Logs selected for placement would generally have a minimum diameter of 12 inches and a minimum length 1.5 times the mean stream channel type bankfull width at the deployment site. A root wad should have a minimum root bole diameter of 5 feet and a minimum length of 15 feet, and should be at least half the channel type bankfull width. More information can be found on page VII-23 of the Manual.
- Fish screens may be used to prevent entrainment of juvenile salmonids in water diverted for agriculture, power generation, or domestic use, and are necessary on both

gravity flow and pump diversion systems. Guidelines for functional designs of downstream migrant fish passage facilities at water withdrawal projects are found in Appendix S of the Manual. The appendix covers structure placement, approach velocity, sweeping velocity, screen openings, and screen construction.

- Fish passage at stream crossings includes activities that provide fish-friendly crossings where the crossing width is at least as wide as the active channel. Culvert passes are designed to withstand a 100-year storm flow and crossing bottoms are buried below the streambed. Examples include replacement of barrier stream crossings with bridges, bottomless arch culverts, embedded culverts, or fords. Guidelines for fish passage practices are covered in Part IX of the Manual. Baffled culverts (Washington baffles and steel ramp baffles,), fishways (step-and-pool, Denil fishway, Alaskan steeppass and back-flooding weirs), and fish ladders are described in Part XII of the Manual.

Fish passage improvements may include removal of obstructions such as log jams, beaver dams, waterfalls and chutes, and landslides. Suitable large woody debris removed from fish passage barriers that are not used by the project for habitat enhancement would be left within the riparian zone so as to provide a source for future recruitment of wood into the stream system. Guidelines for fish passage improvements are covered in Part VII of the Manual.

- Upslope restoration activities reduce sediment delivery to anadromous streams, and may include road decommissioning, road upgrading, and stormproofing roads by replacing high risk culverts with bridges, installing culverts to withstand the 100-year flood flow, installing critical dips, installing armored crossings, and removing unstable sidecast and fill materials from steep slopes. Guidelines for upslope restoration practices are covered in Part X of the Manual.
- Watershed and stream bank stability activities serve to reduce sediment input from erosive areas within the watershed. Examples include slide stabilization, stream bank stabilization, boulder stream bank stabilization structures, log stream bank stabilization structures, tree revetment, native material revetment, mulching, revegetation, willow wall revetment, brush mattress installation, checkdams, brush checkdams, waterbars, and exclusionary fencing. Guidelines for watershed and stream bank stability are covered in Part VII of the Manual.

Project Location: The location of these restoration activities would take place in coastal watersheds in the following counties within the Los Angeles District: Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura. Please see map included as Figure 1.

GENERAL CONDITIONS OF THIS RGP:

1. This regional general permit expires **September 16, 2024**. Reguest for an extension of the permit should be submitted at least 60 days before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification from this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

SPECIAL CONDITIONS OF THIS RGP:

1. The permittee shall implement all habitat improvement projects in accordance with the latest version of the California Salmonid Stream Habitat Restoration Manual.

2. The permittee shall generally restrict habitat improvement projects to the summer dry season, generally between July 1 and November 1, unless seasonal conditions warrant an extension beyond November 1 (generally when the region experiences a relatively late initiation of rainfall that results in persistent flow within the subject streamcourse).

3. The permittee shall ensure a project's staging area and equipment/material storage area are located outside of the stream's high water channel and associated riparian area. The number of access routes and total area of the work site activity shall be limited to the minimum necessary to complete the restoration action.

4. The permittee shall; ensure all mechanized equipment work within the stream channel shall be performed in isolation from the flowing stream. If any work must be accomplished with flowing water present, the contractor shall utilize minor diversions (i.e., sandbag berms, seed-free rice straw bales, etc.) upstream of the work area and convey flows around the active project area. Intakes at the upstream end of the diversion shall be fitted with fish screens meeting CDFW

and NMFS criteria to prevent entrainment or impingement of small fish. The receiving area downstream of the active project area shall utilize a sediment or desilting basin before ultimate release back to the active stream channel. Materials used for diversion of flows shall be removed in their entirety when they are no longer necessary to complete the project.

5. The Permitee shall ensure that revegetation is accomplished using only native species that would be expected to occur within the subject subwatershed.

6. The permittee shall ensure that project contractors and workers are made familiar with the project's purpose and intent, including the need to avoid and minimize adverse impacts to aquatic resources.

7. The permittee shall ensure that ground-disturbance activities that may affect cultural resources will be avoided through implementation of mitigation measures, including completing cultural resource surveys, fencing, on-site monitoring, and redesigning proposed work to avoid disturbance of cultural resources. The permittee shall conduct preliminary investigations for cultural resources at each year's proposed project sites, and provide the findings of these investigations to the Corps with its annual list of proposed projects.

8. Pursuant to 36 C.F.R. Section 800.13, in the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property, the permittee shall immediately suspend all work in any area(s) where potential cultural resources are discovered and shall not resume construction in the area surrounding the potential cultural resources until the Corps re-authorizes project construction, per 36 C.F.R. Section 800.13. The permittee shall notify the Corps archeological staff within 24 hours (Danielle Storey 213-452-3855 or Meg McDonald at 213-452-3849).

9. The permittee shall ensure that specific measures that have been developed to avoid impacts to endangered, rare, or threatened species that could occur at specific work sites, as described in the latest CDFW's Mitigated Negative Declaration (CEQA) for the project's fiscal year, are fully implemented as necessary.

10. This Corps permit does not authorize you to take any threatened or endangered species, in particular the tidewater goby (Eucyclogobius newberryi), unarmored threespine stickleback (Gasterosteus aculeatus williamsoni), arroyo toad (Anaxyrus californicus), least Bell's vireo (Vireo bellii pusillus), southwestern willow flycatcher (Empidonax traillii extimus), California red-legged frog (Rana draytonii), or southern steelhead (Oncorhynchus mykiss), or adversely modify designated critical habitat for any of these species. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with incidental take provisions with which you must comply). The USFWS and NMFS biological opinions (1-8-08-F-17 and 151422SWR2007PR00446, respectively) contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with incidental take that is also specified in the BOs. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the

attached BOs, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BOs, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The USFWS or NMFS are the appropriate authorities to determine compliance with the terms and conditions of its BO and with the ESA.

11. The permittee shall notify the Corps on an annual basis of the year's projects and shall not begin the activity until after receiving a written Notice to Proceed (NTP), or until 45 days have passed since receipt by the Corps of complete project information. The NTP may include site-specific special conditions to avoid and minimize adverse impacts to waters of the United States. The notification must include the following information:
i. The name, address and telephone number of the project point of contact;
ii. The location of the proposed project in sufficient detail to locate the project in the field, including the identification of the waterbody (this could include a copy of a U.S.G.S. topographic map, Thomas Guide map, or hand-drawn location map with suitable landmarks);
iii. Color photographs of the site;
iv. A description of the current site conditions, including factors in the watershed that may be contributing to the degradation problem and existing habitat;
v. A description of the proposed methods and materials of construction, and a brief discussion regarding how the proposed work would address the situation;
vi. Detailed drawings (plan view and cross-section, as appropriate) of the proposed structures or work, including, as appropriate;
vii. If a water diversion is proposed, the notification must include a dewatering plan; and
viii. If a temporary access path is proposed, the submitted project plans must illustrate the location and dimensions of the path.
If the Corps has not issued its written NTP within 60 days of receipt of a complete project notification package and the Corps has not indicated or identified any issues by any written or verbal means, the permittee may presume authorization under RGP 78 is granted.

12. The permittee shall monitor and maintain the structures or work conducted at a given site for at least three years after construction to ensure the integrity of the structure and successful growth of the planted vegetation. Maintenance of any structure authorized by this RGP must be conducted in accordance with the terms and conditions of the authorization. Maintenance that requires deviations from the original design may require a separate or additional authorization.

13. No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, tires, etc.), and material discharged must be free from pollutants in toxic amounts. (See Section 307 of the Clean Water Act)

14. For projects affecting uses or resources of the coastal zone, the permittee shall obtain concurrence from the California Coastal Commission (CCC) that the project is consistent with the State's certified Coastal Management Program. Because a coastal permit issued by a local agency does not satisfy the federal consistency requirements of the federal Coastal Zone

Management Act (CZMA), the permittee shall also contact the Federal Consistency Coordinator for the CCC at (415) 904-5288 to determine the appropriate procedures. For any activity outside the coastal zone, but with the potential to affect coastal uses or resources, the permittee should also contact the Federal Consistency Coordinator to determine appropriate procedures.

15. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ″study river″ for possible inclusion in the system while that river is in an official study status, unless the appropriate Federal agency with direct management responsibility for that river has determined in writing that the proposed activity would not adversely effect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area. Currently the only designated Wild and Scenic River systems in the coastal areas of Los Angeles District are Piru Creek from 0.5 miles downstream of Pyramid Dam at the first bridge crossing to the boundary between Los Angeles and Ventura Counties (7.3 miles; USDA Forest Service); the main stem Sespe Creek from its confluence with Rock Creek and Howard Creek downstream to where it leaves Section 26, T5N, R20W (31.5 miles; USDA Forest Service); and Sisquoc River, from its origin downstream to the Los Padres National Forest boundary (33.0 miles; USDA Forest Service).

16. No activity or its operation may impair reserved Tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights. For projects proposed on Tribal lands, the permittee shall submit an approval letter from the Tribe with the notification package and shall obtain Section 401 Water Quality Certification, or waiver thereof, from the EPA. authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

Further Information:

1. Congressional Authorities. You have been authorized to undertake the activity described above pursuant to:

(x) Section 10 of the River and Harbor Act of 1899 (33 U.S.C. 403).
(x) Section 404 of the Clean Water Act (33 U.S.C. 1344).
( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
b. This permit does not grant any property rights or exclusive privileges.
c. This permit does not authorize any injury to the property or rights of others.
d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
d. Design or construction deficiencies associated with the permitted work.
e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.
b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give you favorable consideration to a request for an extension of this time limit.

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

_____ _____

David J.Castanon DATE
Chief, Regulatory Division

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

TRANSFEREE DATE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
2008-F-0441

December 9, 2008

Bruce A. Henderson
Regulatory Branch
U. S. Army Corps of Engineers, Los Angeles District
2151 Alessandro Drive, Suite 110
Ventura, California 93001

RECEIVED
DEC 11 2008
Regulatory Branch

Subject: Biological Opinion for the Proposed California Department of Fish and Game Fisheries Restoration Grant Program Regional General Permit, San Luis Obispo, Santa Barbara, and Ventura Counties, California (1-8-08-F-17)

Dear Mr. Henderson:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Los Angeles District of the U.S. Army Corps of Engineers' (Corps) proposed issuance of a Regional General Permit (RGP), pursuant to section 404 of the Federal Water Pollution Control Act, as amended (Clean Water Act), authorizing projects funded by the California Department of Fish and Game's (CDFG) Fisheries Restoration Grant Program (FRGP). At issue are the effects of the proposed authorization on the endangered tidewater goby (*Eucyclogobius newberryi*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), arroyo toad (*Bufo californicus*), California tiger salamander (*Ambystoma californiense*), least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), Gambel's watercress (*Rorippa (=Nasturtium) gambellii*), marsh sandwort (*Arenaria paludicola*), and Chorro Creek bog thistle (*Cirsium fontinale* var. *obispoense*), and the federally threatened California red-legged frog (*Rana aurora draytonii*). This document was prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). Your request for formal consultation was dated April 7, 2007.

This biological opinion is based on information contained in your April 7, 2007, request for consultation, the Final Mitigated Negative Declaration for the 2006 Fisheries Restoration Grant Program (CDFG 2006), the stream restoration manual (CDFG 2002), telephone and electronic mail communications between our staffs, and our files. A complete administrative record of this consultation is available at the Ventura Fish and Wildlife Office.

Although you have determined that issuance of your RGP is likely to adversely affect the California tiger salamander and the Chorro Creek bog thistle, we conclude that these species would not be affected by the Program activities. The California tiger salamander is restricted to still ponds and pools that are not connected to streams in which salmonids would migrate or

breed. Based upon the project description that follows, we believe that the Program would not have projects within California tiger salamander habitat. The Chorro Creek bog thistle is restricted to open seep areas in serpentine soil outcrops and is not likely to occur in areas where fisheries restoration projects would occur. Therefore, these two species will not be addressed in this biological opinion.

Also, your request for consultation did not include designated critical habitat within the counties where the FRGP would be implemented. Within the area under our jurisdiction, critical habitat has been designated for the tidewater goby, southwestern willow flycatcher, least Bell's vireo, arroyo toad, and California red-legged frog. Except for the arroyo toad and least Bell's vireo, units of critical habitat for all of these species could be adversely affected by the actions that would be permitted under the RGP. Therefore, we are including analysis of these critical habitat designations in our biological opinion. We will not be analyzing any effects to arroyo toad and least Bell's vireo critical habitat because these designated areas are well inland of where the FRGP would likely apply or upstream of obstructions which salmonids could not pass (e.g., Gibraltar Dam). If projects are proposed in critical habitat of the arroyo toad and least Bell's vireo in the future, the Corps would be required to reinitiate consultation.

Consultation History

During consultation for this biological opinion, we had come to the conclusion that the project, as proposed, could potentially jeopardize the continued existence of both the marsh sandwort and the Gambel's watercress. We contacted the Corps on June 30, 2008, via e-mail, and notified you of the possible jeopardy. You contacted the CDFG and on July 2, 2008, we received an e-mail from Mary Larson of CDFG informing us that none of the FRGP projects would be conducted in areas where marsh sandwort or Gambel's watercress was known to occur. Also, CDFG would have qualified botanists survey areas within the range of the two plants prior to FRGP projects to ensure that previously unknown populations would not be affected. Further, Ms. Larson stated, and we agreed, that any FRGP projects on Vandenberg Air Force Base that could affect these two plant species would be subject to consultation with the Air Force, so that impacts to the plants would be avoided.

Consequently, the proposed avoidance measure is incorporated into the project description below. Because this measure will avoid adverse effects to marsh sandwort and Gambel's watercress, these species will not be discussed further in this biological opinion.

BIOLOGICAL OPINION

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification of critical habitat" at 50 Code of Federal Regulations 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the analysis with respect to critical habitat that is contained in this biological opinion.

DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to issue a RGP authorizing the CDFG to fund and carry out various salmonid habitat enhancement and restoration projects through implementation of the FRGP. The Corps' RGP would have a term of 5 years from the date of authorization. Program activities are proposed annually for various watersheds throughout San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, San Bernardino, and Riverside Counties. The Corps' proposed authorization addressed by this consultation would apply only to Program projects in counties within the regulatory jurisdictional boundaries of the Corps' Los Angeles District. Of the resulting geographic area, the Ventura Fish and Wildlife Office has regulatory purview only over San Luis Obispo, Santa Barbara, and Ventura Counties, and a portion of Los Angeles County. Therefore, this consultation pertains only to Program projects utilizing the proposed authorization that are executed in San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties within the purview of the Ventura Fish and Wildlife Office.

Individual restoration projects would involve the application of one or more of the restoration treatments described in Part VII of the California Salmonid Stream Habitat Restoration Manual (Restoration Manual) (CDFG 2002) with the exception of dam removal. Dam removal activities are not addressed in this consultation due to the varying potential effects of sediment mobilization.

All projects would be restricted to, and carried out in accordance with, techniques identified in the Restoration Manual. The following descriptions of restoration treatments are summarized from the Restoration Manual; these descriptions are not intended to be exhaustive. Part VII of the Restoration Manual contains more detailed information on specific project methods, and is hereby incorporated by reference. In the following discussion, use of heavy equipment refers to one or more of the following types of equipment: hydraulic excavator, front-end loader, self-propelled logging yarder, or backhoe. The following types of projects and treatments are proposed:

1. Instream Habitat Improvements

    a. Cover structures such as logs, root wads, tree bundles, and boulders would be installed using heavy equipment. Cover structures would increase the quality of pool habitat in a stream.

    b. Boulder structures such as boulder weirs, boulder clusters, and boulder wing-deflectors would be installed using heavy equipment. Boulder structures would break up or diversify stream flow in a particular stream reach, provide instream cover for juvenile salmonids and spawning adults, or recruit spawning gravel.

    c. Log structures such as log weirs, log wing-deflectors, divide logs, digger logs, and Hewitt ramps would be installed using heavy equipment and manual labor. Log structures would provide instream cover for juvenile salmonids and spawning

adults, scour pools for rearing habitat, recruit spawning gravel, and stabilize eroding stream banks.

d. Spawning gravel would be placed using heavy equipment. Gravel would be clean, creek-run ranging from 0.5 inch to 4 inches in diameter.

e. Fish screens would be installed at water diversion intake sites. Fish screens would prevent entrainment of juvenile salmonids and other wildlife in water diverted for agriculture, power generations, or domestic use on both gravity flow and pump diversion systems. Fish screens typically consist of perforated metal plate or mesh material with openings sized to prevent entrainment of aquatic wildlife.

2. Fish Passage

a. Obstructions such as log jams or beaver dams would be modified to facilitate fish passage. Log barriers would be modified using either manual labor or heavy equipment.

b. Waterfalls and chutes would be modified by blasting resting pools into bedrock, forming a step-and-pool passage for fish.

c. Landslides would be modified using either manual labor or heavy equipment such as a hydraulic excavator.

d. Man-made obstructions such as dams, sills, and culverts would be addressed through construction of fishways such as step-and-pool, Denil ladders, and Alaskan steep-pass fishways.

e. Culverts would be modified by either constructing back-flooding weirs downstream of the culvert outflow or installing baffles within the culvert.

3. Watershed and Stream Bank Stabilization

a. Boulder riprap to armor stream banks would be installed using heavy equipment such as a hydraulic excavator or backhoe. A gravel blanket or geotextile fabric would be placed on the soil in the area to be covered by riprap. Riprap would be installed beginning in a trench dug at the toe of the bank, and extending up the stream bank to the bankfull discharge level.

b. Log stream bank stabilization structures such as cribbing or bank armoring would be installed using heavy equipment. Log structures may also be installed using manual labor in areas without access for heavy equipment. These structures would be installed by stacking logs against the stream bank and securing them

using threaded rebar and/or steel cable. Base logs would be placed in a toe trench below stream grade. When installing log cribbing, tieback logs would be imbedded 4-6 feet into the slope perpendicular to the direction of stream flow. When installing log bank armoring, metal fence posts, culvert stakes, or 'deadman' structures would be substituted for tieback logs.

c. Tree revetments would be used to stabilize vertical, eroding stream banks in low gradient meadow streams. Trees would be cut and laid against the vertical bank, using either heavy equipment or manual labor, with the tree tops angling downstream. Tree bases would be tied off to the upper stream bank. Branches slow the water velocity and cause suspended sediment to settle, allowing banks to rebuild and vegetation to re-establish.

d. Mulching for erosion control would be conducted by applying weed-free straw or forest leaf litter to bare soil.

e. Revegetation would be accomplished by transplanting, planting container-grown or bare root stock, or sprigging (inserting cut stakes of willows (*Salix* spp.) or cottonwoods (*Populus* spp.)). Transplanting would typically be done using hand excavation. In hard soils, an iron bar or power auger would be used to bore planting holes for cut stakes; otherwise, cut stakes would be driven into the soil by hand.

f. Willow wall revetments, brush mattresses, and willow siltation baffles would also be used to stabilize and revegetate degraded stream banks. These treatments would involve combinations of the following: excavation of a trench at the toe of the stream bank, installation of willow poles perpendicular to the stream bank, weaving willow branches throughout the standing willow poles, or placing and compressing willow branches on the stream bank's soil surface parallel to the stream channel.

g. Checkdams are small dams (less than 10 feet in height) that would be installed across small drainages to reduce water velocity and trap sediment. Checkdams would be constructed using strawbales, rock, brush, small trees, redwood boards, or compacted earth.

h. Waterbars would be installed using hand tools or heavy equipment as a temporary means of breaking surface flow over sloped sections of road. Waterbars would consist of a shallow ditch and rounded berm, less than 2 feet in height, placed diagonally across a road surface.

i. Exclusionary fencing would be installed to prevent livestock from overgrazing riparian vegetation, reducing water quality, and compromising stream bank

integrity. Fencing would be constructed approximately parallel to the stream channel, with a setback of at least 25 feet from the top of the stream bank.

Other protective measures proposed by the Corps and the CDFG include:

1. At least 15 days prior to the onset of activities, the CDFG will submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until the CDFG has received written approval from the Service that the biologist(s) is qualified to conduct the work.

2. A Service-approved biologist will survey the work site at least two weeks before the onset of activities. If arroyo toads or California red-legged frogs are found in the project area and those individuals are likely to be killed or injured by work activities, the Service-approved biologist will be allowed sufficient time to move them from the site before work activities resume. Only Service-approved biologists will participate in activities associated with the capture, handling, and monitoring of arroyo toads and California red-legged frogs.

3. Before any construction activities begin on a project, a Service-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the arroyo toad and California red-legged frog and their habitat, the importance of the species and their habitat, the general measures that are being implemented to conserve the arroyo toad and California red-legged frog as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

4. A Service-approved biologist will be present at the work site until such time as all removal of arroyo toads and California red-legged frogs, instruction of workers, and habitat disturbance has been completed. After this time, the contractor or permittee will designate a person to monitor on-site compliance with all minimization measures. The Service-approved biologist will ensure that this individual receives training outlined in protective measure 3 above and in the identification of arroyo toads and California red-legged frogs. The on-site biological monitor and the Service-approved biologist will have the authority to halt any action that might result in impacts that exceed the levels anticipated by the Corps and Service during review of the proposed action. If work is stopped, the Corps and Service will be notified immediately by the Service-approved biologist or on-site biological monitor.

5. During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas.

6. All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 65 feet from any riparian habitat or water body. The Corps and the CDFG will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the CDFG will ensure that the contractor has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

7. A Service-approved biologist will ensure that the spread or introduction of invasive exotic plant species is avoided to the maximum extent possible. Areas disturbed by project activities will be restored and planted with native plants.

8. The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated.

9. Ground-disturbing activities in potential arroyo toad and California red-legged frog habitat will be restricted to the period between July 1 and October 15.

10. To control erosion during and after project implementation, the CDFG will implement best management practices, as identified by the Regional Water Quality Control Board.

11. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent California red-legged frogs from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction and reduce the creation of ponded water. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

12. A Service-approved biologist will permanently remove, from within the project area, any individuals of exotic species, such as bullfrogs (*Rana catesbiana*), centrarchid fishes, and non-native crayfish to the maximum extent possible. The biologist will have the responsibility to ensure that their activities are in compliance with the California Fish and Game Code.

13. No projects will be implemented in areas outside of Vandenberg AFB where they would affect Gambel's watercress or marsh sandwort, including Nipomo Mesa, Black Lake, Black Lake Canyon, and Oso Flaco Lake. At Vandenberg AFB, CDFG anticipates that the Air Force would consult with the Service prior to any actions that would affect Gambel's watercress in that watershed and that adverse effects would be avoided.

14. CDFG biologists performing pre-project evaluations under the FRGP will be trained to identify both Gambel's watercress and marsh sandwort and their similar relatives, and

will either identify the plants or take photos for review by Service-approved botanists. Alternatively, CDFG will enlist these Service-approved individuals to conduct on-site surveys or to verify plant identifications if either Gambels' watercress or marsh sandwort are suspected.

The description above does not include measures from the CDFG Manual (e.g., Part X) that describe erosion and sedimentation control during and after projects are implemented. We have reviewed these measures and acknowledge that the methods described in the manual are appropriate for controlling erosion and sedimentation that may develop during the activities. The reader is referred to the Manual (CDFG 2002) for details.

If projects that qualify for authorization under the proposed RGP have already undergone individual consultation pursuant to section 7(a)(2) of the Act, the requirements of individual project consultation documents will supersede those outlined in this biological opinion. If a proposed project involves additional species or effects not considered in this consultation, the Corps will reinitiate this consultation or consult on the project individually.

STATUS OF THE SPECIES

Tidewater Goby

The tidewater goby was listed as endangered on March 7, 1994 (59 FR 5494). On June 24, 1999, the Service proposed to remove the populations occurring north of Orange County, California, from the endangered species list (64 FR 33816). In November 2002, the Service withdrew this proposed delisting rule and made the determination to retain the tidewater goby's listing as endangered throughout its range (67 FR 67803). A recovery plan for the tidewater goby was completed on December 12, 2005 (Service 2005). A 5-Year Review for the tidewater goby was completed in September 2007 (Service 2007b). Unless otherwise noted, information in the following species account is summarized from the following sources: Wang (1982), Irwin and Soltz (1984), Lafferty et al. (1999a, 1999b), Swift et al. (1989, 1993, 1997), Worcester (1992), Swenson (1995, 1999), and Swenson and McCray (1996).

The tidewater goby is endemic to California and typically inhabits coastal lagoons, estuaries, and marshes, preferring relatively low salinities of approximately 12 parts per thousand (ppt). Tidewater goby habitat is characterized by brackish estuaries, lagoons, and lower stream reaches where the water is fairly still but not stagnant. They tend to be found in the upstream portions of lagoons. Tidewater gobies can withstand a range of habitat conditions and have been documented in waters with salinity levels that range from 0 to 42 ppt, temperatures from 46 to 77 degrees Fahrenheit, and depths from approximately 10 inches to 6.5 feet.

The tidewater goby is primarily an annual species in central and southern California, although some variation in life history has been observed. If reproductive output during a single season fails, few (if any) tidewater gobies survive into the next year. Reproduction typically peaks from late April or May to July and can continue into November or December depending on the

seasonal temperature and amount of rainfall. Males begin the breeding ritual by digging burrows (3 to 4 inches deep) in clean, coarse sand of open areas. Females then deposit eggs into the burrows, averaging 400 eggs per spawning effort. Males remain in the burrows to guard the eggs. They frequently forego feeding, which may contribute to the mid-summer mortality observed in some populations. Within 9 to 10 days, larvae emerge and are approximately 0.20 to 0.27 inch in length. Tidewater gobies live in vegetated areas in the lagoon until they are 0.60 to 0.70 inch long. When they reach this life stage, they become substrate-oriented, spending the majority of time on the bottom rather than in the water column. Both males and females can breed more than once in a season, with a lifetime reproductive potential of 3 to 12 spawning events. Aquatic vegetation is critical for over-wintering tidewater gobies because it provides refuge from high water flows.

Tidewater gobies feed on small invertebrates, including mysids, amphipods, ostracods, snails, aquatic insect larvae, and particularly chironomid midge larvae. Tidewater gobies of less than 0.30 inch in length probably feed on unicellular phytoplankton or zooplankton, similar to many other early stage larval fishes.

Tidewater gobies enter the marine environment when sandbars are breached during storm events. The species' tolerance of high salinities (up to 60 ppt) for short periods of time enables it to withstand marine environment conditions where salinities are approximately 35 ppt, thereby allowing the species to re-establish or colonize lagoons and estuaries following flood events. However, genetic studies indicate that individual populations rarely have contact with other populations so natural recolonization may be rare.

Native predators are not known to be important regulators of tidewater goby population size in the lagoons of southern California. Rather, population declines are attributed to environmental conditions. During high flows, streams flood and breach lagoon barriers creating strong tidal conditions. As a result, tidewater goby populations plummet. Populations typically recover quickly in summer, with recorded mean densities of 54 to 323 fish per square foot. Tidewater goby densities are greatest among emergent and submergent vegetation (Moyle 2002). Tidewater gobies that are found upstream of lagoons in summer and fall tend to be juveniles. The highest densities of tidewater gobies are typically present in the fall.

Historically, the tidewater goby occurred in at least 135 California coastal lagoons and estuaries from Tillas Slough near the Oregon border south to Agua Hedionda Lagoon in northern San Diego County. The southern extent of its distribution has been reduced by approximately 8 miles. The species is currently known to occur in about 112 locations, although the number of sites fluctuates with climatic conditions. Currently, the most stable populations are in lagoons and estuaries of intermediate size (5 to 124 acres) that are relatively unaffected by human activities.

The decline of the tidewater goby is attributed primarily to habitat loss or degradation resulting from urban, agricultural, and industrial development in and around coastal wetlands. Tidewater gobies have been extirpated from water bodies that are impaired by degraded water quality (e.g.,

Mugu Lagoon, Ventura County), but still occur in others (e.g., Santa Clara River, Ventura County). Some extirpations are believed to be related to pollution, upstream water diversions, and the introduction of non-native predatory fish species (most notably, centrarchid sunfish (*Lepomis* spp.) and bass (*Micropterus* spp.)). These threats continue to affect some of the remaining populations of tidewater gobies.

Critical Habitat for the Tidewater Goby

We originally designated critical habitat for the tidewater goby on November 20, 2000 (65 FR 69693); however, in 2006, we proposed revisions to that designation (71 FR 68914). In January 2008, we finalized the revised designated critical habitat (73 FR 5919).

The critical habitat designation for the tidewater goby encompasses approximately 10,003 acres. Critical habitat is located in Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties, California. This designation is intended to conserve areas supporting primary constituent elements that exist at coastal lagoons, estuaries, backwater marshes, and associated freshwater tributaries, and that are necessary to support the life history functions, of the tidewater goby, which were the basis for the proposal. Because not all life history functions require all of the primary constituent elements, not all critical habitat units contain all of the primary constituent elements.

All of the areas of revised critical habitat for the tidewater goby are within the species' historical geographic range and contain primary constituent elements to support at least one of the tidewater goby's essential life history functions. Based on our current knowledge of the life history, biology, and ecology of the tidewater goby and the requirements of the habitat to sustain the essential life history functions of this species, we have determined that the primary constituent elements for the tidewater goby are: (1) persistent, shallow (in the range of about 4 to 80 inches), still-to-slow-moving, aquatic habitat most commonly ranging in salinity from less than 0.5 ppt to about 10 to 12 ppt, which provides adequate space for normal behavioral and individual and population growth; (2) substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction; (3) submerged and emergent aquatic vegetation, such as *Potamogeton pectinatus* and *Ruppia maritima,* that provides protection from predators; and (4) presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

Unarmored Threespine Stickleback

The unarmored threespine stickleback was listed as endangered in 1970 (35 FR 16047) primarily due to competition with or predation by non-native fish, loss of habitat through urbanization and channelization, and introgression with other subspecies of sticklebacks. Critical habitat for the unarmored threespine stickleback was proposed in 1980 for two reaches of the Santa Clara River, and single reaches of both San Francisquito Creek and San Antonio Creek; however, that

proposal was withdrawn in response to a lawsuit in 2002 (67 FR 58580). The unarmored threespine stickleback is a fully protected species under California law, per California Fish and Game Code, Section 5515 (b)(9).

Unarmored threespine sticklebacks are small fish (up to 2.36 inches) inhabiting slow-moving reaches or quiet water microhabitats of streams and rivers. Favorable habitats usually are shaded by dense and abundant vegetation but in more open reaches algal mats or barriers may provide refuge for the species. Unarmored threespine sticklebacks feed primarily on benthic insects, small crustaceans, and snails, and to a lesser degree, on flat worms, nematodes, and terrestrial insects. Unarmored threespine sticklebacks reproduce throughout the year with a minimum of breeding activity occurring from October to January. Reproduction occurs in areas with adequate aquatic vegetation and gentle flow of water where males establish and vigorously defend territories. The male builds a nest of fine plant debris and algal strands and courts all females that enter his territory; a single nest may contain the eggs of several females. Following spawning, the male defends the nest and, after approximately six days, the newly hatched fry. Most unarmored threespine sticklebacks are believed to live for only one year (Service 1985).

Unarmored threespine sticklebacks historically were distributed throughout southern California but are now restricted to the upper Santa Clara River and certain tributaries in Los Angeles and Ventura counties, Cañada Honda and San Antonio creeks on Vandenberg Air Force Base, Shay Creek (tributary to Baldwin Lake) in San Bernardino County, and San Felipe Creek in San Diego County. The population in Cañada Honda Creek is a transplanted population, as is the small population that may persist in San Felipe Creek.

Habitat degradation is a primary threat to unarmored threespine stickleback survival, such as when people or livestock trample stream banks, causing increased soil erosion and sedimentation in streams and breeding pools and thus reducing the availability of plants and insects that serve as habitat and food for the species. Damage to or destruction of the emergent vegetation along the stream banks also degrades the shallow, weedy nursery areas that provide abundant food and shelter for unarmored threespine stickleback.

Other threats to unarmored threespine stickleback often occur in popular riparian areas near campgrounds. There, people dam pools for wading and inadvertently trample adjacent sand or gravel bars during streamside recreational activities, forcing unarmored threespine sticklebacks into areas where they are more susceptible to injury or mortality due to predation or recreational activities.

Exotic predators, which include African clawed frogs, bullfrogs, mosquitofish (*Gambusia affinis*), crayfish (*Procambarus clarki*), and green sunfish (*Lepomis cyanellus*), prey on or compete for resources with unarmored threespine stickleback. Furthermore, certain exotic species may serve as vectors for the Ich parasite (*Ichthyopthirius multifilis*) that could infect populations of unarmored threespine stickleback. Populations of unarmored threespine stickleback in the Angeles National Forest were severely affected by the introduction of Ich in

1995 (U.S. Forest Service 2000). Introduced goldfish (*Carasius auratus*) were suspected to be the source of the Ich infestation.

Arroyo Toad

The arroyo toad was listed as endangered on December 16, 1994 (59 Federal Register (FR) 64589). Critical habitat for the arroyo toad was designated on April 13, 2005 (70 FR 19562). The final recovery plan for the arroyo toad was published in 1999 (Service 1999). In addition to the final recovery plan, important sources for information below on the biology of the arroyo toad include: Campbell et al. (1996), Griffin and Case (2001), Griffin et al. (1998), Holland and Sisk (2001), Ramirez (2002a, 2002b, 2002c, 2003), and Sweet (1992, 1993).

The arroyo toad is a small, dark-spotted toad of the family Bufonidae. The parotid glands, located on the top of the head, are oval-shaped and widely separated. A light or pale area or stripe is usually present on these glands and on top of the eyes. The arroyo toad's underside is buff-colored and usually without spots (Stebbins 1985). Recently metamorphosed individuals typically blend in with stream side substrates.

Optimal breeding habitat for the arroyo toad consists of low-gradient sections of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces. Arroyo toads breed and deposit egg masses in the shallow, sandy pools of these streams, which are usually bordered by sand-gravel flood-terraces. Stream order, elevation, and flood plain width appear to be important factors in determining habitat capability (Sweet 1992, Barto 1999, Griffin 1999). High stream order (i.e., third to sixth order), low elevation (particularly below 3,000 feet), and wide flood plains seem to be positively correlated with arroyo toad population size. However, small arroyo toad populations are found along first and second order streams at elevations up to 4,600 feet in some locations. Outside of the breeding season, arroyo toads are essentially terrestrial and are known to use a variety of upland habitats including, but not limited to, sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grassland (Holland 1995, Griffin et al. 1999).

Breeding typically occurs from February to July on streams with persistent water (Griffin et al. 1999). Female arroyo toads must feed for a minimum of approximately two months to develop the fat reserves needed to produce a clutch of eggs. Eggs are deposited and tadpoles develop in shallow pools with minimal current and little or no emergent vegetation. The substrate in these pools is generally sand or fine gravel overlain with silt. The eggs hatch in 4 to 5 days and the tadpoles are essentially immobile for an additional 5 to 6 days. They then begin to disperse from the pool margin into the surrounding shallow water, where they spend an average of 10 weeks. After metamorphosis (June and July), the juvenile arroyo toads remain on the bordering gravel bars until the pool dries out (usually from 8 to 12 weeks depending on the site and rainfall). Most individuals become sexually mature by the following spring (Sweet 1992).

Arroyo toad tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes

1994). Juvenile arroyo toads feed on ants almost exclusively (Service 1999). By the time they reach 0.7 to 0.9 inch in length, they consume more beetles, along with the ants (Sweet 1992, Service 1999). Adult arroyo toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, larvae, caterpillars, and others.

Individual arroyo toads have been observed to move approximately 1 mile along a stream reach and 0.6 mile away from the stream, into native upland habitats (Sweet 1992, Holland 1995) or agricultural areas (Griffin et al. 1999). Movement distances may be regulated by topography and channel morphology. Griffin (1999) reported a female arroyo toad traveling more than 948 feet perpendicular from a stream and Holland (1998) found arroyo toads 0.7 mile from a water course. At Little Rock Creek, on the desert slopes of the San Gabriel Mountains, arroyo toads were found up to approximately 120 feet from the active channel; they burrowed closer to the active stream channel as the time after the last spring rain increased (Ramirez 2000). Arroyo toads are critically dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, especially during periods of inactivity, generally late fall and winter (Sweet 1992).

A study by Ramirez (2003) found that arroyo toads generally burrowed within sandy or loamy substrates with no associated canopy cover, or within mule fat (*Baccharis salicifolia*) scrub or arroyo willow (*Salix lasiolepis*) patches. The majority of individuals tracked in that study were located immediately adjacent to the active channel or within the bench habitats located within flood prone areas. Arroyo toads are known to aestivate in their burrows during the non-breeding season, which usually starts in the late summer and extends from August to January (Ramirez 2003).

Arroyo toads have disappeared from approximately 75 percent of the previously occupied habitat in California. They were known historically to occur in coastal drainages in southern California from San Luis Obispo County to San Diego County and in Baja California, Mexico. In Orange and San Diego counties, the species occurred from estuaries to the headwaters of many drainages. In 1996, arroyo toads were discovered on Fort Hunter Liggett, Monterey County. This discovery constituted a northern range expansion for the species. Populations of this species also occur on the desert slopes of both the San Gabriel Mountains (in Little Rock Creek in Los Angeles County) and the San Bernardino Mountains (in the Mojave River and in its tributaries, Little Horsethief and Deep creeks, in San Bernardino County). Arroyo toads now survive primarily in the headwaters of coastal streams as small isolated populations, having been extirpated from much of their historic habitat.

A variety of factors have contributed to the decline of arroyo toads but nearly half of extirpations can be attributed to dam building and operation (Sweet 1992; Ramirez 2003). Suitable habitat is often flooded out by reservoir water and downstream breeding and non-breeding habitat are impacted by reduced flows, as well as unnatural discharges that increase flow rates. These unnatural releases of water destroy sand bars used during the breeding season, and reconfigure or destroy suitable breeding pools, thus disrupting clutch and larval development (Ramirez 2003).

Other threats to arroyo toads include flood control projects, agriculture, sand and gravel mining, urban development, off-highway vehicle use, urbanization, and recreational activities such as camping, fishing, hiking, and the use of campgrounds (Service 1999; Ramirez 2003). The introduction of non-native species that compete for resources or that prey on arroyo toads also pose a serious threat to arroyo toad existence. Non-native bullfrogs (*Rana catesbeiana*) and African clawed frogs (*Xenopus laevis*) are known to feed on arroyo toads in various life stages. Non-native plant species, particularly tamarisk (*Tamarix* spp.) and giant reed (*Arundo donax*) alter the natural hydrology of stream drainages by eliminating sandbars and breeding pools and upland habitats. In summary, the loss of habitat, coupled with habitat modifications due to the manipulation of water levels in many central and southern California streams and rivers, and predation from introduced aquatic species, have caused arroyo toads to disappear from a large portion of their previously occupied habitat in California (Jennings and Hayes 1994).

The recovery plan for the arroyo toad divides its range into the northern, southern, and desert recovery units (Service 1999). The recovery plan recommends that the arroyo toad be reclassified as a threatened species when management plans have been developed and implemented to secure the genetic and phenotypic variation of the species in each recovery unit; this goal would be accomplished by conserving the necessary riparian and upland habitats on federally managed lands. Delisting would be pursued when 15 additional self-sustaining populations of arroyo toads are known to exist, including those that occur on lands that are not managed by Federal agencies.

California Red-legged Frog

The California red-legged frog was federally listed as threatened on May 23, 1996 (61 *FR* 25813). A recovery plan has been published (Service 2002).

Detailed information on the biology of California red-legged frogs can be found in Storer (1925), Stebbins (2003), and Jennings et al. (1992). This species is the largest native frog in the western United States, ranging from 1.5 to 5.1 inches in length. The abdomen and hind legs of adults are largely red; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers, and dorsolateral folds are prominent on the back. Tadpoles range from 0.6 to 3.1 inches in length and are dark brown and yellow with dark spots.

California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. Deep pools with dense stands of overhanging willows and an intermixed fringe of cattails are considered optimal habitat. Eggs, larvae, transformed juveniles, and adults also have been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting population numbers and distribution. Some California red-legged frogs have moved long distances over land between water sources during winter rains. Adult California red-legged frogs have been documented to move more than 2 miles in northern Santa Cruz County "without apparent regard

to topography, vegetation type, or riparian corridors" (Bulger et al., 2003). Most of these overland movements occur at night.

California red-legged frogs breed from November through March with earlier breeding records occurring in southern localities. California red-legged frogs are often prolific breeders, typically laying their eggs during or shortly after large rainfall events in late winter and early spring. Female California red-legged frogs deposit egg masses on emergent vegetation so that the masses float on the surface of the water. Egg masses contain about 2,000 to 5,000 moderate-sized (0.08 to 0.11 inch) in diameter, dark reddish brown eggs. Embryos hatch 6 to 14 days after fertilization and larvae require 3.5 to 7 months to attain metamorphosis. Tadpoles probably experience the highest mortality rates of all life stages, with less than 1 percent of eggs laid reaching metamorphosis. Sexual maturity normally is reached at 3 to 4 years of age; California red-legged frogs may live 8 to10 years. Juveniles have been observed to be active diurnally and nocturnally, whereas adults are mainly nocturnal.

The diet of California red-legged frogs is highly variable. Invertebrates are the most common food items for adults, although vertebrates such as Pacific treefrogs (*Hyla regilla*) and California mice (*Peromyscus californicus*) can constitute over half of the prey mass eaten by larger frogs (Hayes and Tennant 1985). Larvae likely eat algae.

The California red-legged frog has been extirpated or nearly extirpated from 70 percent of its former range. Historically, this species was found throughout the Central Valley and Sierra Nevada foothills. At present, California red-legged frogs are known to occur in 243 streams or drainages in 22 counties, primarily in central coastal California. The most secure aggregations of California red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators. Over-harvesting, habitat loss, non-native species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes 1985, Hayes and Jennings 1988). Ongoing causes of decline include direct habitat loss due to stream alteration and disturbance to wetland areas, indirect effects of expanding urbanization, and competition or predation from non-native species.

Although the presence of California red-legged frogs is correlated with still water deeper than approximately 1.6 feet, riparian shrubbery, and emergent vegetation (Jennings and Hayes 1985), there are numerous locations in the species' historical range where these elements are well represented yet California red-legged frogs appear to be absent. The cause of local extirpations does not appear to be restricted solely to loss of aquatic habitat. The most likely causes of local extirpation are thought to be changes in faunal composition of aquatic ecosystems (i.e., the introduction of non-native predators and competitors) and landscape-scale disturbances that disrupt California red-legged frog population processes, such as dispersal and colonization. The introduction of contaminants or changes in water temperature may also play a role in local extirpations. These changes may also promote the spread of predators, competitors, parasites, and diseases.

Critical Habitat for the California Red-legged Frog

Critical habitat for the California red-legged frog was first designated on March 13, 2001 (66 *FR* 14625). On November 6, 2002, the United States District Court for the District of Columbia set aside the designation and ordered the Service to publish a new final rule with respect to the designation of critical habitat for the California red-legged frog (*Home Builders Association of Northern California et al. versus Gale A Norton, Secretary of the Department of Interior et al.* Civil Action No. 01-1291 (RJL) U.S. District Court, District of Columbia.). The Service published a new proposed rule to designate critical habitat for the California red-legged frog on April 13, 2004 (69 *FR* 19620). Critical habitat for the California red-legged frog was re-designated on April 13, 2006 (71 FR 19244).

The critical habitat encompasses 450,288 acres in Alameda, Butte, Contra Costa, El Dorado, Kern, Los Angeles, Marin, Merced, Monterey, Napa, Nevada, San Benito, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Ventura and Yuba Counties, California. In addition, the Service finalized a special rule pursuant to section 4(d) of the Act, associated with final listing of the California red-legged frog as threatened, for existing routine ranching activities (71 FR 19244).

For critical habitat of the California red-legged frog, we identified the following features essential to the conservation of the species: aquatic breeding habitat, non-breeding aquatic habitat, upland habitat, and dispersal habitat. Aquatic breeding habitat consists of freshwater bodies both natural and manmade (e.g., stock ponds and backwaters within streams) and is essential for providing space, food, and cover necessary to sustain all life stages of California red-legged frogs. The aquatic non-breeding habitat is essential for providing the space, food, and cover necessary to sustain California red-legged frogs. Non-breeding aquatic habitat consists of those aquatic elements identified above, and also includes, but is not limited to, other wetland habitats such as intermittent creeks, seeps, and springs. Upland habitat is defined as occurring within 200 feet of the edge of the riparian vegetation or the dripline surrounding aquatic and riparian habitat, and comprises various vegetation series such as grasslands, woodlands, and/or wetland/riparian plant species that provide shelter, forage, and predator avoidance. Upland habitat can include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter. Dispersal habitat is defined as accessible upland or riparian habitat within designated units and between occupied locations within 0.7 mile of each other that allows for movement between sites.

Least Bell's Vireo

The least Bell's vireo was federally listed as endangered on May 2, 1986 (51 *Federal Register* 16474), and critical habitat was designated in 1994 (59 *Federal Register* 4845). The species was listed due to extensive loss of habitat, brood parasitism, and lack of adequate protective regulations. Critical habitat was designated for the least Bell's vireo on February 2, 1994 (59 *Federal Register* 4845). Within the counties listed and covered in the biological opinion, designated critical habitat is present only along the Santa Ynez River in Santa Barbara County,

above Gibraltar Reservoir. A draft recovery plan for the species was completed in 1998. The least Bell's vireo is also State-listed as endangered.

The least Bell's Vireo typically breeds in willow riparian forests supporting a dense, shrubby understory of mulefat (*Baccharis salicifolius*) and other mesic species (Goldwasser 1981, Gray and Greaves 1984, Franzreb 1989). Oak woodland with a willow riparian understory is also used in some areas (Gray and Greaves 1984). The most important aspect of least Bell's vireo habitat is the presence of dense cover within 3.25 to 6.5 feet of the ground, where nests are typically placed and a dense stratified canopy for foraging (Goldwasser 1981, Gray and Greaves 1981, Salata 1981). Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important a determinant of nesting site selection as habitat structure (USFWS 1998).

Bell's vireos are insectivorous, preying on a wide variety of insects, including bugs, beetles, grasshoppers, moths, and particularly caterpillars (Chaplin 1925, Bent 1950). They obtain prey primarily by foliage gleaning and hovering (USFWS 1998). Foraging occurs at all levels of the canopy, but appears to be concentrated in the lower to mid-strata, particularly when pairs have active nests (Grinnell and Miller 1944, Goldwasser 1981, Gray and Greaves 1981, Salata 1983, Miner 1989). Foraging occurs most frequently in willows (Salata 1983, Miner 1989).

The least Bell's vireo is a subtropical migrant, traveling some two thousand miles annually between breeding and wintering grounds. The earliest studies of color-banded least Bell's vireos suggested that they were strongly site tenacious; once birds selected a breeding site, they returned to it year after year (Salata 1983, Greaves 1989). Not only do least Bell's vireos return to the same drainage, they often return to the same territory and even the same tree or shrub to nest (USFWS 1998). Recent studies have found, however, that least Bell's vireos may change locations during their first few breeding seasons.

Least Bell's vireos arrive on the southern California breeding grounds in mid-March to early April, with males arriving in advance of females by several days (USFWS 1998). They are generally present on the breeding grounds until late September, although they may begin departing by late July (Garrett and Dunn 1981, Salata 1983). Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males. In general, a least Bell's vireo's territory is between 0.5 and 7.5 acres (USFWS 1998). Least Bell's vireos begin nest building a few days after pair formation. Nests are typically constructed in the fork of a tree or shrub branch within 3 feet of the ground and are placed in a wide variety of plant species including willows (*Salix spp.*), mule fat, California wild rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*), grape (*Vitus californica*), elderberry (*Sambucus mexicana*), Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), coast live oak (*Quercus argifolia*), and several herbaceous species (USFWS 1998). Egg laying begins one to two days after nest completion. Least Bell's vireos typically lay four eggs, occasionally two, and rarely five. Both parents share in incubation, which takes

approximately 14 days. Upon hatching, nestlings are fed by both parents for 10-12 days until fledging, and are then cared for by the parents for an additional two weeks until the defense of territorial boundaries is relaxed (USFWS 1998).

Historically, the least Bell's vireo was widespread and abundant, ranging from interior northern California near Red Bluff (Tehama County), south through the Sacramento-San Joaquin Valleys and the Sierra Nevada foothills, and in the Coast Ranges from Santa Clara County south to approximately San Fernando, Baja California, Mexico. Populations also were found in Owens Valley, Death Valley, and at scattered oases and canyons throughout the Mojave Desert (USFWS 1998). By the early 1980s, the least Bell's vireo had been extirpated from the Sacramento and San Joaquin Valleys, once the center of its breeding range, and the species was restricted to two localities in the Salinas River Valley in Monterey and San Benito Counties, one locality along the Amargosa River (Inyo County), and numerous small populations in southern California south of the Tehachapi Mountains and in northwestern Baja California, Mexico (Gaines 1977, Goldwasser 1978, Goldwasser et al. 1980, Unitt 1984, Wilbur 1987).

The decline of the least Bell's vireo was mainly attributable to habitat loss due to flood control, development, channelization, water extraction, agriculture, and other human-caused factors that eliminated large areas of riparian habitat. The species has also been under assault by the brown-headed cowbird (*Molothrus ater*) which is a brood parasite; the female cowbirds lay their eggs in the nests of other birds and the host birds raise the cowbirds' young to the detriment of its own brood.

Southwestern Willow Flycatcher

The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (60 FR 10694) and critical habitat was designated for the subspecies on October 19, 2005 (70 FR 60886). The recovery plan for the subspecies was completed in August 2002 (Service 2002a).

The southwestern willow flycatcher occurs in riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods, or smaller spring-fed areas with willows or alders (*Alnus* spp.). They forage within, and occasionally above, the canopy of riparian vegetation, taking insects on the wing or gleaning them from vegetation. Nesting habitat consists of even-aged, structurally homogeneous, and dense riparian vegetation (Brown 1988, Sedgwick and Knopf 1992). Historically, they nested primarily in willows and mule fat with a scattered overstory of cottonwood (Grinnell and Miller 1944). Following recent changes in riparian plant communities, nesting occurs in willows where available, but can also include thickets dominated by tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*) (Brown 1988). Fragmented riparian zones with large distances between willow patches and individual willow plants are usually not selected for either nesting or singing (Sedgwick and Knopf 1992).

Southwestern willow flycatchers are typically present and singing on breeding territories by mid-May, although presence and status are often confused by migrating individuals of the northern

subspecies (little willow flycatcher; *Empidonax trailii brewsteri*) passing through breeding habitat. The southwestern willow flycatcher builds nests and lays its eggs in late May to early June. They typically raise one brood per year, and clutch size is 3 to 4 eggs (Service 2002a). Fledglings depart the nest at the age of 12 to 15 days in early July and usually disperse from the natal territory at the age of 26 to 30 days. Some variation in these dates has been observed and may be related to altitude, latitude, and re-nesting. Territories range in size from 0.25 to 5.7 acres, although most are 0.5 to 1.2 acres (Service 2002a). Adults depart from breeding territories in mid-August to early September. Sixty-six to 78 percent of breeding southwestern willow flycatchers known to have survived returned to the same breeding sites (Service 2002a). The southwestern willow flycatcher's current breeding range extends from southern California to western Texas, including portions of southernmost Nevada and Utah, southwestern Colorado, and northernmost Sonora and Baja California del Norte. Its current range is similar to the historic range, but the quantity of suitable habitat within that range has been much reduced from historical levels. The historic range of the southwestern willow flycatcher in California included all lowland riparian areas in the southern third of the state (Service 2002a). The flycatcher migrates to Mexico, Central, and possibly northern South America during the non-breeding season.

The decline of the southwestern willow flycatcher is attributed to numerous factors, including nest depredation and brood parasitism by the brown-headed cowbird. However, large scale loss of southwestern wetlands, particularly cottonwood-willow riparian habitat, is the principal reason for the southwestern willow flycatcher's current status. Habitat loss is a result of urban and agricultural development, water diversion and impoundment, livestock grazing, and hydrological changes attributable to these and other land uses (60 FR 10694).

Critical Habitat of the Southwestern Willow Flycatcher

The primary constituent elements of critical habitat for southwestern willow flycatcher are: (i) Riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter) with (A) supporting trees and shrubs such as willows (Salix spp.), boxelder (*Acer negundo*), tamarisk, Russian olive (*Eleagnus angustifolia*), cottonwood, stinging nettle (*Urtica dioica*), alders (*Alnus* spp.), velvet ash (*Fraxinus velutina*), poison hemlock (*Conium maculatum*), blackberry (*Rubus ursinus*), mulefat, oaks (*Quercus agrifolia, Quercus chrysolepis*), rose (*Rosa californica, Rosa arizonica, Rosa multiflora*), sycamore (*Platanus wrightii, Platanus racemosa*), false indigo (*Amorpha californica*), Pacific poison ivy (*Toxicodendron diversilobum*), grape (*Vitus arizonica*), Virginia creeper (*Parthenocissus cinquefolia*), Siberian elm (*Ulmus pumila*), and walnut (*Juglans hindsii*); (B) dense riparian vegetation with thickets of trees and shrubs ranging in height from 6 to 98 ft. Lower-stature thickets (6 to 13 ft tall) are found at higher elevation riparian forests, and tall stature thickets are found at middle- and lower-elevation riparian forests; (C) areas of dense riparian foliage at least from the ground level up to approximately 13 ft above ground or dense foliage only at the shrub level, or as a low, dense tree canopy; (D) Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., a tree or shrub canopy with densities ranging from 50 percent to 100 percent); or (E) Dense

patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 ac) or as large as 70 ha (175 ac); and (ii) diverse insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies/moths and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

Critical habitat for the southwestern willow flycatcher has been designated across a wide portion of the subspecies' range and is organized into Management Units (as described in the Recovery Plan). We designated stream segments in 15 Management Units found in 5 Recovery Units as critical habitat for the southwestern willow flycatcher. The stream segments designated occur in southern California, southern Nevada, southwestern Utah, Arizona, and New Mexico. Critical habitat segments provide riparian habitat for breeding, migrating, non-breeding, territorial, and dispersing southwestern willow flycatchers. Due to the dynamic nature of riparian habitat and the variety of purposes and conditions that are used by the flycatcher for life-history needs, a location in these segments that has a specific purpose today, such as a breeding site, foraging location, or areas used for migration or dispersal, can change over time (sometimes within a year or over a few years). Changes can occur due to flooding, drought, fire, or choices in land management. These changes can result in an increase or decrease in habitat suitability, growth, and location depending on which influence is exercised. Although all of the designated segments are within the geographical area occupied by the species, not all of the areas known to be occupied by the southwestern willow flycatcher were included.

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 *Code of Federal Regulations* 402.02). For the purposes of this biological opinion, we consider the action area to include all watercourses within San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties within the jurisdiction of the Ventura Fish and Wildlife Office, which could or do support runs of anadromous salmonids. Because of the generality of the proposed action, we are unable to identify those specific watercourses where restoration projects could occur, so our baseline descriptions below are not specific in most cases. We assume and have noted that most FRGP projects are implemented on the coastal plain or low in a watershed; therefore, we have excluded from the action area portions of watersheds above dams or other barriers, or high up in watersheds where FRPG projects are not likely to be proposed.

Tidewater Goby

Tidewater gobies generally select habitat in the upper parts of an estuary, usually within the fresh-saltwater interface. Tidewater gobies range upstream a short distance into fresh water, and downstream into water of up to about 75 percent sea water. The species is typically found

in salinities of less than 12 parts per thousand (Swift *et al.* 1989). These conditions occur in two relatively distinct situations: 1) the upper edge of tidal bays, near the entrance of freshwater tributaries, and 2) the coastal lagoons formed at the mouths of coastal rivers, streams, or seasonally wet canyons.

Tidewater gobies are known to occur in numerous lagoons and estuaries within the area under our jurisdiction that would be covered by the Corps' RGP for the FRGP. Tidewater gobies are absent from areas where the coastline is steep and streams do not form lagoons or estuaries. For example, a large natural gap in the distribution occurs between the Salinas River, (Monterey County), southward to Arroyo del Oso (northern San Luis Obispo County), because of very steep shorelines preventing lagoon development. Another large gap occurs in the Los Angeles Basin between city of Santa Monica (western Los Angeles County) and Aliso Creek (central Orange County).

Tidewater goby localities closely correspond to major drainages. Sediments provided by these streams produce sandy beaches with low-lying coastal areas conducive to formation of coastal lagoons (Swift *et al.* 1989; Habel and Armstrong 1977). Recolonization of extirpated localities has been documented as occurring when extant populations are present within several miles (Holland 1992; Lafferty *et al.* 1999a, 1999b). More recently, tidewater gobies have been found in localities once considered extirpated and that are separated from the nearest extant tidewater goby locality by 6.2 to 12.4 miles. In 1995, tidewater gobies were found for the first time in Cañada Honda, Santa Barbara County (Lafferty *et al.* 1996). Tidewater gobies had never been found in this locality during previous surveys. The locality was observed to go nearly dry during the drought of the late 1980's and early 1990's (C. Swift, pers. comm. 1995). The nearest locality to Cañada Honda is the Santa Ynez River, 6.5 miles to the north. These more recent records suggest that distant movement by tidewater gobies is possible. However, the source of these recolonizations may have been small numbers of individuals present in these localities that were missed by surveyors (K. Lafferty, U.S. Geological Survey, pers. comm. 1996).

Critical Habitat for the Tidewater Goby

Critical habitat for the tidewater goby in the action area includes 21 units totaling 1,070 acres (10.7 percent of the total designation). They are:

SLO-1 Arroyo del Corral (5 acres)
SLO-2 Oak Knoll Creek (3 acres)
SLO-3 Little Pico Creek (2 acres)
SLO-4 San Simeon Creek (16 acres)
SLO-5 Villa Creek (5 acres)
SLO-6 San Geronimo Creek (1 acre)
SLO-7 Pismo Creek (18 acres)
SB-1 Santa Maria River (468 acres)
SB-2 Cañada de las Agujas (1 acre)
SB-3 Cañada de Santa Anita (3 acres)

SB-4 Cañada de Alegria (1 acre)
SB-5 Cañada de Agua Caliente (1 acre)
SB-6 Gaviota Creek (9 acres)
SB-7 Winchester-Bell Canyons (6 acres)
SB-8 Arroyo Burro (2 acres)
SB-9 Mission Creek – Laguna Channel (14 acres)
VEN-1 Ventura River (51 acres)
VEN-2 Santa Clara River (350 acres)
VEN-3 J Street Drain (45 acres)
LA-1 Malibu Creek (64 acres)
LA-2 Topanga Creek (5 acres)

According to the final critical habitat rule, these units represent the range of special management needs to conserve the tidewater goby. The threats facing these units include: coastal development, water diversions, non-point source pollution, channelization, and cattle grazing.

Unarmored Threespine Stickleback

Within the action area, the unarmored threespine stickleback occurs only on Vandenberg Air Force Base in Cañada Honda and San Antonio Creeks. The unarmored threespine stickleback in Cañada Honda are considered introduced. San Antonio Creek has been surveyed numerous times in previous years for the presence of unarmored threespine sticklebacks and other special-status fishes. The following information was obtained from the Special-Status Fish Species Survey Report for San Antonio Creek (Tetra Tech 1999). (Unarmored threespine sticklebacks do occur in the upper Santa Clara River watershed, Los Angeles and Ventura Counties, but we believe their occurrences are outside of the area in which FRGP projects would be proposed.)

Dr. Camm Swift conducted surveys for special-status fish in San Antonio Creek from around the Lompoc-Casmalia Road Crossing downstream to the lagoon (Tetra Tech 1999). Dr. Swift surveyed San Antonio Creek visually, confirming his observations by occasional seine hauls; careful seining, removal, counting, measuring, and returning of all fishes in 320-foot sections in the creek; setting and monitoring a downstream trap for seaward migrating steelhead just above Lompoc-Casmalia Road; and careful seining of multiple, 256 square-foot quadrants in the lagoon, primarily to obtain quantitative estimates of the tidewater goby population in the lagoon (Tetra Tech 1999).

The unarmored threespine stickleback was the most common fish observed in the creek above the lagoon and is much more abundant in the upper half of the creek area that was surveyed due to the lower stream gradient, slower water velocity, more spread out channel, and lack of native or invasive aquatic predators. The unarmored threespine stickleback comprised approximately 70 percent of fish observed (excluding the survey transects and lagoon surveys) and comprised 99 percent of fish observed in the transects along with small numbers of arroyo chub (*Gila orcutti*), prickly sculpin (*Cottus asper*), mosquitofish, and tidewater goby (Tetra Tech 1999).

Approximately 48,000 unarmored threespine sticklebacks were estimated to inhabit the lower 5 miles of the creek above the lagoon with an average of 1.94 sticklebacks per yard, assuming that the deeper ponded areas not represented in the survey transects had about the same number of sticklebacks as the areas surveyed. The density of stickleback was the highest in the 1.2 miles above and below the El Rancho Road crossing. The unarmored threespine stickleback occurs upstream of VAFB in San Antonio Creek at least as far as Barka Slough (Tetra Tech 1999).

Arroyo Toad

The historical range of the arroyo toad extends from the upper Salinas River system on Fort Hunter Liggett Military Reservation, Monterey County (U.S. Army Reserve Command 1996), south through the Santa Ynez, Santa Clara, and Los Angeles River basins (Myers 1930, Sanders 1950, Stebbins 1951, Sweet 1992) and the coastal drainages of Orange, Riverside, and San Diego Counties, to the Arroyo San Simeon system, about 10 miles southeast of San Quintin, Baja California (Tevis 1944, Gergus *et al.* 1997). Since the early part of this century, arroyo toads have been found in at least 22 river basins in California.

Although arroyo toads may be found along relatively long stretches of some creeks and rivers, suitable breeding or upland habitat may not occur throughout the entire distance. The proportion of suitable habitat may change during the year and from year to year depending on climatic conditions, fires, or other natural or human-related events. Because of this, it is difficult to estimate the exact distribution of arroyo toads or the extent of suitable habitat in any particular system at a given time. Some events or activities clearly have resulted in permanent losses of habitat, while others have caused degradation or temporary habitat losses. The latter may be reversed by appropriate recovery actions.

Within the action area, arroyo toads originally were found in the upper Salinas River basin near Santa Margarita, San Luis Obispo County, on June 12, 1936 (Miller and Miller 1936). Surveys of the area during the 1980's and 1990's located no arroyo toads (S. S. Sweet, pers. comm. 1997). The available arroyo toad habitat probably was affected adversely by the construction of Santa Margarita Dam, approximately 10 miles upstream from the collection site.

Arroyo toads have been reported from the Sisquoc River, Los Padres National Forest, since June 1991 (Campbell *et al.* 1996). The area of suitable habitat for the arroyo toad extends from the vicinity of the junction with Manzana Creek upstream to the vicinity of Sycamore Campground (elevation 1,150 to 2,050 feet), a distance of about 9 miles. Apart from some grazing and low-intensity recreational use, this section of the Sisquoc River is essentially free from habitat disturbances and introduced aquatic predatory species that affect arroyo toad populations elsewhere (Sweet 1992). The number of adult arroyo toads present in this population is unknown. Arroyo toad populations may be located on the lower reaches of the Sisquoc River and its tributaries, such as La Brea and Manzana Creeks, and on other tributaries of the Santa Maria River such as the Huasna River, Cuyama River, and Alamo Creek. The area where toads have been reported is affected by grazing and sand and gravel mining.

Arroyo toads are present at scattered locations on the upper Santa Ynez River, above Gibraltar Reservoir, from Mono Creek to Fox Creek upstream of Juncal Campground, below Juncal Dam (elevation 1,400 to 1,850 feet), a distance of about 8.6 miles. They also are present on the lower reaches of Mono Creek (at the upper end of Gibraltar Reservoir) and Indian Creek from their confluences with the Santa Ynez River to elevations of about 1,700 feet and 1,500 feet respectively, a distance of about 3.5 miles. Arroyo toads in the upper Santa Ynez River were affected by the construction during the 1920's and subsequent operation of Gibraltar Dam, and by the construction during the 1930's and subsequent operation of Juncal Dam. There is a lack of sand and silt in the Santa Ynez River bed below Juncal Dam (C. Charles Evans, Montecito Water District, *in litt.* 1998), probably as a result of sediment trapping in Jameson Lake by Juncal Dam. This has degraded the breeding and foraging habitat for arroyo toads.

The most recent studies on these subpopulations indicate that they are currently small, with the largest number of toads found in Mono Creek. All of these arroyo toad subpopulations are threatened by off-highway vehicles and recreational use of roads and campgrounds in the area (Sweet 1992, 1993). The toads along the Santa Ynez River additionally are affected by introduced fishes (especially green sunfish, bluegill [*Lepomis macrochirus*], and fathead minnows [*Pimephales promelas*]), bullfrogs, and flow regulation of the river (Sweet 1993). Louisiana red-swamp crayfish (*Procambarus clarkii*) and bullfrogs are well-established in Jameson Lake. Tamarisk, an invasive non-native plant, has become established on some sandy terraces, reducing foraging habitat. Interactions of current small population sizes with natural events such as fires, floods, and droughts, and human-induced changes, including collecting, may lead to local extirpation of some subpopulations.

Arroyo toads were found in the Santa Clara River basin on May 22, 1912, at Santa Paula, Ventura County (Camp 1915). This site (now located along Highway 150) apparently was part of a formerly extensive oak (*Quercus* spp.) woodland on the floodplain near Santa Paula Creek. The creek floodplain from 250 to 400 feet elevation, a distance of about 3 miles, has been urbanized extensively and arroyo toads have been extirpated from the area (M. R. Jennings, unpubl. data). The species has also been reported from the Santa Clara River in Los Angeles County, near the city of Santa Clarita and Soledad Canyon. These latter areas are far upstream in the drainage and not likely to be subject to FRGP projects.

A large number of arroyo toads persists along Sespe Creek, Los Padres National Forest, Ventura County, from about Hot Springs Canyon upstream to the mouth of Tule Creek (Sweet 1992). The stream reach with suitable arroyo toad habitat is 15 miles and the elevational range is 2,250 to 3,400 feet. The upper half of the portion of Sespe Creek inhabited by arroyo toads had large areas of excellent habitat and numerous high-quality breeding pools, while the lower portion supports few stream terraces with suitable substrates, and fewer pools appropriate for use as arroyo toad breeding sites (Sweet 1992). Current impacts to this population include recreational activities such as off-highway vehicles, fishing, camping, random events such as fires and floods, and the spread of introduced aquatic predators such as green sunfish, black bullheads (*Ameiurus melas*), and bullfrogs.

Along Piru Creek, Ventura and Los Angeles Counties, arroyo toads historically were found between the mouth (elevation 660 feet) and Bear Gulch (elevation 3,100 feet) (Sanders 1950). With the construction of Lake Piru in the 1950's and Pyramid Lake in the 1970's, arroyo toads were eliminated from much of their historic range in the drainage and now are restricted to short segments above each of the two reservoirs (Sweet 1992). The lower segment is from Blue Point Campground upstream to lower Piru Gorge (elevation 1,100 to 1,350 feet), a distance of 3.5 miles, and the upper segment is from the headwaters of Pyramid Lake upstream to Bear Gulch (elevation 2,500 to 3,100 feet), a distance of 4.5 miles. A population of arroyo toads is also present in the lower 1 mile section of Agua Blanca Creek (Sweet 1992). Upper Piru Creek generally has small populations of arroyo toads distributed in a range of good to marginal habitats, while lower Piru Creek generally has larger numbers of arroyo toads distributed over areas of good to excellent habitat that generally are undisturbed by human activities (Sweet 1992). Toads in both areas are affected by recreational activities. The upper section of Piru Creek also has been impacted by placer mining and off-highway vehicle use. The lower section of Piru Creek is affected by the introduction of Louisiana red-swamp crayfish, bullfrogs, exotic fishes (especially green sunfish, black bullhead, prickly sculpin [*Cottus asper*], and largemouth bass [*Micropterus salmoides*]), recreational activities in and around campgrounds, flow regulation from Pyramid Lake, and grazing of the riparian zone by livestock (Sweet 1992; Campbell *et al.* 1996; D. C. Holland, *in litt.* 1997).

Along Castaic Creek, Los Angeles County, on California Department of Water Resources land and the Angeles National Forest, arroyo toads recently were found below the dam at Castaic Lake, over a distance of 2 miles, as well as above the reservoir in the dredge spoils, over a distance of about 1 mile (Campbell *et al.* 1996; Frank T. Hovore, Planning Consultants Research, Santa Monica, CA; pers. comm. 1997). The toads probably were more widespread in the Castaic Creek drainage between 1,450 to 1,575 feet elevation before the reservoir was constructed in the 1970's. Toads at both sites currently are affected by exotic aquatic predators, off-highway vehicles, flooding, and recreational activities. Toads at the lower site are threatened also by water flow regulation and potential urban development of the surrounding hillsides (Campbell *et al.* 1996).

In summary, arroyo toads are found in several large drainages within the action area. It is likely that they also occur in tributaries to these drainages. Unlike areas to the south, arroyo toads tend to occupy the upper reaches of these drainages, and not the coastal plains as is observed in Orange and San Diego Counties, so many of them may not be in areas where FRGP projects are implemented.

California red-legged frog

The mechanisms for decline of the California red-legged frog are poorly understood. Although presence of California red-legged frogs is correlated with stillwater pools deeper than approximately 1.6 feet, riparian shrubbery, and emergent vegetation (Jennings and Hayes 1985), there are numerous locations in the species' historical range where these elements are well represented yet California red-legged frogs appear to be absent. The cause of local extirpations

therefore does not appear to be restricted solely to loss of aquatic habitat. The most likely causes of local extirpation are thought to be changes in faunal composition of aquatic ecosystems (i.e., the introduction of non-native predators and competitors) and landscape-scale disturbances that disrupt California red-legged frog population processes, such as dispersal and colonization. The introduction of contaminants or changes in water temperature may also play a role in local extirpations. These changes may also promote the spread of predators, competitors, parasites, and diseases.

The central California coast supports the greatest number of drainages currently occupied by California red-legged frogs. Most coastal drainages in San Luis Obispo County are occupied by the species, although they get less common as you move farther south into Santa Barbara, Ventura, and Los Angeles Counties. Some seemingly suitable drainages in these latter counties may not support California red-legged frogs, especially in the most southern part of the action area.

Since the California red-legged frog was listed as threatened on May 23, 1996 (61 *FR* 25813), this office has completed numerous formal consultations on the effects of proposed projects on the California red-legged frog in the action area for this consultation (San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties). None of the projects subject to these consultations were expected to appreciably reduce the environmental baseline for the California red-legged frog in the action area. The actions were generally small, short-term, and included post-project restoration. The listing has prompted several restoration projects intended to benefit the California red-legged frog and other aquatic species.

Critical Habitat for the California Red-legged Frog

Within the area under our jurisdiction that would be covered by the Corps' RGP for the FRGP, we designated critical habitat for the California red-legged frog totaling 151,734 acres. This represents approximately 34 percent of the total critical habitat designated. Three units within the counties covered by the proposed RGP were eliminated from consideration in the biological opinion because one drains into the Central Valley of California (SLO-1A-B), one is far inland where it is unlikely to be subject to a restoration project that would benefit salmonids (LOS-1), an one is upstream of a dam in the upper portion of a watershed (STB-7). The remaining units were designated because they contain one or more of the primary constituent elements listed in the Status of the Species section and have direct connection to coastal waters. The remaining critical habitat units extend from San Luis Obispo County to Ventura County and include the following:

SLO-8 Upper Salinas River (16,277 acres)
STB-1 La Brea Creek (25,111 acres)
STB-3 Sisquoc River (47,439 acres)
STB- 4 Jalama Creek (7,662 acres)
STB-5 Gaviota Creek (4,328 acres)
VEN-1 Matilija Creek (6,660 acres)

VEN-2 San Antonio Creek (2,915 acres)
VEN-3 Piru Creek (8,837 acres)

These units were designated because they support aquatic breeding and non-breeding habitat, including the appropriate vegetation, and upland habitat where individual California red-legged frogs can take shelter during dry periods.

Least Bell's Vireo

According to the 5-year status review for the least Bell's vireo (Service 2006), the overall number of nesting least Bell's vireos has increased tenfold since the species was listed in 1986. The vast majority of the increase was realized in the southern part of the species' range (Ventura County and south). In Santa Barbara County, least Bell's vireo numbers have actually declined overall. A Population Viability Analysis (PVA) that measures the potential for a population to survive for a certain period of time was conducted using the least Bell's vireo data in the 5-year review. The results indicated that of the populations targeted for recovery analyzed in the PVA, only the Santa Ynez River population (Santa Barbara County) remained at risk of extinction in the next 100 years.

Within the action area, the major population centers for the least Bell's vireo include the Santa Clara River watershed (Los Angeles and Ventura Counties) and the Santa Ynez River (Santa Barbara County), above Gibraltar Reservoir. As noted above, numbers of least Bell's vireos have increased modestly in the former, while they have declined in the latter. No explanation for this was provided in the 5-year status review (Service 2006). The review did note, however, that future recovery was dependent upon continued efforts to control brown-headed cowbirds.

Least Bell's vireos occur sporadically outside of the known population centers. Individuals and breeding pairs have been reported at isolated, suitable habitat patches within the action area. Consequently, any drainage with the characteristics of least Bell's vireo habitat as described in the Status of the Species section may support the species.

Southwestern Willow Flycatcher

The Recovery Plan for the southwestern willow flycatcher indicates that historically, the southwestern willow flycatcher was common in all lower elevation riparian areas of the southern third of California, including the Los Angeles basin, the San Bernardino/Riverside area, and San Diego County. River systems where the flycatcher currently persists include the Colorado, Owens, Kern, Mojave, Santa Ana, Pilgrim Creek, Santa Margarita, San Luis Rey, San Diego, San Mateo Creek, San Timoteo Creek, Santa Clara, Santa Ynez, Sweetwater, San Dieguito, and Temecula Creek. The remaining flycatcher populations in southern California, most of which number fewer than five territories, occur at scattered sites along drainages that have changed little during the past 15 years. Sogge et al. (2007) report that the number of known breeding sites and territories has increased since 1993, from 40 breeding sites and 140 territories in 1993, to 284 breeding sites and 1,262 territories in 2006. Sogge et al. point out that this increase is not

due to an increase in southwestern willow flycatcher numbers, but to the increased survey efforts that uncovered previously unknown breeding sites and territories.

Within the action area, southwestern willow flycatchers are concentrated in two major drainages: the Santa Clara and Santa Ynez Rivers and their tributaries. Sogge et al. (2007) report that the latest survey data indicates that the Santa Clara River supports 12 potential breeding sites that, in 2006, contained 8 active territories. The Santa Ynez River supports 4 breeding sites and in 2006, 7 territories (Sogge et al. 2007). These small populations are vulnerable to extirpation, as demonstrated by the apparent abandonment of 135 previously known breeding sites since 1993 throughout the range of the southwestern willow flycatcher.

The threats to the southwestern willow flycatcher in the action area are the same as those found elsewhere in the species' range; habitat loss due to a number of factors (i.e., development, water diversion, flood control, agriculture, etc.), nest parasitism by brown-headed cowbirds, habitat conversion to non-native species, competition for nest space with non-native birds, and others. These problems are exacerbated in small populations such as those in the action area.

Critical Habitat for the Southwestern Willow Flycatcher

The action area contains the Coastal California Recovery Unit of the southwestern willow flycatcher which was used to encompass the critical habitat units. The recovery unit stretches along the coast of southern California from just north of Point Conception south to the Mexico border and encompasses the Santa Ynez, Santa Ana, and San Diego Management Units of the critical habitat designation. In 2003, the entire Recovery Unit area supported an estimated 165 southwestern willow flycatcher territories (15 percent of the rangewide total) (Durst et al. 2007). A total of 149 territories were estimated in the three Management Units included in this designation (Santa Ynez, 8 territories; Santa Ana, 41 territories; San Diego, 100 territories). The largest number of territories are within the San Luis Rey (n = 67), Santa Margarita (n = 19), and Santa Ana (n = 40) watersheds (Durst et al. 2007), all of which are south of the action area. Of the three, only the Santa Ynez Management Unit is within the action area for the proposed RGP.

The Santa Ynez Management Unit is composed of a 20-mile reach of the Santa Ynez River, from approximately 1-mile east of Highway 101 near the City of Buellton, downstream to 1.2 miles east of Highway 1 near Lompoc, entirely in Santa Barbara County. This unit supports nesting southwestern willow flycatchers and is northernmost along coastal California. In 2000, 28 territories were detected at this breeding site. In 2006, 7 territories were known at this site (Sogge et al. 2007). Reasons for the decline in this area are not known. Southwestern willow flycatchers have been detected nesting on the Santa Ynez River since 1994.

EFFECTS OF THE ACTION

General Effects

In general, the FRGP should have beneficial effects on the species analyzed in this biological opinion. The individual restoration projects are intended to improve habitat for migrating salmonids, including removing obstructions, controlling erosion, improving vegetation, stabilizing banks, and creating pools. Because the listed species that share habitat with anadromous salmonids evolved under similar conditions and most likely do best under natural conditions, taking the measures listed in the Project Description and the CDFG Manual (2002) should improve their habitat as well. While the conditions that benefit anadromous fish should also benefit other aquatic species, there could be temporary effects and incompatible changes that will affect some of the species considered here.

Some of the activities associated with the FRGP could have negative effects of a similar nature on most or all of the species described in this biological opinion. Movement of equipment and people could crush and injure or kill any of the less mobile species. In addition, ground disturbance such as grading and placement of rip-rap or other features, could also kill or injure some species. The possible exceptions to these effects would be the least Bell's vireo and southwestern willow flycatcher which can move out of the way easily; however, flushing either of these species away from their territories or nests could have an adverse effect on them or their offspring.

Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality or upland habitat to a degree where listed aquatic species are injured or killed. The potential for this effect to occur would be reduced by CDFG's proposals for worker education, locating staging and fueling areas a minimum of 65 feet from riparian areas or other water bodies, and having an effective spill response plan in place.

Tidewater Goby

We anticipate that effects to tidewater gobies will come from two potential sources: sedimentation that reaches goby habitat, and de-watering or stream diversion that reduces freshwater flows into goby habitat.

Sedimentation can smother gobies by clogging their gills, and it can cover their nesting burrows and food sources. It is possible that some tidewater gobies could be injured or killed if this occurs. The threat of sedimentation is greater the closer the project is to tidewater goby habitat; that is, sedimentation from farther upstream may settle out to some degree before it reaches goby habitat, whereas activities immediately adjacent can introduce unchecked sedimentation. However, the CDFG Manual includes measures to control sedimentation. If these measures are implemented and are effective, the effects of sedimentation on gobies would be minimized regardless of where in a watershed a restoration project is implemented.

De-watering a stream or diverting flows away from tidewater goby habitat can have multiple negative effects on the individuals. With reduced freshwater flows, salinities may increase above the level that gobies can tolerate. Reduced flows can also result in lower oxygen levels in the areas where gobies have taken refuge. Most directly, small lagoons or ponds where gobies live could potentially dry out, stranding the fish and leaving them susceptible to desiccation or predation.

To illustrate other potential effects of FRGP-funded projects on the tidewater goby, we have a report from one FRGP-funded project that took place on Arroyo Hondo Creek in Santa Barbara County (subject to a separate consultation, No. 1-8-06-F-14). The report from LFR (2007) states that tidewater gobies upstream of a culvert were "moved" along with several California red-legged frogs, steelhead, and sculpin. The LFR report does not state where the tidewater gobies were taken, but later investigation indicated that they were moved to another estuary. We have no information on the fate of the translocated tidewater gobies; however, moving them to another estuary was counter to the Recovery Plan goal of maintaining genetic separations among drainages. Because of the limitation that is posed by the desire to maintain genetic uniqueness among tidewater goby populations, capture and relocation is not a viable option and any individuals at risk may be killed or injured by the effects described above.

Tidewater Goby Critical Habitat

Effects to tidewater goby critical habitat should be temporary. As described above, we expect that the principal problems associated with the proposed activities would be sedimentation and de-watering/stream diversion. CDFG's measures to control erosion and sedimentation should help avoid related changes to the primary constituent elements. De-watering and stream diversions should be temporary, but while they are occurring the critical habitat areas may become dry or salinities may increase. Overall, the actions that benefit the anadromous salmonids should benefit tidewater goby critical habitat and the critical habitat units should continue to serve their conservation functions.

Unarmored Threespine Stickleback

In addition to the potential general effects described above, the risks from potential restoration project to the unarmored threespine stickleback are similar to those described for the tidewater goby, although unarmored threespine sticklebacks are not likely to be in areas where increasing salinity would be a problem. Also, individual unarmored threespine sticklebacks that may be stranded by de-watering or diversion could be moved upstream or downstream of the disturbance with little adverse effect, although some injury or mortality from capture and relocation cannot be ruled out.

Arroyo Toad and California Red-legged Frog

The discussion of the effects to the arroyo toad and California red-legged frog are lumped here because these effects may be similar. Both species have aquatic and terrestrial stages in their life histories, and the effects described below address both of those stages. Their distributions may not overlap, but where the actions are taking place, the impacts could be the same. Critical habitat for the California red-legged frog is discussed separately below.

Relocating arroyo toads or California red-legged frogs out of harm's way may reduce injury or mortality from equipment, foot traffic, or ground disturbance; however, injury or mortality of individuals may occur as a result of improper handling, containment, or transport of individuals or from releasing them into unsuitable habitat (e.g., where exotic predators are present). Observations of diseased and parasite-infected amphibians are now frequently reported. This has given rise to concerns that releasing amphibians following a period of captivity, during which time they can pick up infections of disease agents, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried between habitats on the hands, footwear, or equipment of fieldworkers, which can spread them to localities containing species which have had little or no prior contact with such pathogens or parasites. Use of a Service-approved biologist would reduce or prevent improper handling, containment, or transport of arroyo toads or California red-legged frogs.

Work activities, including noise and vibration, may cause arroyo toads or California red-legged frogs to leave the work area. This disturbance may increase the potential for predation and desiccation. Minimizing the area disturbed by project activities may reduce the potential for dispersal resulting from the action. California red-legged frogs, especially, are more likely to disperse overland in mesic conditions. Because the CDFG would primarily be executing the proposed projects during the dry season, these impacts are less likely. As long as no substantial rainfall (substantial rainfall equal greater than 0.5 inch of rain in a 24-hour period) occurs, arroyo toads and California red-legged frogs are unlikely to be at risk.

Tadpoles of both species may be injured or killed if entrained by pump or water diversion intakes. Screening pump intakes with wire with not greater than 0.2-inch diameter mesh, as proposed by CDFG, may reduce the potential that tadpoles would be caught in the inflow.

If water that is impounded during or after work activities creates favorable habitat for non-native predators, such as bullfrogs, crayfish, and centrarchid fishes, arroyo toads and California red-legged frogs may suffer unusual rates of predation. Additionally, any time arroyo toads or California red-legged frogs are concentrated in a small area at unusually high densities, native predators such as great blue herons (*Ardea herodias*), great egrets (*A. alba*), Virginia opossums (*Didelphis virginiana*), and raccoons (*Procyon lotor*) may feed on them opportunistically.

Trash left during or after project activities could attract predators to work sites, which could, in turn, prey on arroyo toads and California red-legged frogs. For example, raccoons are attracted to trash and also prey opportunistically on arroyo toads and California red-legged frogs. This

potential impact would be reduced or avoided by careful control of waste products at all work sites as proposed by the CDFG.

Uninformed workers could disturb, injure, or kill arroyo toads or California red-legged frogs. The potential for this effect to occur may be greatly reduced by informing workers of the presence and protected status of this species and the measures that are being implemented to protect it during project activities. Regular monitoring by a qualified biologist, as proposed by the CDFG, will also reduce the potential for such inadvertent effects.

The restoration projects that would utilize the Corps' proposed RGP are intended to provide additional habitat for and increased populations of anadromous salmonids in the respective project areas. The effects of increasing numbers of potential predators on the arroyo toad and California red-legged frog cannot be accurately predicted. These fish and amphibian species presumably occurred sympatrically in many coastal watersheds prior to the onset of human disturbance. Although we anticipate that some predation of arroyo toads and California red-legged frogs by salmonid fishes may occur, this level of predation is not expected to appreciably alter the population structure within the project areas.

The Corps' proposed RGP and the attendant FRGP projects are not expected to result in the permanent loss of arroyo toad and California red-legged frog habitat. The restoration projects will provide more stable stream banks, better water quality through decreased erosion and sediment loading, and shelter along stream banks for arroyo toads and California red-legged frogs. Additionally, many of the projects will improve habitat by creating additional pools and providing a more natural water flow regime by eliminating or altering fish passage barriers. The restoration projects will contribute to the local recovery of the arroyo toad and California red-legged frog by removing non-native predators such as bullfrogs, which out-compete and ultimately displace arroyo toads and California red-legged frogs from suitable habitat, and by improving the riparian buffer along streams which should reduce the movement of pesticides into the aquatic environment.

To illustrate potential effects of projects approved under the Corps' RGP, we again cite the results of the FRGP-funded project on Arroyo Hondo in Santa Barbara County (subject to individual consultation, No. 1-8-06-F-13) (LFR 2007). During the restoration project to improve passage for steelhead, monitors observed 47 California red-legged frogs in the project area. Of these, 45 were captured and relocated upstream of the project site, with no data on their fate once relocated. Two of the California red-legged frogs had been injured by equipment and ground disturbance on the site. An unknown number of California red-legged frogs were likely injured or killed and not detected, despite efforts to locate and move them prior to activities.

We conclude that the Corps' proposed authorization would affect a small number of arroyo toads and California red-legged frogs, if any occur in the areas that would be temporarily disturbed by project activities. Because of the small size of the work areas, the temporal nature of the projects, the implementation of the projects in the dry season, and the proposed protective measures, we anticipate that few arroyo toads or California red-legged frogs are likely to be

killed or injured during project activities. Restoration and enhancement of riparian vegetation in project sites is likely to increase the number and quality of cover sites and the diversity and abundance of prey species for arroyo toads and California red-legged frogs. The proposed authorization is likely to improve the quality of habitat for the arroyo toad and California red-legged frog in areas affected by projects implemented under the Program.

California Red-legged Frog Critical Habitat

The effects of restoration projects funded under the FRGP on California red-legged frog critical habitat are likely to be the same as those described for individual California red-legged frogs, above (i.e., small areas of disturbance, temporary de-watering, etc.). In general, any negative impacts to primary constituent elements of the critical habitat would be small and temporary. We do not anticipate any permanent loss of critical habitat, and we anticipate that the projects would, in general, benefit the critical habitat units. The conservation role of the designation would not be diminished.

Least Bell's Vireo and Southwestern Willow Flycatcher

As with the arroyo toad and California red-legged frog, we have lumped the effects analysis for these two bird species because of similarities in habitat, behavior, and presumably response to the proposed activities. The critical habitat of the southwestern willow flycatcher will be treated separately below.

The temporary loss of riparian habitat within the river bed could diminish available foraging habitat for least Bell's vireos and southwestern willow flycatchers. Project-generated dust, noise, and activity near habitat occupied by these species could disturb individuals to the extent that foraging and breeding behavior would be altered. Both species exhibit site fidelity and adults often return to the previous season's territory to breed. Temporary loss of riparian habitat in the project area may cause least Bell's vireos and southwestern willow flycatchers to seek out other areas in which to forage or nest, thereby increasing their vulnerability to predators and competition. These effects would be minimized by the CDFG proposal to work in the dry season, which is presumably late in the nesting season of the least Bell's vireos and southwestern willow flycatcher.

Disturbance and noise resulting from project activities in areas near potential least Bell's vireos and southwestern willow flycatcher breeding habitat could cause breeding adults to spend less time incubating and caring for nests and broods if scared off of their nests or kept busy defending their territories. Human disturbance that affects the amount of parental care during the nesting and brooding period could result in decreased hatching and fledging success.

If there are any breeding/nesting territories within a project area, work crews or other personnel associated with the project could potentially trample nests or nest sites while clearing vegetation. Least Bell's vireo nests are typically built approximately 3 feet above the ground, while nests of the southwestern willow flycatcher generally occur from ground level to approximately 13 feet

above the ground. If project activities begin or noise increases once a least Bell's vireo or southwestern willow flycatcher pair has established a nest or breeding territory, they may abandon their nests, resulting in a failed breeding attempt and unnecessary expenditure of energy.

Human activity near nests may also attract predators and brown-headed cowbirds. If trash is left behind or food items discarded in the work area, raccoons and coyotes may be attracted and may prey upon least Bell's vireos and southwestern willow flycatcher nests. CDFG proposes to remove all trash and keep work sites clean, so this will most likely not be a problem. Brown-headed cowbirds are also attracted to clearings and human activity and may incidentally find least Bell's vireos or southwestern willow flycatcher nests near work areas.

Southwestern Willow Flycatcher Critical Habitat

The potential restoration projects under the FRGP should have only temporary negative effects to southwestern willow flycatcher critical habitat. These temporary effects include vegetation removal, disturbance, installation of erosion control structures, and de-watering. In the long run, however, the projects should be beneficial to the critical habitat because they will restore primary constituent elements, such as vegetation. Also, the streams within the southwestern willow flycatcher critical habitat designation are subject to periodic natural disturbance from flooding and scouring. Therefore, the effects of restoration projects may be no more harmful in the long-term than the natural processes. We anticipate that the critical habitat units for southwestern willow flycatcher will remain intact and continue to serve their conservation role.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Agricultural land use throughout the action area (San Luis Obispo, Santa Barbara, and Ventura Counties) is likely to continue due to the high productivity of soils in these areas. The health of riparian areas throughout much of the action area is also threatened by livestock grazing and ground water pumping. Continued residential and commercial development is also expected in the action area. Indirect effects on the listed species analyzed in this biological opinion, such as pollutant runoff, sedimentation of aquatic habitats, and disruption of dispersal corridors, will likely be amplified as a result of increased development. We are currently unaware of other non-Federal actions that are reasonably certain to occur in the action area that may adversely affect the listed species or designated critical habitat.

CONCLUSION

After reviewing the current status of the species and critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the Corps' issuance of the CDFG Fisheries Restoration Grant Program RGP, as proposed, is not likely to jeopardize the continued existence of tidewater goby, unarmored threespine stickleback, arroyo toad, California red-legged frog, least Bell's vireos, or southwestern willow flycatcher, nor destroy or adversely modify critical habitat for the tidewater goby, California red-legged frog, or southwestern willow flycatcher.

We have reached these conclusions based on the following reasons:

1. The Corps and the CDFG have proposed measures to minimize the potential adverse effects of project activities on the listed species and critical habitat;

2. The projects are generally small in area and of short duration;

3. Few individuals of any species are likely to be killed or injured during project activities;

4. The primary constituent elements of designated critical habitat and the conservation function of those units should be retained and perhaps improved by restoration; and

5. The overall quality of breeding, foraging, and dispersal habitat for all of the species would be improved as a result of improved water quality, reduced sedimentation, and habitat enhancement associated with FRGP projects.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibits the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary. The Corps must make them binding conditions of its authorization issued to the CDFG for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps fails to require the CDFG to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the authorization, the protective coverage of section 7(o)(2) may lapse.

Given the avoidance and minimization proposed by CDFG and the Corps, we anticipate that take of listed species will be limited to: crushing of individuals not relocated out of harm's way; spread of pathogens (e.g., chytrid fungus); de-watering or diversion that strands tidewater gobies or the aquatic stages of arroyo toad and California red-legged frog; noise that displaces nesting least Bell's vireos or southwestern willow flycatchers; creation of ponded areas during de-watering or stream diversions that attract predators; and temporary habitat loss. All other potential sources of take are avoided by the measures proposed by CDFG or the Corps and included in the Project Description or the CDFG Restoration Manual.

The FRGP may result in numerous projects under which the CDFG and Corps will need to make specific decisions with regard to future actions. Although we have evaluated the general nature of the effects of these actions, both negative and positive, on the listed species, we cannot fully assess the potential effects of specific future actions under the FRGP because information on the location, timing, nature, and other aspects of the actions is not available at this time. Given this limitation, we cannot quantify the exact numbers of listed animals that may be incidentally killed or injured as a result of the actions that the Corps authorizes through approval of the RGP because of the large size of the action area, the patchy distribution of the listed animal species, the nature of the activities, and the unpredictability of when these activities are likely to cause injury or mortality to the listed species. Additionally, finding carcasses and assigning a cause of death are problematic over such large areas and in the presence of numerous scavengers that are likely to find dead animals soon after they die. Taking these limitations into consideration, we provide the following quantification of the anticipated amount or extent of incidental take resulting from the likely activities:

Species	Unit	By Project	By Year*
Tidewater Goby	Individuals	50	150
Unarmored threespine stickleback	See note below	0	0
Arroyo Toad	Adults/Juveniles	5	15
	Tadpoles	10	30
	Egg Masses	1	3
Capture/Relocation Only	Adults/Juveniles/Tadpoles	10	30
California Red-legged Frog	Adults/Juveniles	5	15
	Tadpoles	20	60
	Egg Masses	2	6
Capture/Relocation Only	Adults/Juveniles/Tadpoles	25	75
Least Bell's Vireo	Acres (suitable nesting habitat)	0.5	1.5
Southwestern Willow Flycatcher	Acres (suitable nesting habitat)	0.5	1.5

*Yearly take totals are not cumulative. That is, if take limits are not reached in a given year, the remainder does not carry over. The anticipated limit expires each calendar year.

We must clarify that these numbers are not based upon specific site conditions, but were determined based upon similar previous projects, the distribution and numbers of listed animal species we anticipate may be in a given restoration site, and the following assumptions:

1. Most arroyo toad and California red-legged frog adults, juveniles, and tadpoles within the boundaries of work areas may be taken through capture during translocation activities.

2. Tidewater gobies may be abundant in a given location, so while the number of individuals taken may be high, the populations can withstand such losses.

3. Arroyo toads are less abundant in the action area than California red-legged frogs, so although effects may be similar, we anticipate that fewer arroyo toads will be taken.

4. Because incidental take of listed animals will be difficult to detect (due to their small body size and finding a dead or injured specimen is unlikely), the number of individuals observed to have been taken may be lower than the number actually taken.

5. The number of individuals taken will be relatively low due to the avoidance and minimization measures proposed by the CDFG and Corps.

6. For the least Bell's vireo and southwestern willow flycatcher, take is best assessed through acreage of habitat based upon average minimum territory size. We assume such habitat loss would be temporary.

7. Generally, the restoration projects approved and funded will be beneficial to all listed animal species dependent upon the resources and habitat conditions shared by anadromous salmonids.

Also, note that we are not providing a take estimate for the unarmored threespine stickleback. This is because CDFG has proposed working with us and the Air Force for any projects in the San Antonio Creek watershed which is on Vandenberg Air Force Base, Santa Barbara County. This is the only known location of unarmored threespine stickleback in the action area in which we expect FRGP projects to be implemented. Consequently, no take of unarmored threespine stickleback would be associated with activities approved under the Corps' RGP until such consultation has been completed.

If any listed animals are found dead or injured, the Corps or the CDFG must contact our office immediately so we can review the project activities to determine if additional protective measures are needed. Project activities may continue during this review period, provided that all

protective measures proposed by the Corps and the CDFG and the terms and conditions of this biological opinion have been and continue to be implemented, and as long as the take limits cited above are not met or exceeded. This biological opinion does not authorize any form of take that is not incidental to implementation of the Program projects within the boundaries covered under the Corps' jurisdiction.

Through the reasonable and prudent measures and terms and conditions below, we have established a requirement for the Corps to re-initiate formal consultation with the Service, pursuant to section 7(a)(2) of the Endangered Species Act, if any of the take limits in the table above are met or exceeded. We believe the detection of the incidental take of individual animals resulting from these activities represents a reasonable indicator for determining when the anticipated level of incidental take described in this incidental take statement has been exceeded.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of listed animal species:

1. Biologists who handle arroyo toads and California red-legged frogs must ensure that their activities do not transmit diseases.

2. Authorized biologists must minimize the effects of capture and relocation on the arroyo toad and California red-legged frog.

3. De-watering and stream diversions must be monitored to ensure that these actions do not attract predators or entrap tidewater gobies, arroyo toads, or California red-legged frogs.

4. Buffer zones will be established between work areas and known nest sites of the least Bell's vireos and southwestern willow flycatcher.

5. The Corps or CDFG must monitor activities to ensure that the level of incidental take of the listed animals is commensurate with the analysis contained in the biological opinion.

The Service's evaluation of the effects of the proposed action includes consideration of the measures to minimize the adverse effects of the proposed action on the listed species that were developed by the CDFG and repeated in the Description of the Proposed Action portion of this biological opinion. Any subsequent changes in these measures proposed by the Corps or the CDFG may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR 402.16. These reasonable and prudent measures are intended to supplement the protective measures that were proposed by the Corps and the CDFG as part of the proposed action.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps must ensure that the CDFG complies with the following terms and conditions, which implement the reasonable and prudent measures. These terms and conditions are non-discretionary.

1. The following term and condition implements reasonable and prudent measure 1:

   a. To ensure that diseases are not conveyed between work sites by the Service-approved biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force must be followed at all times. A copy of the code of practice is enclosed.

2. The following terms and conditions implement reasonable and prudent measure 2:

   a. The capture, handling, and monitoring of arroyo toads and California red-legged frogs must be conducted only by Service-approved biologists. The CDFG must provide their qualifications to the Service at least 15 days before they are to begin work.

   b. Prior to the onset of any project-related activities, the approved biologists must identify appropriate areas to receive captured arroyo toad and California red-legged frog adults and tadpoles from the project areas. These areas must be in proximity to the capture site, contain suitable habitat, not be affected by project activities, and be free of exotic predatory species (i.e., bullfrogs, crayfish) to the best of the approved biologists' knowledge.

   c. If arroyo toads or California red-legged frogs are found and these individuals are likely to be killed or injured by work activities, the Service-approved biologists must be allowed sufficient time to move them from the site before work activities resume. The Service-approved biologist must relocate the arroyo toads or California red-legged frogs the shortest distance possible to one of the pre-determined areas discussed in term and condition 2.b. The Service-approved biologist must maintain detailed records of any individuals that are moved (e.g., size, coloration, any distinguishing features, photographs (digital preferred)) to assist him or her in determining whether translocated animals are returning to the point of capture. Only arroyo toads or California red-legged frogs that are at risk of injury or death by project activities may be moved.

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. Any ponded areas created as a result of de-watering or stream diversions must be monitored by the authorized biologist(s) to ensure that non-native predators such as bullfrogs and crayfish are not attracted and concentrated in these areas. Any

such non-native predators observed must be removed and dispatched as humanely as possible.

b. Ponded areas thus created must also be monitored for listed species that may become entrapped. Any arroyo toad or California red-legged frog so entrapped must be relocated to a pre-determined receiving area (see Term and Condition 2.b.). Any tidewater gobies trapped during de-watering or stream diversions must be relocated within the estuary in which the stream flows and not to another drainage, no matter how close.

4. The following terms and conditions implement reasonable and prudent measure 4:

a. Prior to any work in areas where riparian habitat is present, a qualified biologist must do a habitat assessment and determine whether the area within 500 feet of the project site is suitable for nesting by least Bell's vireos or southwestern willow flycatchers. If not, work may proceed without further surveys. If the biologist determines that the area is suitable, a qualified biologist must monitor before and during the project to determine the status of least Bell's vireos and southwestern willow flycatchers within 500 feet of the project site.

b. If any least Bell's vireos or southwestern willow flycatchers are observed nesting within 500 feet of the project activities, work will cease temporarily until it is determined that either the birds are not nesting or young have fledged.

5. The following terms and conditions implement reasonable and prudent measures 5:

a. The CDFG must develop and implement a monitoring plan to determine the level of incidental take of tidewater goby, arroyo toad, California red-legged frog, least Bell's vireos, or southwestern willow flycatcher associated with FRGP-funded activities in the action area. The monitoring plan must include a standardized mechanism for CDFG employees, contractors, permittees, and volunteers to report any observations of dead or injured listed animals to the appropriate Corps and Service offices. The CDFG or Corps must collect information obtained through the monitoring to include in the annual report to the Service that is required by this incidental take statement and described in the "Reporting Requirements" section below.

b. The CDFG or Corps must also report any observation of the incidental take of listed animals associated with the implementation of FRGP projects in the action area to the Service as described in the "Disposition of Dead or Injured Animals" section herein. At that time, the Service and the Corps must review the circumstances surrounding the incident to determine whether any patterns of repeated authorized or unauthorized activities are occurring (e.g., use of an authorized area for development of unauthorized routes or the beginnings of a

trash-dumping site, etc.) that may indicate that additional protective measures are required. If, after completion of the review, the Service and the Corps agree that additional protective measures are required and can be implemented within the existing scope of the action, the Corps must require the CDFG to implement the agreed-upon measures within a reasonable time frame; if the corrective actions cannot be implemented within the scope of the existing action, the Corps and Service will determine whether reinitiation of consultation is appropriate.

c. Notwithstanding term and condition 5.a., the Corps must immediately reinitiate formal consultation with the Service, pursuant to section 7(a)(2) of the Endangered Species Act, if listed animals are taken within the action area at or in excess of the incidental take anticipated in the table in the Incidental Take Statement section, whether by project or by year. Given the analyses contained in the biological opinion regarding the potential effects of FRGP projects, we expect that the cause of any injury or death resulting from these activities is likely to be reasonably identifiable. For example, California red-legged frogs that are killed or injured by vehicles will show signs of crushing. We do not intend to attribute carcasses with no discernable cause of death to the FRGP projects.

REPORTING REQUIREMENTS

The Corps or the CDFG must submit an annual report of implemented projects to the Service's Ventura Fish and Wildlife Office (2493 Portola Road, Suite B; Ventura, California 93003). The report must include: (1) a table documenting the number of tidewater gobies, arroyo toads, California red-legged frogs, least Bell's vireos, or southwestern willow flycatchers observed, killed, injured, or handled during each FRGP project that utilizes the Corps' proposed authorization; (2) a summary of how the terms and conditions of this biological opinion and the protective measures proposed by the Corps and the CDFG worked; and (3) any suggestions of how these measures could be revised to improve conservation of this species while facilitating compliance with the Act. This information will assist the Service in evaluating future actions for the conservation of the listed species involved. Reports must be submitted to the Service's Ventura Fish and Wildlife Office by February 28 of each year the Corps' proposed authorization is valid.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Within 3 days of locating any dead or injured listed animals, the Corps or the CDFG must notify the Service's Division of Law Enforcement in writing (370 Amapola Avenue, Suite 114, Torrance, California 90501) and the Ventura Fish and Wildlife Office by telephone ((805) 644-1766) and in writing. The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information. Care must be taken in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured animals survive, either the Corps or the CDFG must contact the Service regarding their final disposition.

The remains of tidewater gobies must be placed with the Department of Biology (OBEE), University of California at Los Angeles, 621 Young Drive S., Los Angeles, California 90095-1606 (Attn: David K. Jacobs, Ph.D.; (310) 206-7885). Arrangements regarding proper disposition of potential museum specimens must be made with Dr. Jacobs by the Corps or CDFG prior to implementation of any action.

The remains of any arroyo toads or California red-legged frogs must be placed with the Santa Barbara Natural History Museum, contact: Paul Collins, Santa Barbara Natural History Museum, Vertebrate Zoology Department, 2559 Puesta Del Sol, Santa Barbara, California 93105; 805/682-4711, extension 321. The Corps or the CDFG should make arrangements with the Museum regarding proper disposition of potential museum specimens prior to the commencement of project activities. In the case of take or suspected take of listed species not exempted in this biological opinion, the Ventura Fish and Wildlife Office must be notified within 24 hours.

The remains of least Bell's vireos or southwestern willow flycatchers must be placed with the Western Foundation of Vertebrate Zoology (Contact: René Corrado, Curator, 439 Calle San Pablo, Camarillo, California, (805) 388-9944).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We do not have any recommendations at this time; however, the Service requests notification of the implementation of any conservation recommendations so that we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the Corps' proposed issuance of a Regional General Permit for the California Department of Fish and Game Fisheries Restoration Grant Program. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered

in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Rick Farris of my staff at (805) 644-1766.

Sincerely,

Steve Henry
Deputy Field Supervisor

Enclosure

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The Declining Amphibian Populations Task Force Fieldwork Code of Practice

1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires, and all other surfaces. Rinse cleaned items with sterilized (e.g., boiled or treated) water before leaving each work site.

2. Boots, nets, traps, and other types of equipment used in the aquatic environment should then be scrubbed with 70 percent ethanol solution and rinsed clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond. wetland, or riparian area.

3. In remote locations, clean all equipment with 70 percent ethanol or a bleach solution, and rinse with sterile water upon return to the lab or "base camp." Elsewhere, when washing machine facilities are available, remove nets from poles and wash in a protective mesh laundry bag with bleach on the "delicates" cycle.

4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated species, wear disposable gloves and change them between handling each animal. Dedicate sets of nets, boots, traps, and other equipment to each site being visited. Clean them as directed above and store separately at the end of each field day.

5. When amphibians are collected, ensure that animals from different sites are kept separately and take great care to avoid indirect contact (e.g., via handling, reuse of containers) between them or with other captive animals. Isolation from unsterilized plants or soils which have been taken from other sites is also essential. Always use disinfected and disposable husbandry equipment.

6. Examine collected amphibians for the presence of diseases and parasites soon after capture. Prior to their release or the release of any progeny, amphibians should be quarantined for a period and thoroughly screened for the presence of any potential disease agents.

7. Used cleaning materials and fluids should be disposed of safely and, if necessary, taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

For further information on this Code, or on the Declining Amphibian Populations Task Force, contact John Wilkinson, Biology Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
E mail: DAPTF@open.ac.uk
Fax: +44 (0) 1908 654167

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

June 25, 2019 **Refer to NMFS No:** WCR-2019-11540

Crystal Huerta
U.S. Army Corps of Engineers
60 South California Street, Suite 201
Ventura, California 93001

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Corps RGP 78 (Corps File No. SPL-2003-01123-BAH)

Dear Ms. Huerta:

Thank you for your letter of February 14, 2019, requesting initiation of formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act of 1973 (ESA)(16 U.S.C. 1513 et seq.) for the proposed issuance of Regional General Permit (RGP) 78 for implementation of projects under the California Department of Fish and Wildlife's Fisheries Restoration Grant Program in southern and south-central California. Enclosed is NMFS' biological opinion for the subject proposed action. This biological opinion addresses the effects of the proposed action on threatened South-Central California Coast Distinct population Segment of steelhead (*Oncorhynchus mykiss*) and the endangered Southern California Distinct Population Segment of steelhead and designated critical habitat for these species in accordance with section (7)(a)(2) of the ESA.

The biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of the federally threatened or endangered steelhead or result in adverse modification to designated critical habitat. NMFS believes the proposed action is likely to result in the incidental take of steelhead, and therefore the incidental take statement includes the amount and extent of anticipated incidental take with reasonable and prudent measures and non-discretionary terms and conditions that NMFS believes are necessary and appropriate to minimize and monitor incidental take of steelhead. Please call Jay Ogawa at (562)980-4061 if you would like additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Chris Dellith, USFWS, Ventura
Dylan Inskeep, CDFW, Sacramento
Tim Chorey, CDFW, Sacramento
Mary Larson, CDFW, Los Alamitos
Administrative File: 151422SWR2007PR00446

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Issuance of a Regional General Permit 78 to the California Department of Fish and Wildlife for implementation of the Fisheries Restoration Grants Program

NMFS Consultation Number: 151422SWR2007PR00446

Action Agency: United States Army Corps of Engineers, Los Angeles District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
South-Central California Coast Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No
Southern California Steelhead (*O. mykiss*)	Endangered	Yes	No	No

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: _____

Alecia M. Van Atta
Assistant Regional Administrator
California Coastal Office

Date: June 25, 2019

Table of Contents

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System (*https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts*). A complete record of this consultation is on file at NMFS' Southern California Branch office.

1.2 Consultation History

In a letter dated February 14, 2019, the Los Angeles District of the U.S. Army Corps of Engineers (Corps) requested formal Section 7 programmatic consultation under the ESA. The consultation request concerns issuance of regional general permit (RGP) 78 to the California Department of Fish and Wildlife (CDFW). The issuance of RGP 78 would authorize habitat-restoration projects implemented under the CDFW's Fisheries Restoration Grant Program (FRGP) to benefit steelhead (*Oncorhynchus mykiss*) in various coastal streams from northern San Luis Obispo County to the southern extent of San Diego County. The phrase "Program" is used in this biological opinion to collectively relate to all aspects of the FRGP described in this opinion.

The history of this consultation began before receipt of the Corps' letter dated February 14, 2019. On April 18, 2017, NMFS issued a draft biological opinion to the Corps and CDFW that concluded the proposed action would not likely jeopardize the continued existence of the federally threatened or endangered steelhead or result in adverse modification to designated critical habitat. Shortly thereafter on April 27, 2018, NMFS received CDFW's comments on the draft biological opinion. In particular, CDFW sought clarification or requested that language concerning small-dam removal and side-channel habitat projects be deleted from the draft biological opinion.

On May 8, 2018, a conference call was held between the Corps, CDFW, and NMFS to discuss comments concerning the draft. Because the discussion revealed that project plans had changed and a new proposed action had been developed, NMFS advised the Corps that a new consultation was required and, therefore, the existing consultation was terminated.

On August 28, 2018, NMFS received a letter from the Corps requesting initiation of formal consultation. Because the consultation request did not comport with the requirements for initiating formal consultation as defined in 50 CFR § 402.14(c), NMFS sent a letter dated September 26, 2018, to the Corps that outlined the additional information required to initiate ESA Section 7 consultation. In particular, NMFS requested a written description of: (1) CDFW's proposed Program activities, including clarification on whether small-dam removal was an element of the proposed action, (2) the specific area that may be affected by the proposed action, and (3) the manner in which the proposed action may affect steelhead or critical habitat and an analysis of any cumulative effects.

From December 3, 2018, to December 17, 2018, a number of teleconferences were held among NMFS, Corps, and CDFW to explain and assist the Corps and CDFW understand the specific information requested in NMFS' September 26, 2018, letter.

On February 14, 2019, NMFS received from the Corps a revised and complete request for consultation, including the updated effects assessment, and consultation was initiated on the same day.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The threatened South-Central California Coast Steelhead Distinct Population Segment (DPS) of steelhead (*Oncorhynchus mykiss*) and the endangered Southern California DPS of steelhead (for brevity, we hereafter occasionally refer to the South-Central California Coast DPS of steelhead as "threatened steelhead" and the Southern California DPS of steelhead as "endangered steelhead"), and designated critical habitat for these species, are present in the areas to be affected by the proposed action.

The Corps proposes to reissue the five-year RGP 78 (2019 to 2024) to CDFW pursuant to section 404 of the Federal Clean Water Act of 1972, as amended (33 U.S.C. 1344 *et seq*.), for the placement of fill material, and to conduct stream channel work within the waters of the United States. The proposed RGP 78 would annually provide authorization to implement habitat-restoration projects, which would be managed by the CDFW's FRGP, for threatened steelhead and endangered steelhead.

The habitat-restoration projects and related elements are described below and are referred to collectively as "Program Activities" in this biological opinion. The Corps is the lead Federal Agency for permitting the Program Activities (described in Section 1.3.2) that occur within the bankfull width of stream channels. We describe the following principal components of the proposed action are: (1) Summary of Program Characteristics, (2) Program Activities, (3) Fish Relocation and Dewatering Activities, (4) Data Requirements (including sub-categories for certain project types), (5) Proposed Monitoring and Reporting, (6) Annual Report, and (7) the Protection Measures. In addition to these foregoing categories, there are a number of restoration elements that have been excluded from the Program Activities, which are described subsequently in the "Activities Excluded from the Program" section.

1.3.1 Summary of Program Characteristics

Only Program activities that receive funding from the FRGP will be authorized through the RGP. The CDFW's FRGP uses grant funds approved by the California Legislature to initiate activities that are designed to restore, enhance, or protect anadromous salmonid habitat in the coastal watersheds of California or execute projects that restore, enhance, or protect steelhead habitat. Projects selected for funding are typically implemented within two years of funding. The Program's objectives for restoration and enhancement are (CDFW 2017a):

1) improve spawning and rearing habitat for adult and juvenile salmon and steelhead by installing instream habitat-improvement structures and modifying fish-passage barriers;
2) increase survival for eggs, embryos, and rearing juvenile salmonids and steelhead by reducing sediment yield to streams through bank erosion and riparian-enhancement treatments and upslope road decommissioning or upgrading; and
3) implement projects without causing a significant adverse effect on the environment, or reducing the number or restricting the range of an endangered, threatened, or rare species.

Program Activities considered in this biological opinion are proposed to conform with mandates of the California Legislature in the Fish and Game Code and Public Resources Code. The California Salmonid Stream Habitat Restoration Manual (CDFW Manual) (CDFG 2010), Fisheries Habitat Restoration Proposal Solicitation Notice (PSN) (CDFW PSN 2018), and the Mitigated Negative Declaration (MND) for the 2017 Fisheries Habitat Restoration Project (CDFW 2017a) enclosed with the Corps' August 28, 2018, consultation package provides examples and descriptions of the specific types of restorations activities proposed by CDFW in the FRGP. Other than small dam-removal projects, all habitat restoration activities that make up the proposed action will be implemented in accordance with techniques described in the CDFW Manual. In addition, the restoration activities funded by the FRGP would adhere to current CDFW and NMFS guidelines and criteria as identified and referenced in the CDFW Manual and PSN.

This biological opinion specifically considers restoration projects in portions of the following counties that are within the regulatory jurisdiction of the Corps' Los Angeles District and waterways containing threatened steelhead, endangered steelhead, or designated critical habitat for these two populations: San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties. The number of restoration projects implemented on an annual basis is expected to be influenced by the amount of funding FRGP receives. According to the proposed action, the Corps has estimated that no more than 10 projects per DPS of steelhead will be implemented annually, and a maximum of 50 restoration projects per DPS of steelhead will be constructed during the proposed 5-year term of this biological opinion.

1.3.2 Program Habitat-Restoration Activities

The following is a summary of the Program Activities that are considered in this biological opinion. The proposed annual instream construction period for all Program Activities is June 15 to November 1. For this consultation, restoration projects have been grouped by type and are

described below. A description of restoration projects is provided in Part VI of the PSN (CDFW 2018), and by the referenced chapters of the CDFW Manual (CDFG 2010).

1.3.2.1 Instream Habitat Improvements

Instream-habitat structures will be designed to provide refuge from predators, resting area and cover in migration corridors, increase spawning habitat, improve pool-to-riffle ratios, and increase habitat complexity and diversity. Proposed improvement types are described in Part VII-Project Implementation of the CDFW Manual (CDFG 2010), and may include: placement of boulder structures (boulder weirs, vortex-boulder weirs, boulder clusters, and single and opposing boulder wing-deflectors), log and root-wad structures (divide logs, digger logs, spider logs, engineered log jams, log weirs, upsurge weirs, single and opposing log-wing deflectors), combinations of log, root wad and boulder, and placement of imported spawning gravel. Floodplain connection and grading are proposed to improve hydrologic connection between floodplains and the main channel. The FRGP requires that final structure design and placement will be determined by field consultation between the grantee and CDFW project managers. CDFW proposes that implementation of these projects may require the use of heavy equipment (self-propelled logging yarders, mechanical excavators, backhoes, etc.), but hand tools and related labor will be used when possible.

Under the proposed action, specific restoration projects must have accompanying design plans at the 100% level, prior to implementation, that fully describe the project elements and how those elements would operate to produce the establishment of a naturally sustainable steelhead habitat.

1.3.2.2 Instream Barrier Modification for Fish Passage Improvement

Instream barrier modification projects are to improve fish passage and increase access to currently inaccessible salmonid habitat. Under the proposed action instream barriers to include grade-control structures (weirs), flashboard dams, debris basins, water-diversion structures, and log debris accumulations that prevent or impede the volitional passage of adult and juvenile steelhead (CDFW PSN 2018). Proposed project types for this category include removing low-flow barriers, small dams, and Denil and Alaska steep-pass fishways; installing rock weirs to deepen low-flow impediments; notching grade-control structures; and placing baffles within concrete-lined sections of channel. Implementing these types of projects may require the use of heavy equipment (i.e., mechanical excavators, backhoes, cranes, etc.), but CDFW proposes to use hand tools and related labor when possible. Proposed projects must be designed and implemented consistent with the CDFW Manual, specifically Part IX (Fish Passage Evaluation at Stream Crossings) and Part XII (Fish Passage Design and Implementation). This project type also includes the removal of small dams as described below.

1.3.2.2.1 Removal of Small Dams

The proposed action includes small-dam removal to restore fisheries access to historic spawning and rearing habitats and to improve long-term habitat quality and proper stream geomorphology. Because the CDFW Manual does not cover the removal of small dams, the proposed action adopts the guidelines and description of activities in the NOAA Restoration Center (RC) biological opinion (NMFS 2015), which pertain to the removal of small dams. The types of

"small dams" considered under the proposed action involve permanent, flashboard, debris basin, and seasonal dams.

In accordance with the proposed action, applicants to the CDFW's FRGP are required to provide project designs to CDFW and NMFS during the project-review process. Under the proposed action, data requirements and analysis to be provided with dam removal project design are required to meet NMFS 2011 Anadromous Salmonid Passage Facility Design guidelines (NMFS 2011) or most current NMFS' guidance. The proposed action allows that if proposed project designs do not meet CDFW or NMFS current guidelines, a variance may be granted at the discretion of CDFW and NMFS engineers depending on the expected benefits of the project for improving passage characteristics and condition for threatened steelhead or endangered steelhead. Supplemental detailed information regarding the removal of small dams developed for the NOAA RC biological opinion are adopted in the proposed action, and these requirements are outlined in the "Data Requirements" section of this biological opinion (Section 1.3.4.1). Applicants will be required to implement the NOAA RC Fish Passage Barrier Removal Performance Measures and Monitoring Worksheet (see NMFS 2015. Appendix D) that includes recommended regional fish-passage criteria for fish-passage projects.

Two proposed conditions that may preclude a particular small-dam removal from eligibility for coverage under this biological opinion involve: (1) if sediments stored behind dam have a reasonable potential to contain environmental contaminants (dioxins, chlorinated pesticides, polychlorinated biphenyls, or mercury) beyond the freshwater probable effect levels summarized in the NOAA Screening Quick Reference Table guidelines (see Buchman 2008), or (2) the risk of significant loss or degradation of downstream spawning or rearing areas by sediment deposition is considered to be such that the project requires more detailed analysis. Sites should be considered to have a reasonable potential to contain contaminants of concern if sites are downstream of historical contamination sources such as industrial sites, or sites where intensive agricultural production dates back several decades. In these cases, the proposed action requires preliminary sediment sampling. properly evaluated.

In addition to the conditions above, small-dam removal projects meeting one or more of the criteria identified below are considered high-risk and thus are not part of the proposed action for this programmatic opinion (CDFW PSN 2018):

1. mobilize contaminated sediment,
2. potentially impact infrastructure during or following removal,
3. negatively affect valuable, limited habitat,
4. expose problematic bedrock or sediment layers (e.g., slaking clays),
5. require more than five vertical feet total of grade control to avoid the conditions described in bullets 2 through 4 above, or
6. affect storage of flood flows.

High-risk small dam removal projects may be considered for funding under the FRGP, but would not be authorized under RGP 78 (CDFW 2018). Hence, any high-risk dam removal project would require Section 7 ESA formal consultation on a case by case basis.

Lastly, CDFW has proposed to use explosives for small-dam removal. The proposed action requires an applicant must justify any use of explosives by demonstrating the site-specific conditions preclude use of mechanical removal (e.g., no access for heavy equipment). Further, use of explosives must be conducted in dry or dewatered conditions, and any potential harm to steelhead from the explosives blast and pressure waves must be adequately analyzed.

1.3.2.3 Fish Passage Improvement at Stream Crossings

The proposed action includes improving passage conditions for threatened and endangered steelhead at man-made stream crossings, such as paved and unpaved roads, railroads, trails and paths, fair-weather Arizona crossings, bridges, and box, pipe, or concrete culverts or baffles. The passage improvements will include the following characteristics: the crossing width is at least as wide as the active channel, a culvert is designed to withstand a 100-year storm flow at less than 100 percent of the culvert's height, and the crossing substrate is engineered streambed (e.g., boulder, cobble, gravel) that has been sized to match appropriate reference conditions. Projects that incorporate rock chutes or roughened channels must meet the criteria described in Part VII (*Project Implementation*) and Part IX (*Fish Passage Evaluation at Stream Crossings*) of the CDFW Manual. Fish passage projects constructed with FRGP funding must meet the criteria specified in CDFG's *Culvert Criteria for Fish Passage* (CDFG 2002) and NMFS' *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001). Similarly, fish screening projects constructed with FRGP funding must comply with the criteria outlined in CDFG's *Fish Screening Criteria* (2002) and NMFS' Fish Screening Criteria for Anadromous Salmonids (NMFS 1997a). The proposed action requires that for all projects, the proponent must provide evidence of the extent to which the crossing is a barrier to adult and (or) juvenile salmonids (CDFW PSN 2018). Implementing these types of projects may require the use of heavy equipment (i.e., excavators, backhoes, cranes, etc.); however, the use of explosives was not proposed for this specific activity and thus will not be authorized through the RGP or through this biological opinion.

1.3.2.4 Stream Bank Stabilization

Stream bank stabilization is proposed to reduce stream scour and bank failures during high flow events, and decrease the contribution of fine sediment within streams. For this activity CDFW proposes to stabilize stream banks by constructing boulder-stabilization structures, log-stabilization structures, tree revetment, native-material revetment, mulching, revegetation, willow-wall revetment, brush mattresses, brush checkdams, waterbars, and exclusionary fencing. Projects that include the installation of bank-protection materials are required to satisfy the criteria outlined in Part VII (Project Implementation) of the CDFW Manual. The proposed action specifies that final structure design (100% plans) and placement will be determined by field consultation between the Corps, Grantee, the CDFW project manager, and CDFW or NMFS engineer. CDFW proposes that all stream bank stabilization activities will follow the techniques described in the CDFW Manual, and implementing this project type may require the use of heavy equipment.

1.3.2.5 Upslope Watershed Restoration

The proposed action specifies upslope watershed-restoration projects to reduce delivery of sediment to steelhead streams. Proposed road-related upslope watershed restoration projects include: road decommissioning, road upgrading, and storm-proofing roads (replacing high risk culverts with bridges, installing culverts to withstand the 100-year flood flow, installing critical dips, armored crossings, and removing unstable sidecast and fill materials from steep slopes). Part X of the CDFW Manual (*Upslope Assessment and Restoration Practices*) describes methods and provides guidance for identifying and assessing erosion problems, evaluating appropriate treatments, and implementing erosion control treatments in steelhead streams. All road decommissioning is proposed in accordance with techniques described in the Handbook for Forest Ranch Roads (Weaver et al. 2014), and Volume II, Part X of the CDFW Manual. All crossings in fish-bearing reaches of streams are proposed to follow NMFS and CDFW fish passage guidelines (NMFS 2001 and CDFG 2002).

1.3.2.6 Riparian Habitat Restoration

Riparian-restoration projects are proposed to improve salmonid habitat by increasing stream shading, which may lower stream temperatures, as well as increase future recruitment of woody debris to streams, bank stability and invertebrate forage production. Riparian restoration would involve increasing the number of plants and plant groupings per unit area through natural regeneration, livestock exclusionary fencing, bioengineering, plantings, and eradication of non-native, invasive vegetation species and revegetation with native endemic riparian species. CDFW proposes that riparian revegetation will be incorporated into some FRGP streambank stabilization projects. Part XI *(Riparian Habitat Restoration*) of the CDFW Manual provides guidance for riparian-restoration projects and is intended to assist agencies, landowners, schools, and community groups with planning, implementing, and managing native plant revegetation projects.

1.3.2.7 Water Conservation Measures

Proposed water-conservation measures provide more efficient use of water extracted from stream systems and increase flows to benefit aquatic species. Specific proposed projects involve off-channel water storage projects, changing the timing or source of water supply, moving points of diversion, lining irrigation ditches, piping, stock-water systems, installing more efficient irrigation systems, graywater and rainfall-collection systems, and agricultural tailwater recovery or management systems. Additionally, the proposed action requires that (1) water savings for FRGP projects must be quantified, (2) project applicants secure a Forbearance Agreement, an Instream Flow Lease, or a formal dedication or transfer of water rights through Chapter 10, Section 1707 of the California Water Code (i.e., 1707 petition) for the purpose of dedicating all water savings to the stream for steelhead benefits, and (3) all applicants must provide State Water Resources Control Board verification that the proposed project is feasible.

1.3.2.8 Fish Screening of Diversions

Fine-mesh screens are proposed to physically prevent entrainment, injury or death of targeted aquatic species in surface-water diversions, including aqueducts, and cooling-water intakes.

Fish-screen projects are characterized by: 1) diversion type (gravity flow vs. pump diversion systems), and 2) debris cleaning function ("active" or automatic vs. "passive" or manual cleaning). Due to the inherent complexity of designing fish screens, the CDFW Manual does not include specific screen designs, but the proposed action requires that fish-screening projects at diversions will meet CDFW and NMFS screening criteria and guidelines that are provided in the most current version of the CDFW Manual.

1.3.2.9 Water Measuring Devices

Projects eligible under the water measuring devices category are intended to be consistent with and contribute to the California Water Action Plan and/or California Climate Strategy. Projects must be conducted on non-fishing bearing screened-diversion canals. Instream water-measuring devices in a fish-bearing stream will need a separate consultation. Water-measuring device associated with restoration projects install, test and maintain instream and water diversion measuring devices

1.3.2.10 Activities Excluded from the Program

The following activities are not within the scope of the broader Program Activities and, therefore, are not considered in this biological opinion:

- creation of off-channel, side-channel habitat, or alcove habitat,
- installation of a flashboard dam, head gate or other mechanical structure to guarantee project performance,
- projects that are required mitigation or used for mitigation,
- projects that are under an enforcement action by a regulatory agency,
- dewatering or disturbing more than 500-feet of contiguous natural stream,
- dam removal projects that impound more than 900-cubic yards of sediment,
- projects that do not restore, recover, or enhance either salmonid populations and/or habitat,
- installation of new fish ladders or upgraded or maintenance of existing ladders,
- installation of infiltration galleries, and
- construction of concrete-lined channels of any sort.

1.3.3 Fish Relocation and Dewatering Activities

The following project activities authorized through the proposed RGP may require fish relocation and/or dewatering activities: (1) Instream Habitat Restoration, (2) Instream Barrier Modification for Fish Passage Improvement, (3) Instream Bank Stabilization, (4) Fish Passage Improvements at Stream Crossings, (5) Riparian Restoration, (6) Fish Screening of Diversions, and (7) Water Conservation Measures.

For projects that require fish relocation and dewatering the grantee is required to notify the

CDFW project manager a minimum of ten working days before the project site is dewatered and the streamflow diverted. The notification will provide a reasonable time for CDFW personnel to oversee the implementation of the water-diversion plan and the removal and relocation of steelhead from the project area. FRGP project site dewatering and fish-relocation activities are proposed to occur between June 15 and November 1 of each year. The dewatering activities are proposed to be consistent with the measures presented below, which appear on Page IX-51 and IX-52 of the CDFW Manual (*Measures to Minimize Impacts to Aquatic Habitat and Species During Dewatering of Project Sites*):

- When construction work must occur within a year-round flowing channel, the work site must be dewatered. All Program Activities within the stream channel shall be conducted in isolation from the flowing stream and erosion-protection measures shall be in place before work begins.

- Prior to dewatering, determine the best means to bypass flow through the work area to minimize disturbance to the channel and avoid direct mortality of fish and other aquatic vertebrates.
- Coordinate project site dewatering with a fisheries biologist qualified to perform fish and amphibian relocation activities.
- Minimize the length of the dewatered stream channel and duration of dewatering.
- Bypass streamflow around the work area, but maintain the streamflow to the channel downstream of the construction site.
- In the event the work area must be periodically pumped dry of seepage, place pumps in flat areas, well away from the stream channel. Secure pumps by tying off to a tree or stake in place to prevent movement by vibration. Refuel in an area well away from the stream channel and place fuel absorbent mats under pump while refueling. Pump intakes should be covered with 1/8-inch mesh to prevent entrainment of fish or amphibians that failed to be relocated. Check intake periodically for impingement of fish or amphibians.
- Discharge wastewater from construction area to an upland location where it will not drain sediment-laden water back to the stream channel.

To minimize injury and mortality of salmonids during fish relocation and dewatering activities, the additional measures presented below (which appear on Page IX-52 and IX-53 of the CDFW Manual *Measures to Minimize Injury and Mortality of Fish and Amphibian Species During Dewatering*) are proposed:

- Prior to dewatering a construction site, fish and amphibian species should be captured and relocated to avoid direct mortality and minimize take. This is especially important if listed species are present within the project site.

- Fish-relocation activities must be performed only by qualified fisheries biologists, with a current CDFG collectors permit, and experience with fish capture and handling. Check with your local CDFG biologist for assistance.

- In regions of California with high summer air temperatures, perform relocation activities during morning.
- Periodically measure air and water temperatures. Cease activities when water temperatures exceed temperatures allowed by CDFW and NMFS.
- Exclude fish from reentering the work area by blocking the stream channel upstream and downstream the work area with fine-meshed net or screens. Mesh should be no greater than 1/8-inch diameter. It is vital to completely secure the bottom edge of net or screen to the channel bed to prevent fish from reentering the work area. Exclusion screening should be placed in areas of low water velocity to minimize fish impingement. Screens should be checked periodically and cleaned of debris to permit free flow of water.
- Prior to capturing fish, determine the most appropriate release location(s). Consider the following when selecting release site(s):
    a. Similar water temperature as capture location,
    b. Ample habitat for captured fish, and
    c. Low likelihood of fish reentering work site or becoming impinged on exclusion net or screen.
- Determine the most efficient means for capturing fish. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrated by pumping-down the pool and then seining or dip netting fish.
- Electrofishing should only be conducted by properly trained personnel following CDFW and NMFS guidelines.
- Minimize handling of salmonids. However, when handling is necessary, always wet hands or nets prior to touching fish.
- Temporarily hold fish in cool, shaded, aerated water in a container with a lid. Provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise and do not remove fish from this container until time of release.
- Place a thermometer in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds those allowed by CDFW and NMFS, fish should be released and rescue operations ceased.
- Avoid overcrowding in containers. Have at least two containers and segregate young-of-year from larger age-classes to avoid predation. Place larger amphibians, such as Pacific giant salamanders, in container with larger fish.
- If fish are abundant, periodically cease capture, and release fish at predetermined locations.
- Visually identify species and estimate year-classes of fish at time of release. Count and record the number of fish captured. Avoid anesthetizing or measuring fish.
- Submit reports of fish relocation activities to CDFW and NMFS in a timely fashion.
- If feasible, plan on performing initial fish relocation efforts several days prior to the start

of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional electrofishing passes immediately prior to construction. In many instances, additional fish will be captured that eluded the previous days efforts.

- If mortality during relocation exceeds 5 percent, stop efforts and immediately contact the appropriate agencies.

1.3.4 Data Requirements

The proposed action includes the requirement that project applicants will provide data and analyses to CDFW; in turn, CDFW will use the information to evaluate if the proposed restoration project is a covered Program Activity. Proposed projects must have design plans at the 100-percent level that fully describe the project elements and how those elements would operate to produce or ultimately result in the establishment of a naturally sustainable habitat feature. A complete list of the data and required analyses for specific Program Activities is provided in Appendix A.

1.3.4.1 Small Dam Removal Data Requirements

Listed below are the minimal and potential data needs for conducting any small dam-removal project. However, site-specific conditions may require additional information beyond what is identified here to adequately evaluate a small dam-removal project. Similarly, unanticipated complications in a project such as the need to use a roughened channel or other fish passage techniques to pass fish over buried infrastructure (e.g., gas, water, and sewer lines) will require additional data. The minimal data needed to conduct a small dam-removal project, along with the potential data needs for a "complex project," are listed below.

A. Minimal Data Requirements

1) A clear statement of the steelhead passage objectives of the project. Objectives shall be explicitly stated for any small dam-removal project (e.g., to improve steelhead passage, improve sediment continuity and downstream spawning habitat, and/or to provide passage meeting specific steelhead passage guidelines).

2) A clear statement and justification for the project's method of restoring the channel along with a sediment-management plan.

3) The proposed time-frame for dam and sediment removal along with the time expected for channel equilibrium to occur at the project site. Include anticipated and actual start and end dates of project.

4) The distance and location of nearest upstream grade-control feature (natural or anthropogenic).

5) An estimate of depth, volume and grain size distribution of sediment stored above the dam. Evidence that the amount of sediment to be released above the dam is relatively small and unlikely to significantly affect downstream spawning, rearing, and/or over-summering habitats. The estimate should be determined with a minimum of five cross-

sections - one downstream of the structure, three through the reservoir area upstream of the structure, and one upstream of the reservoir area outside of the influence of the structure - to characterize the channel morphology, quantify sediment grain size distribution and quantify the stored sediment. A representative sample taken down to refusal to perform a standard sieve analysis should be used to characterize the sediment quality (i.e., grain size distribution) above and below the dam along the same five cross-sections used to quantify the stored sediment.

6) Detailed information on project/reference reach including:

- Location of project/reference reach.
- Channel width (baseline and target range in feet) determined by taking three measurements of active channel at the dam and immediately upstream and downstream of the dam.
- Any existing geomorphic features present and that will be incorporated into the channel (e.g., pools, riffles, runs, step-pools, etc.).
- Overall channel slope (% baseline and target), determined by taking a longitudinal profile throughout the project reach upstream and downstream to the extent of dam influence on the channel slope.
- Maximum channel slope determined through the site before and after the project using pre-project and as-built (post-project) longitudinal profiles.
- Photographs of pre and post project conditions, illustrating implementation of the dam removal, upstream sediment deposit/reservoir, and channel morphology upstream and downstream of the proposed project reach.
- Maximum jump height (baseline and target range in inches) using the pre-project and/or as built longitudinal profile to determine the maximum height a fish would have to jump to migrate through the site.

7) A longitudinal profile of the stream channel thalweg for at least 20 channel widths upstream and downstream (pre and post project) of the structure or of a sufficient distance to establish the natural channel grade, whichever is greater, shall be used to determine the potential for channel degradation (as described in the 2010 CDFG Restoration Manual).

8) Post construction monitoring results for as-built conditions of channel width, channel slope, and maximum jump height.

9) The number of stream miles blocked by each small dam project should be estimated before removal and verified as steelhead accessible after project completion. The following sources may be used to verify the number of upstream miles made accessible as a result of the project: exiting aerial photos and maps of the project watershed, local or regional barrier databases, existing staff or local expert knowledge of project watershed, and/or field verification (in cases where there is permission to access the stream).

10) Operation and maintenance costs for the expected operation, maintenance and/or liability costs over the next 5 years of the dam's operation if the dam were to remain in place. Periodic or less frequent costs that may occur during this period (e.g., structural upgrades to meet safety or regulatory requirements may be incorporated into this estimate).

Determine the expected operation, maintenance and/or liability costs over the next 5 years if the dam is removed. Provide a comparison of these two estimates.

11) A survey of any downstream spawning areas that may be affected by sediment released by removal of the dam.

12) Surveys to assess presence of steelhead stratified according to pre-implementation and post-implementation for a particular habitat-improvement activity, as described more fully below.

Pre-implementation: Under the proposed action, one of the following survey techniques, defined in California Coastal Salmonid Population Monitoring: Strategy, Design, and Methods (Adams et al. 2011), will be used to identify and report presence/absence for either adults or juveniles upstream of the project site. Describe the survey techniques used to determine presence/absence status of steelhead. If a pre-implementation survey is not possible, report whether the barrier is a known full barrier or partial barrier for steelhead. Describe any pre-project data that is available. If no recent, biological information is available, include surrogate information (e.g., most recent observation of species above barrier, description of "completeness" of barrier, etc.)

Post-implementation: If the pre-implementation status was determined to be "absent," use one of the survey techniques to identify and report presence/absence following implementation. If pre-project upstream status was determined to be “present” (e.g., partial barriers), report any change in presence/absence following implementation. In this case, the post-implementation result may be “continued presence." Describe the methodology used to determine presence/absence for the target fish species. Frequency /duration of sampling: The timing and frequency should correlate with the life history of the target fish species. At a minimum, this parameter should be monitored one time following implementation, and if funding allows, would preferably be monitored on an annual or seasonal basis. Monitoring for this measure is likely to yield meaningful results in the first 3 years after project implementation, although in some situations it may be valuable to monitor for the first 5 years. Once target fish presence is detected upstream of the project site post-implementation, monitoring for this measure is complete. Optional monitoring: for partial barriers or projects where the pre-implementation fish presence/absence status was identified as "present," the proportional change in the number of adults or juveniles due to project implementation may be measured.

B. Potential Data Needs for Complex Small Dam Removal Projects[1]

1) Hydraulic modeling immediately upstream and downstream of the project site, and throughout the project reach.

[1] Complex small dam-removal projects are those that would require analyses beyond those described in the section “Minimal Data Requirements.” For example, a small dam removal project requiring the excavation of impounded sediment and implementation of a stream simulation design following excavation would be considered a complex project.

2) Sediment modeling immediately upstream and downstream of the project site, and throughout the reach of the stream in which the project is located, including: sediment grain size distribution within the dam depositional area and the sediment grain size distributions of the channel bed material within the equilibrium reaches upstream and downstream of the dam; recurrence interval of the discharge needed to mobilize the sediment particles and any established vegetation within the sediment deposit upstream of the dam that is to be removed; and bed and bank grain size distributions.

3) A detailed geomorphic assessment of the watershed and/or stream reach.

4) A detailed hydrologic analysis of the watershed and how it will drive the geomorphic conditions within the watershed before and after dam removal.

5) A detailed assessment of the habitat conditions within the watershed and/or upstream and downstream of the reach of the stream in which the project is located.

1.3.5 Project Types Requiring Engineering Review

The following project types, which are considered in this programmatic consultation, require the services of a licensed professional engineer or geologist to comply with the requirements of the Business and Professions Code section 6700 et seq. (Professional Engineers Act) and/or section 7800 et seq. (Geologists and Geophysics Act) (CDFW 2017a and CDFW PSN 2018): (1) Fish Passage at Stream Crossings, (2) Instream-Barrier Modification for Fish-Passage Improvement, (3) Instream Habitat Restoration, (4) Riparian Restoration (5) Instream Bank Stabilization, (6) Watershed Restoration, (7) Fish Screening of Diversions, (8) Water Conservation Measures, and (9) Water Measuring Devices.

Specific project activities associated with the above project types for which CDFW proposed engineering design and analyses as a requirement include the following:

1) Engineered logjam structures (these structures represent channel obstructions that must withstand the full force of streamflow hydraulics, hence CDFW proposes these structures require robust structural design based upon engineering analyses).
2) Retrofit culverts (under the proposed action, these structures shall meet steelhead-passage criteria for all life stages historically passing through the site prior to the existence of the road crossing according to NMFS and/or CDFW stream crossing criteria); and
3) Small dam removal, fish screening at diversions, and steelhead-passage projects (under the proposed action, these activities must be reviewed and authorized by CDFW engineers prior to commencement of work).

1.3.6 Limitations on Project Construction Timing, Size, and Footprint

CDFW proposed the following limitations to further minimize the potential for short-term adverse impacts, including effects that extend outside the localized impact area:

1) Work in or adjacent to streams is restricted to June 15 through November 1 or the first significant rainfall, whichever comes first.

2) Non-jurisdictional upslope projects do not have seasonal restrictions, but may be restricted at some sites to allow soils to dry adequately.

3) Projects shall not disturb or dewater more than 500 contiguous linear feet per project (concrete-lined channels are not subject to this limitation).

4) The number of access routes, number and size of staging areas, and the total area of the work site (delineated by flagging or fencing) shall be limited to the minimum necessary to complete the restoration action while minimizing riparian disturbance.

5) Suitable large woody debris removed from fish-passage barriers that is not used for habitat enhancement, shall be left within the riparian zone to provide a source of wood to the stream.

6) Any disturbed banks shall be fully restored upon completion of construction.

1.3.7 Proposed Monitoring Requirements

The proposed action requires that all applicants will implement the following measures to ensure that individual restoration projects authorized annually through the RGP will minimize take of listed salmonids, monitor and report take of listed salmonids, and obtain specific information to account for the effects and benefits of salmonid-restoration projects:

1) CDFW will provide the Corps and NMFS notification of projects that are authorized through the RGP. The notification will be submitted at least 60 days prior to project implementation and must contain specific project information including; name of project, type of project, location of project including hydrologic unit code (HUC), creek, watershed, city or town, and county.

2) CDFW will notify the Corps annually of the year's projects. If the Corps has not issued a Notice to Proceed or identified any issues (verbal or written) within 60 days of receiving the notifications, CDFW can proceed with the project.

3) CDFW Grant Manager will inspect the work site before, during, and after completion of the action item, to ensure that all necessary mitigation measures to avoid impacts are properly implemented.

4) CDFW will perform implementation monitoring immediately after each restoration activity is completed to ensure that projects are completed as designed.

5) CDFW will perform effectiveness/validation monitoring on at least 10 percent of restoration projects funded annually. A random sample, stratified by project type and region, shall be chosen from the pool of new restoration projects approved for funding each year. Pre-treatment monitoring will be performed for newly selected projects, and post-treatment monitoring will be performed within three years following project completion.

6) CDFW will monitor the structures or work conducted at a given site for at least one growing season after construction to ensure the integrity of the structure and successful growth of the planted vegetation.

7) Current monitoring forms and instructions used by CDFW for the implementation monitoring and effectiveness monitoring are available online at: http://ftp.dfg.ca.gov/Public/FRGP/Qualitative_Monitoring_Forms/.

1.3.8 Annual Report

Annually, CDFW proposes to prepare a report summarizing results of projects implemented under the FRGP Program during the previous year. The annual report will include a summary of the specific type and location of each project and the DPS affected. The report will include the following project-specific summaries:

1) A summary detailing fish-relocation activities including the number and species of fish relocated and the number and species injured or killed. Any capture, injury, or mortality of steelhead shall be noted in the monitoring data and report. Any injury or mortality from a fish-relocation site that exceeds 5 percent of the collected individuals within a species shall have an explanation describing why.
2) The number and type of instream structures implemented within the stream channel.
3) The length of streambank (feet) stabilized or planted with riparian species.
4) The number of culverts replaced or repaired, including the number of miles of restored access to unoccupied steelhead habitat.
5) The distance (miles) of road decommissioned.
6) The distance (feet) of aquatic habitat disturbed at each project site.
7) Project data in a format compatible with the NMFS Geographic Information System (GIS) database, allowing scanned project-specific reports and documents to be linked graphically within the GIS database.

1.3.9 Measures to Protect Steelhead

CDFW proposes a number of protection measures, as they apply to particular project impacts, to be incorporated into the project descriptions for individual projects authorized under the Program. Appendix B contains the complete list of these protection measures.

1.3.10 Interrelated and Interdependent Actions

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There is no known action interrelated or interdependent to the proposed action.

1.4 Action Area

The action area is defined as all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area involves coastal streams and rivers inhabited by threatened steelhead (San Luis Obispo County only) endangered steelhead, and designated critical habitat for steelhead within these regions.

Restoration projects will occur within stream channels, riparian areas and hydrologically-linked upslope areas within these counties. CDFW proposed that restoration activities could potentially occur within any coastal stream that is designated as critical habitat or have the potential to be occupied by steelhead within counties of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego.

Owing to the large and diverse landscape, the action area encompasses a broad range of environmental conditions. NMFS anticipates the effects resulting from most restoration activities will be restricted to the immediate restoration project site. However, minor sediment releases from some restoration projects such as barrier removals or road decommissioning, may increase turbidity for a short distance downstream. The action area includes these downstream or downslope areas.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the value of designated critical habitat for the conservation of a listed species. This biological opinion relies on the regulatory definition of "destruction or adverse modification" of critical habitat, which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016a (81 FR 7214; February 11, 2016)).

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the range-wide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

Steelhead, an ocean-going form of rainbow trout, are native to Pacific Coast streams from Alaska to California and have decreased significantly from their historic levels (Swift et al. 1993). Reasons for the decline of steelhead (including factors affecting steelhead) include past and present destruction, modification or curtailment of the species habitat; over-utilization for commercial, recreational and educational purposes; disease and predation; and inadequacy of existing regulatory mechanisms (August 18, 1997, 62 FR 43937; January 5, 2006, 71 FR 834). Because this biological opinion considers the potential effects of the proposed action on threatened steelhead and endangered steelhead and critical habitat for the species, the status of steelhead and critical habitat as well as the species' life history and habitat requirements are described as follows.

2.2.1 Status of the Species

Threatened SCCC DPS of Steelhead

The decline of the species prompted listing of the SCCC DPS of steelhead as threatened on 18 August 1997 (62 FR 43937, NMFS 1997b). This DPS occupies rivers from the Pajaro River, Santa Cruz County, south to but not including the Santa Maria River, in Santa Barbara County.

The status of the SCCC steelhead populations was assessed by NMFS' Biological Review Team (BRT) in 1996 (Busby et al. 1996), 2005 (Good et al. 2005), 2011 (Williams et al. 2011), and 2016 (NMFS 2016a). Abundance of adult steelhead in the SCCC DPS declined from a historical high abundance of 25,000 returning adults, to an estimate of 4,750 adults in 1965 for five river systems (Pajaro, Salinas, Carmel, Little Sur, and Big Sur), to fewer than 500 adults currently (Good et al. 2005,Williams et al. 2011).

During the most recent status review for SCCC steelhead (NMFS 2016a) it was determined that there is little evidence to suggest that the biological status of the overall population has changed appreciably and factors for the population's decline appeared to have essentially remained

unchanged. As a result, the review concluded that the SCCC DPS of steelhead should continue to be listed as a threatened population.

Endangered SC DPS of Steelhead

The geographic range of this DPS extends from the Santa Maria River, near Santa Maria, to the California–Mexico border (NMFS 1997b, 2006), which represents the known southern geographic extent of the anadromous form of *O. mykiss*.

The abundance of wild steelhead in California decreased significantly from historic levels, prompting listing of the southern California population of steelhead as endangered on August 18, 1997 (62 FR 43937, NMFS 1997b), which includes all naturally spawned populations of steelhead and their progeny residing below long-standing impassable barriers. The endangered status was reaffirmed on January 5, 2006 (71 FR 834, NMFS 2016b). Estimates of historical (pre-1960s) and recent (1990s - current) abundance of steelhead show a precipitous drop in numbers of spawning adults for major rivers within the range of endangered steelhead (Table 1-1). Recent updated status reports indicate that chief causes for the numerical decline of steelhead in southern California include urbanization, water withdrawals, channelization of creeks, human-made barriers to migration, and the introduction of exotic fishes and riparian plants (NMFS 1997, Good et al. 2005, Williams et al. 2011, NMFS 2016b).

Table 1-1. Historical and recent abundance estimates of adult steelhead in the Southern California DPS. Data are from Good *et al.* 2005, and NMFS SWR redd surveys 2009-2011 (R. Bush, NMFS, personal communication).

	Pre-1950	Pre-1960	1990s	2000s	Percent Decline
Santa Ynez River	20,000-30,000		< 100		99
Ventura River		4,000-5,000	< 100	< 100	96
Santa Clara River		7,000-9,000	< 100	< 10	99
Malibu Creek		1,000	< 100		90

NMFS described historical and recent steelhead abundance and distribution for the southern California coast through a population characterization (Boughton et al. 2006). Surveys in Boughton et al. (2005) indicate between 58 percent and 65 percent of the historical steelhead basins currently harbor *O. mykiss* populations at sites with connectivity to the ocean. Most of the apparent losses of steelhead were noted in the south, including Orange and San Diego counties (Boughton et al. 2005). The majority of losses (68 percent) of steelhead were associated with anthropogenic barriers to steelhead migration (e.g., dams, flood-control structures, culverts, etc.). Additionally, authors found the barrier exclusions were statistically associated with highly-developed watersheds.

2.2.2 Steelhead Life History and Habitat Requirements

The major freshwater life-history stages of steelhead involve spawning, incubation of embryos, freshwater rearing, emigration of juveniles, smoltification, and upstream migration of adults. Steelhead juveniles typically rear in freshwater for 1 to 4 years before migrating to the ocean, usually in the spring, and spend 1 to 3 years in the marine environment before returning to spawn. Steelhead grow and reach maturity at age 2 to 5 while in the ocean. This ocean-going

life history pattern, known as anadromy, leads to more rapid growth than can be accomplished by non-anadromous individuals that spend their entire life in freshwater. The discussion of the steelhead life history below begins with the adults that are about to enter freshwater to spawn.

In south-central and southern California, adults typically immigrate to natal streams for spawning during December through May. Spawning adults enter freshwater during winter and spring freshets when streamflow is sufficient to breach sandspits that form at river mouths. Adults may migrate several to hundreds of kilometers in some watersheds to reach their spawning grounds. Although spawning may occur during December to June, the specific timing of spawning may vary a month or more among streams within a region. Steelhead exhibit an iteroparous life history type, unlike many of the other Pacific salmon (*Oncorhynchus* spp.), which means adult steelhead are capable of surviving after spawning and have the ability to migrate downstream as post-spawned adults (i.e., kelts) to the ocean and make subsequent spawning migrations. Individual steelhead have been documented repeating their spawning migration up to four times (Shapovalov and Taft 1954).

Female steelhead select spawning sites based on a variety of factors, including substrate size, water velocity, depth, and temperature. Females dig their nests (i.e., redds) in the riffle crests that form at the tailouts of complex pools with suitable gravel substrate and adequate instream cover. Spawning involves courtship between the female constructing the redd and one or more suitable males. Egg pockets are excavated in gravel-cobble substrates at a mean depth of about 20-cm (Sheutt-Hames et al. 1996). When the depth of the redd and the coarseness of the gravel meet the female's criteria, and she is courted by an acceptable male, she will release her eggs (Quinn 2005). Successful egg burial occurs immediately following fertilization by the male. In order to cover the embryos with a layer of clean gravel, the female digs a new egg pocket upstream of the pocket containing the fertilized eggs and the excavated, clean gravels are swept downstream by the current to bury the embryos. Depending on the size of the female and the number of eggs deposited in each pocket, the spawning pair may continue to excavate new egg pockets in an upstream fashion enlarging the overall size of the redd. The developing embryos incubate in the gravel for a period of 3 to 8 weeks prior to hatching.

Streams are the initial rearing habitats for juvenile steelhead from the time they emerge from the egg pocket to the pre-smolt stage when juveniles have grown large enough to begin their seaward migration. Alevins, juveniles with an external yolk sac still attached, emerge from redds about 2 to 6 weeks after hatching in the gravel egg pocket. When the yolk sac is depleted, juvenile steelhead are classified as fry. Steelhead fry forage along low-velocity channel margins and utilize gravel-cobble substrate and instream vegetation for cover. Juveniles tend to congregate in schools, but as they grow these schools break up and the fish (now called parr) spread throughout the stream, selecting individual territories with access to adequate cover and food (Shapovalov and Taft 1954). Preferred territories are commonly associated with deep pools, instream large woody debris, boulder clusters, undercut stream banks and deeper riffle/run feeding habitats. During the summer and fall low-flow season, parr make seasonal movements in search of perennial stream reaches with suitable water quality and food availability. Stream habitats formed by scour (i.e., pools) associated with boulders, large woody debris, and intact rootwads are the preferred habitats where south central and southern California steelhead parr over-summer (Spina 2003, Spina et al. 2005, Boughton and Goslin 2006). During winter high-

flow events, juveniles seek low velocity, off-channel habitats such as backwater pools, side channels, and inundated woody riparian vegetation that serve as refugia (Shapovalov and Taft 1954, Solazzi et al. 2000).

Steelhead have the most flexible freshwater life history of any of the Pacific salmonids such that emigration instincts are not obligate. While most steelhead go to sea before maturing, some individuals of both sexes spawn (with anadromous or resident life forms) before going to sea, while still others complete their life cycles entirely in freshwater (McPhee et al. 2007, Christie et al. 2011). Transformation of steelhead parr into smolts is the physiological preparation for ocean residence and includes changes in shape and color, osmoregulation (salt balance) and energy storage (Quinn 2005). Larger individuals in good condition tend to migrate to sea in the spring, whereas smaller individuals are more likely to remain in freshwater or reside in estuarine habitats. Estuaries encompass a wide range of habitat types including riparian edge, bottom, slough, and open water environments. Estuaries play an important role in steelhead life history prior to ocean entry, providing nutrient rich feeding areas, transition to seawater, and predator avoidance. Some steelhead populations rear in estuaries for months (Bond et al. 2008), but patterns of estuarine entry and use likely differ between regional watersheds based on estuary size, habitat complexity, smolt size, tidal influence, water quality and food availability.

This highly variable life cycle gives rise to complex habitat needs, particularly during the freshwater phase. South-central and southern California steelhead habitat consists of water, substrate, and riparian vegetation representing both estuarine and riverine habitat types. Spawning gravels must be of a certain size and free of sediment to allow successful incubation of the eggs. Eggs require cool, clean, and well-oxygenated waters for proper development. Juveniles often feed on insects that drift in the current, so fish orient upstream and defend feeding positions adjacent to instream cover and consume drifting prey items. The same instream cover used as feeding territories doubles as places to hide from predators, such as under logs, root wads, instream boulders, and beneath overhanging vegetation. Juveniles need places to seek refuge from periodic high flows (side channels and off channel areas) and occasionally from high summer water temperatures (cold water springs and deep pools). Low streamflow, high water temperature, physical barriers, low dissolved oxygen, and high turbidity can delay or halt downstream migration of juveniles and subsequent entry into the marine environment (i.e., estuary, lagoon, or ocean). Returning adults generally do not feed in fresh water but instead rely on limited energy stores to migrate, mature, and spawn. During all life stages steelhead require cool water that is free of contaminants and suitable places to rest and hide from predators. They also require rearing and migration corridors with adequate passage conditions (water quality and quantity available at specific times) to allow access to the various habitats required to complete their life cycle (70 FR 52488; September 2, 2005).

2.2.3 Population Viability

Before NMFS can evaluate the effects of the proposed action on a population and a species, an understanding of the condition of the population and species in terms of their chances of survival and recovery is critical for the effects analysis. The chances of survival and recovery contribute to NMFS' understanding of whether the population is likely to experience viability. Population viability is the hypothetical state(s) in which extinction risk of the broad population is negligible over a 100-year period and full evolutionary potential is retained (Boughton et al. 2006).

Four principal parameters were used to evaluate the extinction risk for the endangered Southern California DPS of steelhead and the threatened South-Central California Coast DPS of steelhead: abundance, population growth rate, population spatial structure, and population diversity. These specific parameters are important to consider because they are predictors of extinction risk, and the parameters reflect general biological and ecological processes that are critical to the growth and survival of steelhead (McElhany et al. 2000).

There are three basic concepts (adapted from Boughton et al. 2006) that describe the meaning of population viability and how population growth rate and related parameters work together to provide a framework for judging the persistence of a population in the wild. The first concept is that for a population to persist indefinitely, on average each adult fish in the population has to give rise to at least one adult fish in the next generation (i.e., the population of adults must replace itself year after year). The second concept involves the size of the population. The larger the population, the less likely the population is to become extinct and the less likely that all mates will fail to produce eggs. Large population size is the single most important trait to protect a population from being driven to extinction due to random events. The third concept involves the relationship of vital events (e.g., births, deaths, and matings). The more correlated that vital events tend to be across the population, the larger the population has to be to protect it from extinction.

These concepts are expected to apply to the endangered SC DPS and threatened SCCC DPS of steelhead. The largest populations within these two DPSs are needed to support an effective recovery strategy. The role of the largest populations in recovery is based on population theory, which suggests the largest populations would have the highest viability if restored to an unimpaired condition (see Boughton et al. 2006). In nature, population abundance fluctuates for a variety of reasons including random changes in environmental conditions (often referred to as environmental stochasticity). If the fluctuations are large enough, the number of individuals in the population can fall to zero, even though the population may be relatively large initially. The influence of environmental stochasticity on both DPSs is expected to be high, and because environmental stochasticity increases extinction risk to the population, and to compensate for the environmental influences, both the SC DPS and the SCCC DPS need to have a larger average size than a broad population that is not as affected by chance fluctuations in environmental conditions (Boughton et al. 2006).

The expected sources of environmental stochasticity in both DPSs involve drought (and associated features such as high temperatures, low streamflow, lack of sandbar breaching at the mouths of rivers), floods, and wildfire. Southern California is currently experiencing a severe multi-year drought; extensive instream drying has been observed in numerous coastal drainages in the range of the SC DPS of steelhead prompting NMFS and CDFW to collaborate on a high number of steelhead relocations in an attempt to enhance survival of fish in the wild. Under such conditions stream temperature can increase dramatically, exceeding the heat tolerance of fish, and dissolved-oxygen concentration can fall below levels tolerable for steelhead. Finding dead or dying juvenile steelhead is not uncommon under such conditions.

Based on the complete population viability evaluation and findings in Boughton et al. (2006),

neither DPS is viable and is at high risk of extinction. That is, each DPS has a low likelihood of viability. This finding is consistent with conclusions of past and recent technical reviews (Busby et al. 1996, Good et al. 2005, Williams et al. 2011), and the formal listing determinations for the species (NMFS 1997, 2006).

Spatial structure of a steelhead population is also critical to consider during the jeopardy analysis when evaluating population viability. Each population's spatial structure comprises of both the geographic distribution of individuals in the population and the processes that generate that distribution (McElhany et al. 2000). Understanding the spatial structure of a population is important because the population structure can affect evolutionary processes and; therefore, alter the ability of a population to adapt to spatial or temporal changes in the species' environment. Populations that are thinly distributed over space are susceptible to experiencing poor population growth rate and loss of genetic diversity (Boughton et al. 2007). Because human activities have decreased the total area of habitat, a negative trend on population viability is expected (McElhany et al. 2000). Construction and the ongoing impassable presence of man-made structures throughout the Southern California Coast DPS have rendered many habitats inaccessible to adult steelhead (Boughton et al. 2005). In many watersheds that are accessible to these species (but that may currently contain few or no fish), urbanization and exploitation of water resources has eliminated or dramatically reduced the quality and amount of living space for steelhead.

Population diversity is an additional factor considered within the viability criteria. Steelhead possess a suite of life-history traits, such as anadromy, timing of spawning, emigration, and immigration, fecundity, age-at-maturity, behavior, physiological and genetic characteristics, to mention a few. The more diverse these traits (or the more these traits are not restricted), the more likely the species is to survive a spatially and temporally fluctuating environment. Factors that constrain the full expression of a trait are expected to affect the diversity of a species (McElhany et al. 2000). The loss or reduction in anadromy and migration of juvenile steelhead to the estuary or ocean is expected to reduce gene flow, which strongly influences population diversity (McElhany et al. 2000). Evidence indicates genetic diversity in populations of southern California steelhead is low (Girman and Garza 2006).

Habitat is the "templet" for ecological variation in a species (Southwood 1977) and, accordingly, when a species' habitat is altered, the potential for the habitat to promote ecological variation is also altered. Loss or limited migration opportunities are expected to adversely affect the species' basic demographics and evolutionary processes, causing a reduced potential for both DPS units (SCCC and SC) to withstand environmental fluctuations. Activities that affect evolutionary processes (e.g., natural selection) have the potential to alter the diversity of the species. Hence, the widespread effects of anthropogenic activities in southern California are believed to have contributed to a decline in genetic diversity of southern California steelhead (Girman and Garza 2006).

2.2.4 Status of Critical Habitat

The designation of critical habitat for Southern California steelhead uses the term "primary constituent elements" (70 FR 52488; September 2, 2005). The new critical habitat regulations (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016b (81 FR 7214;

February 11, 2016)) replace this term with "physical or biological features" (PBF). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified primary constituent elements or physical or biological features. In this biological opinion, we use the term "physical or biological features" to mean "primary constituent elements." PBFs for both DPSs of steelhead and their habitat include:

1) Freshwater spawning sites with sufficient water quantity and quality and adequate accumulations of substrate (i.e., spawning gravels of appropriate sizes) to support spawning, incubation and larval development. Habitat features responsible for accumulating and storing spawning gravels include instream large wood, boulder clusters and instream aquatic vegetation.
2) Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow salmonid development and mobility; sufficient water quality and forage to support juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4) Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and salt-water; natural cover; and juvenile and adult forage supporting growth and maturation.
5) Nearshore marine areas free of obstruction with sufficient water quality and quantity conditions and forage to support salmonid growth and maturation; and natural cover.
6) Offshore marine areas with sufficient water quality and forage, including marine invertebrates and fishes, to support salmonid growth and maturation.

Critical Habitat in the SCCC DPS

Designated critical habitat for the SCCC DPS includes 1,249-miles of stream habitat and 3-square miles of estuary habitat within Monterey, San Benito, Santa Clara, Santa Cruz, and San Luis Obispo counties from the Pajaro River Hydrologic Sub-area south to the Estero Bay Hydrologic Unit (to but not including the Santa Maria River Hydrologic Unit). There are 30 occupied hydrologic sub-unit watersheds within the freshwater and estuarine range of the DPS. The action area for the proposed action overlaps with designated critical habitat for SCCC steelhead only in San Luis Obispo County.

Critical habitat for the SCCC DPS was designated on September 2, 2005 (70 FR 52488), and includes streams listed above in the *Status of the Species* section. Critical habitat has a lateral extent as defined by the bankfull discharge, also known as a 2-year flood event. Estuarine areas of listed streams are also included in the designation, but the riparian zone is not included in the designation. PBFs within these streams essential for the conservation of the DPS are those sites

and habitat components that support one or more steelhead life stages. These include freshwater spawning sites and rearing sites with water quantity and quality sufficient to form and maintain physical habitat conditions that support juvenile growth and mobility. PBFs include natural cover such as shade, submerged and overhanging large wood, logjams, beaver dams, aquatic vegetation, large rocks, boulders, side channels and undercut banks. Additional PBFs of critical habitat consist of freshwater migration corridors free of obstruction and excessive predation that have sufficient water quantity and quality, and physical cover within migration corridors that supports steelhead mobility and survival, as well as estuarine areas that also share these attributes. Also listed as PBFs are juvenile and adult steelhead food forage, including aquatic invertebrates and fishes that support steelhead growth and maturation.

Streams designated as critical habitat in the SCCC DPS have the above PBF attributes to varying degrees, depending on the stream location and the impacts associated with the watershed. NMFS' most recent status reviews for SCCC steelhead (NMFS 2016a) identified habitat destruction and degradation as serious ongoing risk factors for this DPS. Urban development, flood control, water development, and other anthropogenic factors have adversely affected the proper functioning and condition of some spawning, rearing, and migratory habitats in streams designated as critical habitat. Urbanization has resulted in some permanent impacts to steelhead critical habitat due to stream channelization, increased bank erosion, riparian damage, migration barriers, and pollution (Good et al. 2005). Many streams within the DPS have dams and reservoirs that reduce the magnitude and duration of flushing stream flows, withhold or reduce water levels suitable for fish passage and rearing, physically block upstream fish passage, and retain valuable coarse sediments for spawning and rearing. In addition, some stream reaches within the DPS' designated critical habitat may be vulnerable to further perturbation resulting from poor land use and management decisions.

Critical Habitat in the SC DPS

Critical habitat for the SC DPS encompasses 708 miles of stream habitat within a small part of San Luis Obispo County, and Santa Barbara, Ventura, Los Angeles, Orange and San Diego counties from the Santa Maria River Hydrologic Unit south to the San Juan Hydrologic Unit. The action area includes all designated SC DPS critical habitat.

Critical habitat for the SC DPS was designated on September 2, 2005 (70 FR 52488). We summarize here relevant information from the final rule regarding the PBFs and activities with the potential to affect critical habitat. The designation identifies PBFs that include sites necessary to support one or more steelhead life stages and, in turn, these sites contain the physical or biological features essential for conservation of the DPS. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine areas. The physical or biological features that characterize these sites include water quality, quantity, depth, and velocity, shelter/cover, living space, and passage conditions. Activities with the potential to affect critical habitat for the SC DPS are similar to those listed in the previous section.

Habitat for steelhead has suffered destruction and modification, and anthropogenic activities have reduced the amount of habitat available to steelhead (Nehlsen et al. 1991, NMFS 1997b,

Boughton et al. 2005, NMFS 2006). In many watersheds throughout the range of the SC DPS, the damming of streams has precluded steelhead from hundreds of miles of historical spawning and rearing habitats (*e.g.*, Twitchell Reservoir within the Santa Maria River watershed, Bradbury Dam within the Santa Ynez River watershed, Matilija Dam within the Ventura River watershed, Rindge Dam within the Malibu Creek watershed, Pyramid Dam and Santa Felicia Dam on Piru Creek). These dams created physical barriers and hydrological impediments for adult and juvenile steelhead migrating to and from spawning and rearing habitats. Likewise, construction and ongoing impassable presence of highway projects have rendered habitats inaccessible to adult steelhead (Boughton et al. 2005). Within stream reaches that are accessible to this species (but that may currently contain no fish), urbanization (including effects due to water exploitation) have in many watersheds eliminated or dramatically reduced the quality and amount of living space for juvenile steelhead. The number of streams that historically supported steelhead has been dramatically reduced (Good et al. 2005). Groundwater pumping and diversion of surface water contribute to the loss of habitat for steelhead, particularly during the dry season (e.g., NMFS 2005a, see also Spina et al. 2006). The extensive loss and degradation of habitat is one of the leading causes for the decline of steelhead abundance in southern California and listing of the species as endangered (NMFS 1997b, 2006).

A significant amount of estuarine habitat has been lost across the range of the DPS with an average of only 22-percent of the original estuarine habitat remaining (Williams et al. 2011). The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed and the necessary restoration activities will likely require decades. Many of these threats are associated with the larger river systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Luis Rey, Santa Margarita, San Dieguito, and San Diego rivers, but they also apply to smaller coastal systems such as Malibu, San Juan, and San Mateo creeks. Overall, these threats have remained essentially unchanged for the DPS as determined by the last status review (Williams et al. 2011) though some individual, site specific threats have been reduced or eliminated as a result of conservation actions such as the removal of small fish passage barriers.

2.2.5 Regional Climatic Variation and Trends

Impacts of climate change on stream, estuarine and marine environments have the potential to significantly impact steelhead populations. Coupled with naturally stressful environments at the southern limit of the species distribution, multiple stressors are likely to be amplified by ongoing increases in temperature, changes in precipitation patterns, and decreases in snowpack (Mote et al. 2003, Hayhoe et al. 2004). Research suggests that a change in climate would be expected to shift species distributions as they expand in newly favorable areas and decline in marginal habitats (Kelly and Goulden 2008). When climate interacts with other stressors such as habitat fragmentation, additional threats to natural resources will likely emerge (McCarty 2001), including threats to the viability of steelhead populations. In particular, seasonal access to perennial, cool water habitats, especially smaller streams at higher elevations, will likely become more important to endangered salmonids seeking refuge from unsuitable temperature and streamflow (Crozier et al. 2008).

World-wide CO2 levels from human activities (e.g., fossil fuel use) have been steadily increasing. Climate scientists have documented increases in global temperatures and predict continued increases (IPCC 2007). This warming is affecting large-scale atmospheric circulation patterns (Dettinger and Cayan 1995), and it is impacting climate at global, regional, and local scales (Zwiers and Zhang 2003, Cayan et al. 2008). Climate change is occurring and is accelerating (IPCC 2007, Battin et al. 2007). While continued changes in climate are highly likely, estimating the magnitude of the change is more difficult the further into the future one must go. For example, increases in air temperatures globally are more certain than increases in air temperature in a particular watershed in California. Increases in global air temperatures may shift wind patterns, and these changes, in combination with regional topography, may affect how air temperatures in a particular watershed change in relation to changes in global air temperatures.

Environmental monitoring data in the southwestern United States indicate changes in climatic trends that have the potential to affect steelhead life history strategy and habitat requirements. The southwest U.S. average annual temperature is projected to rise approximately 4° F to 10° F over the region by the end of the century (USGCRP 2009). Southern California is also experiencing an increasing trend in droughts, measured by the Palmer Drought Severity Index from 1958 to 2007 (USGCRP 2009). Snyder and Sloan (2005) project mean annual precipitation in central western California will decrease by about 3-percent by the end of the century. Small thermal increases in summer water temperatures have resulted in suboptimal or lethal conditions and consequent reductions in *O. mykiss* distribution and abundance in the northwestern United States (Ebersole et al. 2001). Thus, climate variability will likely be an important factor in evaluating how the status of the species is influenced by changing climate.

Wildfire frequency, intensity, and extent are all important parameters to consider when considering a changing climate and associated impacts to steelhead and their habitat. Changes in vegetation communities for this region will likely include increases in the amount of grassland and decreases in most other major vegetation communities (e.g., chaparral, riparian woodland). Based on a wildfire risk assessment in southern California, it was determined that the probability of large (>200-ha) fires ranges from a decrease of 29 to an increase of 28-percent (Westerling and Bryant 2008). The variation in range is due to the type of model used to make forecasts. Wildfires can have long-term benefits for fish habitat (such as producing influxes of spawning gravels to the stream), but in the short-term they can be catastrophic due to accumulation of fine sediment that negatively affects spawning, foraging and depth refugia (Boughton et al. 2007). Many of the foregoing climatic trends are likely to further degrade endangered steelhead over-summering habitat in southern California by reducing stream flows and raising stream temperatures (Katz et al. 2012). Impacts to steelhead may result in increased thermal stress even though this species has shown to tolerate higher water temperatures than preferred by the species as a whole (Spina 2007). Conservation of existing steelhead populations will rely on identifying and providing unimpeded passage to the highest quality over-summering and spawning habitats which are expected to buffer habitat against changing climatic and hydrologic conditions. Habitat connectivity becomes as important as habitat quantity and quality when populations decrease and habitat is fragmented (Isaak et al. 2007).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). Within this section, NMFS describes the current status of steelhead and critical habitat in the action area by describing each DPS separately, and provides a single analysis of the ongoing threats to steelhead and designated critical habitat in the action area owing to the similarity of threats that both DPSs experience.

2.3.1 Status of Steelhead and Critical Habitat in the Action Area

Threatened SCCC DPS of Steelhead

This part of the action area includes all coastal streams entering the Pacific Ocean in San Luis Obispo County south to, but not including the Santa Maria River. It includes naturally spawned anadromous populations of *O. mykiss* that inhabit those portions of coastal watersheds that are at least seasonally accessible to steelhead entering the ocean. The area is dominated by a steep mountain range along the coast (Santa Lucia Mountains), coastal valleys and terraces. Watersheds within this region fall into two basic types: (1) those characterized by short coastal streams draining mountain ranges immediately adjacent to the coast (e.g., watersheds draining to Estero Bay), and (2) those containing larger stream systems that extend inland through gaps in the coastal ranges (e.g., Arroyo Grande Creek).

Major steelhead watersheds in this part of the action area include San Simeon, Santa Rosa, San Luis Obispo, Pismo, and Arroyo Grande creeks (Busby et al. 1996, 1997, Titus et al. 2003 Good et al. 2005). The creeks in the northern part of San Luis Obispo County occur in relatively undisturbed areas, as development within the watersheds increases in a southerly direction, especially near the cities of San Luis Obispo, Pismo Beach, and Arroyo Grande. Urban development is concentrated in coastal areas and inland valleys, with the most extensive and densest urban development located within the San Luis Obispo and Arroyo Grande watersheds. Some coastal valleys and foothills are extensively developed with agriculture – principally row-crops, orchards, and vineyards (e.g., Arroyo Grande valley). Significant portions of the upper watersheds within the SCCC DPS are found within the Los Padres National Forest (Monterey and Santa Lucia Ranger Districts). These lands are managed primarily for water production, recreation, livestock grazing, mining, oil and gas production and protection of native fish, wildlife, and botanical resources.

Endangered SC DPS of Steelhead

This part of the action area includes all coastal streams entering the Pacific Ocean from the Santa Maria River in northern Santa Barbara County south to the Mexican border. Although critical habitat for the SC DPS only extends down to San Mateo Creek in the San Juan Hydrologic Unit in San Diego County, the action area extends through San Diego County to the Mexican border. This area is dominated by a series of steep mountain ranges and coastal valleys and terraces. Watershed types within this region are similar to the SCCC DPS, characterized by short coastal

drainages adjacent to the coast (e.g., Gaviota Coast streams, tributaries to Santa Monica Bay), and larger river systems that extend inland through the coastal ranges (e.g., Santa Maria River, Santa Ynez River, Ventura River, Santa Clara River, San Gabriel River, Santa Ana River, San Luis Rey River, and San Diego River).

Major inland watersheds occupied by steelhead in the SC DPS include the Santa Maria, Santa Ynez, Ventura and Santa Clara River systems (Good et al. 2005, Boughton et al. 2006). Many smaller coastal streams in Santa Barbara County (Arroyo Hondo Creek, Mission Creek, Montecito Creek and others), Ventura County (Rincon Creek), and northern Los Angeles County (Malibu Creek, Topanga Creek and others) also currently support naturally spawning *O. mykiss*. Steelhead have been recently observed in three watersheds in southern Orange County and northern San Diego County (San Juan Creek, San Luis Rey River, and San Mateo Creek). These southernmost populations are separated from the northernmost populations by approximately 80 miles.

Significant portions of the upper watersheds within the area are contained within four National Forests (Los Padres, Angeles, San Bernardino, and Cleveland National Forests). These forests are managed primarily for water production, recreation and wildlife habitat (with limited grazing and oil, gas, and mineral production). Urban development is concentrated in coastal areas and inland valleys, with the most extensive and densest urban development located within the Los Angeles Basin. This area is home to more than 21 million people, over half the population of the State of California. Some coastal valleys and foothills, such as the Santa Ynez, Santa Clara, and San Luis Rey watersheds are extensively developed with agriculture – principally row crops, orchards, and vineyards (NMFS 2012).

2.3.2 Threats to Steelhead and Designated Critical Habitat in the Action Area

The past and ongoing effects of numerous anthropogenic activities in the action area have reduced the quality and availability of habitat for endangered and threatened steelhead and threaten the long-term survival and recovery of these species (NMFS 2012, 2013b). While some activities are physically outside the action area the activities adversely affect critical habitat and steelhead in the action area (e.g., in the case of land-use activities causing input of sand and smaller particles to habitats within the action area, or in the case of a water storage or diversion facility altering the downstream pattern and magnitude of discharge in the action area). Forecasts regarding pending climatic changes portend future adverse alterations to habitat for the species. The activities threatening steelhead and designated critical habitat in the action areas are described quite extensively in NMFS' recovery plan for endangered steelhead (NMFS 2012) and threatened steelhead (NMFS 2013b), and because threats to each species are the same or similar, the following summary describes threats pertaining to the entirety of the action area and each species.

2.3.2.1 Urban Development

Urbanization has degraded anadromous salmonid habitat through stream channel realignment, flood plain drainage, and riparian damage. When watersheds are urbanized, problems may result simply because structures are placed in the path of natural runoff processes, or because the urbanization itself has induced changes in the hydrologic regime. In almost every point that

urbanization activity touches the watershed, point source and nonpoint pollution occur. Sources of nonpoint pollution, such as sediments washed from the urban areas, contain heavy metals such as copper, cadmium, zinc, and lead. These toxic substances, together with pesticides, herbicides, fertilizers, gasoline, and other petroleum products, contaminate drainage waters and harm aquatic life necessary for anadromous salmonid survival. Water infiltration is reduced due to extensive ground covering with impervious surfaces (e.g., parking lots). As a result, runoff from the watershed is flashier, with increased flood hazard.

2.3.2.2 Flood-Control Activities

Streams within the action area have been altered over the past decades through activities that promote conveyance of flood waters. One activity has involved the removal of large and small woody debris (e.g., live trees, downed tree trunks, limbs, root wads) from instream areas. Removing such debris from streams can have the overall effect of reducing the quality and availability of habitat for anadromous salmonids because woody debris in streams (Bryant 1983, Lisle 1986) creates complex habitat for fish and loss of such habitat is reported to cause reductions in stream-fish abundance (Dolloff 1986, Elliott 1986).

Routine removal of riparian and instream vegetation has been reported to have a host of adverse consequences for stream-fish populations, including reductions in streamside and instream cover, increased stream temperature, streambank erosion and channel widening, lack of tree root structure creating undercut banks, reductions of live and fallen large woody debris within bankfull channel and reductions in fish abundance (Hicks et al. 1991, Platts 1991, Thompson et al. 2008). Thompson and others (2012) found that in southern California steelhead streams standing live and dead trees contributed a high proportion, 72%, of the total LWD loading within the bankfull width and were often key pieces in wood habitat features. Within the action area, removal of woody debris and vegetation from creeks is widespread, and occurs in numerous creeks each year that are designated critical habitat for steelhead (SBCFCD 2001, Questa 2003, SWCA 2010). Regional studies have identified that the extended summer low-flow period allows trees to become established within the bankfull channel that in turn provide critical habitat features utilized by steelhead (Thompson et al. 2008, 2012). Given the value of instream woody debris to stream salmonids and the reported effects of woody-debris removal on stream habitats, the annual removal of live and dead stream vegetation has likely caused a reduction in the functional value of designated critical habitat for endangered and threatened steelhead, including a decrease in living-space capacity, and reduced abundance of juvenile steelhead in the action area.

Flood control and land drainage schemes may concentrate runoff, resulting in increased bank erosion that causes a loss of riparian vegetation and undercut banks and eventually causes widening and down-cutting of natural stream channels. The construction of concrete-lined channels, or channelization, is one flood-control method practitioners have utilized to protect urban infrastructure from concentrated storm runoff. Channelization and concrete-lined flood control channels exist throughout the action area and were constructed and are maintained to decrease roughness and maximize flood conveyance. Channelization of river channels can have numerous biological effects on waterways, including effects to essential features of instream habitat that are important to sustain growth and survival of stream fish (Brookes 1988), and is

principally responsible for the current character and condition of certain waterways in the action area.

2.3.2.3 Conversion of Wildland and Land Use

Conversion of wildlands for agriculture is apparent in the action area, and while not widespread, the agricultural activities themselves can increase runoff of nitrogen from fertilizers and animal waste, pesticides, and fine sediments into streams in the action area (i.e., critical habitat for steelhead). This is of concern because an increase in agricultural runoff can results in eutrophication (*i.e*., excessive nutrients) of river mainstems, and their estuaries (Weaver and Garman 1994, Bowen and Valiela 2001, Quist et al. 2003). Eutrophication can have negative effects on endangered and threatened steelhead and critical habitat because it results in excessive blooms of algae and bacteria, lower dissolved oxygen levels, and kills macroinvertebrates that salmonids use for food (Spence et al. 1996). Agricultural runoff can result in increased turbidity and sedimentation in streams, which reduces water quality (Alexander and Hansen 1986) and is harmful to steelhead (Cordone and Kelley 1961, Hillman et al. 1987, Chapman 1988). However, NMFS is not aware of the specific type, amount, and extent of agricultural runoff to waterways in the action area and related potential effects on endangered or threatened steelhead and designated critical habitat for either species.

Within the portion of the SCCC DPS that is in the action area, some coastal valleys and foothills are extensively developed with agriculture, principally row-crops, orchards, and vineyards. Several of the watersheds within the SCCC DPS (e.g., Pajaro, Salinas, Santa Rosa, and Arroyo Grande) are developed for commercial agriculture, particularly row crops which are subjected to regular applications of a variety of pesticides (NMFS 2013b). The nature and extent of the short and long-term effects of these pesticides on steelhead within the action area has not been extensively studied, and consequently is not well known. Agriculture developments within the Salina River watershed, including livestock ranching and increasingly vineyards, are important land uses that directly or indirectly affect watershed processes throughout this DPS. A major consequence of agricultural activity in this region is reservoir development (NMFS 2013b).

Within the SC DPS action area, the conversion of wildlands for agriculture is perhaps most prevalent along coastal terraces, like the Santa Maria River Valley, which is intensively farmed. Managed flow releases from Twitchell Dam provide irrigation water to approximately 35,000 acres of cropland. Seventy-five percent of the water supply from the Santa Maria River watershed goes to irrigation, watering crops such as sugar beets, strawberries, alfalfa, and, more recently, grapes (USBR 1996). Agricultural and urban development has severely constrained floodplain connectivity on sections of the Santa Maria River floodplain (SWCA 2011). Other areas in the SC action area where agriculture is a significant land use activity includes the Santa Ynez and Santa Clara River Valley in the south (NMFS 2012).

Estuarine functions are adversely affected through a range of activities, including filling, diking, and draining. Approximately 75 percent of estuarine habitats across the SCCC DPS have been lost and the remaining 25 percent is constrained by agricultural and urban development, levees, and transportation corridors such as highways and railroads (NMFS 2013b), while the SC DPS has been artificially reduced 70 to 95-percent by development (NMFS 2012). In addition to the

loss of overall acreage, the habitat complexity and ecological functions of south-central and southern California estuaries have been substantially reduced as a result of: (a) loss of shallow-water habitats such as tidal channels, (b) degradation of water quality through both point and non-point waste discharges, and (c) artificial breaching of the seasonal sandbar at the estuaries mouth which can reduce and degrade steelhead rearing habitat by reducing water depths and the surface area of estuarine habitat.

2.3.2.4 Ongoing Operation of Dams

The construction of dams in the action area is expected to have contributed to declines in abundance of threatened and endangered steelhead (e.g., Nehlsen et al. 1991), owing to reported effects of dams on fish species and their habitat (Morita and Yamamoto 2002). Within the action area, the ongoing operation of several dams continues to block steelhead from historical spawning and rearing habitats. A summary description of these dam types and their effects are presented as follows.

Steelhead access to spawning and rearing habitat in the SCCC DPS action area has been significantly reduced as a result of dams and other instream structures that block or impede migration of adult steelhead (NMFS 2013b). Dams and diversions have a multitude of effects on fishery resources and quality of steelhead habitat (Blahm 1976, Mundie 1991, Smith et al. 2000). Several drainages in San Luis Obispo County are completely blocked to steelhead migration owing to their respective dams, including the Nacimiento River (Nacemiento Reservoir Dam), Old Creek (Whale Rock Dam), West Corral De Piedra (Righetti Dam), Arroyo Grande Creek (Lopez Dam), Santa Maria River (Twitchell Dam), and Chorro Creek (Chorro Creek Dam). All of these dams block steelhead from a substantial portion of the upper watersheds, which contain the majority of historical spawning and rearing habitats for anadromous *O. mykiss*, remain intact (though inaccessible to anadromous fish) and protected from intensive development as a result of their inclusion in the Los Padres National Forest (NMFS 2013b).

Steelhead access to spawning and rearing habitat in the SC DPS action area has also been significantly reduced as a result of dam construction and continued operation on numerous steelhead drainages. The damming of the larger drainages including the Santa Ynez River (Gibraltar Dam and Bradbury Dam), Ventura River (Casitas Dam and Matilija Dam), Piru Creek (Santa Felicia Dam and Pyramid Dam) and Malibu Creek (Rindge Dam) blocks steelhead from historical spawning and rearing habitat because none of these reservoirs were constructed to allow fish passage. The amount of historical spawning and rearing habitat rendered unavailable to steelhead in these watersheds due to the construction of dams is substantial. As an example, the Santa Felicia Dam blocks 95% percent of the steelhead habitat within the Piru Creek watershed; more than 30 miles of stream lies between Santa Felicia Dam and Pyramid Dam alone (NMFS 2008b).

Remnant steelhead populations that reside upstream of dams have the potential to occasionally out-migrate downstream past these dams, but *O. mykiss* survival is expected to be low. The reason for the low expected survival is that steelhead smolts must migrate through large, static reservoirs and either pass over high-head dams via steep spillways or through the dam by circumventing the high velocity outlet works (i.e., gates, energy dissipators). Operations of dams

and diversions may decrease water available for surface flows, reducing rearing opportunities for steelhead and adversely affecting the physicochemical and biological characteristics of streams (Poff et al. 1997).

2.3.2.5 Surface and Groundwater Withdrawals

In addition to blocking threatened and endangered steelhead from historical spawning and rearing habitats, the agricultural, municipal and private withdrawal of surface and groundwater from drainages in the action area, as well as characteristics of local geology, can lead to reach-specific instream dewatering primarily during the dry season and periods of below normal rainfall (NMFS 2012, NMFS 2013b). The artificial reduction in the amount and extent of surface flows can translate into decreased living space for steelhead, particularly over-summering juveniles and potentially death of this specific life stage (Spina et al. 2006). Because freshwater rearing sites for over-summering steelhead are geographically limited throughout southern California, including the action area, the artificial reduction in freshwater rearing sites for juveniles during the summer can translate into a reduction in abundance of juvenile steelhead and therefore the number of returning adults in subsequent years.

Diversions in the action area can have adverse effects on fishery resources that are similar to the effects of dams, particularly when the diversion functions over a relatively broad range of discharges and is not designed to allow fish migration (Blahm 1976, Mundie 1991, Smith et al. 2000). Many larger screened diversions are installed on streams by constructing low-head dams that pond water and allow for stream diversion while providing some portion of discharge as a "bypass" flow for the intended purpose of providing sufficient fish migration flows. One such facility is the Robles Diversion Dam on the Ventura River is capable of diverting up to 500-cfs discharge in a concrete channel while the Casitas Municipal Water District maintains a minimum 50-cfs augmentation flow in the main-stem river for fish passage. Diversion dams can affect steelhead by causing migration delays and attenuating stream discharge that serves as a natural cue for migratory fish to emigrate in unregulated rivers, and affect habitat by disrupting the natural transport of spawning gravels and establishment of healthy riparian vegetation. Operation of unscreened diversions in the action area can disrupt migration of steelhead and prevent a large fraction of smolts from reaching the ocean due to entrainment of juveniles.

Groundwater withdrawals (primarily for irrigation) have reduced surface streamflow in many streams throughout California which has the functional effect of decreasing the amount and quality of steelhead rearing habitat. Water quantity problems are a significant cause of habitat degradation and depressed fish populations. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion of it. Water withdrawals have a significant effect on steelhead over-summer rearing habitat and seasonal flow patterns by removing water from streams when discharge is naturally modest (i.e., May through September). Over-summer rearing habitat has been found to be the most restricted habitat type in the SCCC and SC DPSs (Boughton and Goslin 2006).

2.3.2.6 Gravel Mining

Extraction of alluvial material from within or near a streambed has a direct impact on the stream's physical habitat parameters such as channel hydraulics, morphology, sediment transport, bed elevation, and substrate composition (NMFS 2005b). The immediate and direct effects are to reshape the boundary, either by removing or adding materials. The subsequent effects are to alter the flow hydraulics when water levels rise and inundate the altered features. This can lead to shifts in flow patterns and patterns of sediment transport. Local effects also lead to upstream and downstream effects.

Altering these habitat parameters can have deleterious impacts on instream biota, food webs, and the associated riparian habitat (Spence et al. 1996). For example, impacts to anadromous fish populations due to gravel extraction can include reduced fish populations in the disturbed area, replacement of one species by another, replacement of one age group by another, or a shift in the species and age distributions (Moulton 1980). Changes in physical habitat characteristics of aquatic systems can alter competitive interactions within and among species; similarly, changes in temperature or flow regimes may favor species that prey on anadromous fish populations (Spence et al. 1996). In general terms, Rivier and Seguier (1985) suggest that the detrimental effects to biota resulting from bed-material mining are caused by two main processes: (1) alteration of the flow patterns resulting from modification of the river bed, and (2) an excess of suspended sediment.

The aggregate mining in the Santa Maria River and lower Sisquoc River since the early 1900's is expected to have caused a number of adverse effects on the quality and availability of habitat for endangered steelhead, given the reported effects of gravel mining on riverine environments (Kondolf 1997). Gravel mining can lead to overall physical degradation to the structure and function of river channels. In turn, a reduction in the physical and biological capability of the channel to support growth and survival of stream fish can be observed as well as an overall reduction in abundance.

Mining of sand and gravel occur in certain watersheds within San Luis Obispo County (e.g., Salinas River, San Simeon Creek). Mining can contribute soil to streams, and cause sedimentation and turbidity, which can be harmful to fish (Cordone and Kelley 1961, Hillman et al. 1987, Chapman 1988) and their habitat (Alexander and Hansen 1986,). Floodplain and instream mining can also cause changes to the stream channel (i.e., head-cuts, channel widening, etc.) that adversely affect steelhead migration (NMFS 2005b).

2.3.2.7 Environmental Stochasticity

Surface and groundwater pumping in or near many coastal streams (*e.g.*, San Simeon, Santa Rosa Creek, Arroyo Grande Creek, Morro Creek, San Luis Obispo Creek, Chorro Creek, See Canyon Creek) and larger river systems have the potential to adversely affect threatened and endangered steelhead. In some cases, these pumping operations have reduced available surface flows and even dried portions of streams, thereby reducing available habitat quantity and quality for rearing steelhead (Spina et al. 2006). In many watersheds there are certain portions of the

stream that naturally dry yearly. In these stream sections pumping operations may cause drying of the stream earlier than normal.

Changes in land use through conversion of lands (*e.g.*, due to development of urban areas) can increase input rates of nitrogen and sediment (*i.e.*, sand and smaller particles) to receiving waters (and therefore critical habitat for steelhead), leading to reductions in the quality of critical habitat and abundance of desirable aquatic species, and increased eutrophication of receiving waters such as estuaries and streams (Weaver and Garman 1994, Bowen and Valiela 2001, Quist et al. 2003). Past and present development of lands often results in an increase of impervious surfaces which can lead to increased potential for runoff of pollutants to surface water. Increased runoff may not necessarily be confined to the wet season, but may extend into the dry season as a result of people washing streets, parking lots, vehicles, and other elements of the urban environment. Once in surface water, pollutants of sufficient concentration may impair water quality and alter the characteristics of the channel bed. Long-term urbanization effects have been associated with lower fish species diversity and abundance (Weaver and Garman 1994). Consequently, the proliferation of urban areas within many of the coastal watersheds throughout the San Luis Obispo County as well as major river watersheds such as the Salinas River is of concern.

Direct and indirect evidence of cattle in riparian areas and streams within many of the Estero Bay and Salinas watersheds (NRCS 2010) have been observed. It is estimated that 90% of the 1,691,810 acres of land used for agriculture in San Luis Obispo County is used for cattle grazing (NRCS 2010). Cattle have been observed in and along parts of these rivers and tributaries, grazing on slopes above waterways, and exposing soil, thereby increasing the potential for water-quality alterations related to sedimentation and turbidity (Platts 1991). Therefore, cattle grazing has the potential to impact steelhead rearing and spawning habitat.

2.4 Effects of the Proposed Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. We divide the discussion in this section into Effects of the Action on Critical Habitat and Effects of the Action on Endangered Steelhead.

Because projects will occur in the future, and exact project descriptions needed to determine the precise effects of the proposed action on steelhead and their habitats are limited or unavailable at this time, this assessment of effects is primarily qualitative, except where data are available. Our approach to assess effects is based on a review of ecological literature concerning the effects of loss and alteration of habitat elements important to salmonids, including water, substrate, food, and adjacent riparian areas, which are the PBF's of critical habitat that will be affected

As an overview to the effects section, the available information indicates effects of the proposed action would be confined to over-summering juveniles and migrating life stages (smolts and adults). Based on data received from CDFW for FRGP projects constructed within the action area since 2003, and our observations and surveys in southern and south-central California streams, we anticipate that a small proportion of the total number of rearing juvenile steelhead within a stream will be represented within the action area.

With regard to adverse effects on critical habitat, the proposed action is expected to affect certain PBFs, with the expected impacts for individual projects to vary from temporarily elevating turbidity concentration to temporarily dewatering discrete areas of streams. In this context, NMFS describes the effects to critical habitat and effects to the species. This section also evaluates the efficacy of the proposed protection measures.

2.4.1 Effects on Designated Critical Habitat

Designated critical habitat for threatened and endangered steelhead is expected to be altered as a result of the following Program activities: (1) dewatering the work area; (2) installing boulder and wood structures; (3) crossing streams with heavy equipment; (4) modifying fish-passage barriers (including small dam removal) and improving passage conditions for fish at stream crossings; and (5) installing water-conservation measures and water-measuring devices. As described more fully in the following, the anticipated effects of the action on designated critical habitat are largely beneficial.

2.4.1.1 Dewatering

Program Activities that may require dewatering include streambank stabilization and riparian-habitat restoration, instream-habitat improvement, instream-barrier modification, fish-passage improvement at stream crossings, and water-conservation projects. Dewatering the immediate work area is expected to cause temporary loss of critical habitat for steelhead, and loss of invertebrate forage for steelhead within the dewatered work area. Program Activities that require instream activities will be implemented during the dry season (June 15 to November 1) and no more than 500-linear feet of creek will be dewatered to allow construction in the dry.

Aquatic macroinvertebrate forage will be temporarily reduced or eliminated within the action area as a result of isolating the workspace from flowing water. Aquatic insects provide a source of food for instream fish populations, and may represent a substantial portion of food items consumed by juvenile steelhead. Effects to aquatic macroinvertebrates resulting from streamflow diversion and dewatering will be temporary because construction activities will be temporary, and rapid recolonization (about one to two months) of the restored channel area by macroinvertebrates is expected following re-watering (Cushman 1985, Thomas 1985, Harvey 1986). In addition, the effect of macroinvertebrate loss on juvenile steelhead is expected to be negligible because food from upstream sources would be available downstream of the dewatered area via drift through the diversion pipe. Based on the foregoing, the temporary loss of aquatic macroinvertebrates as a result of dewatering activities is not expected to adversely affect steelhead.

Effects on critical habitat associated with dewatering activities will be minimized due to the multiple protection measures that are required as described in Appendix B. For certain projects where it is deemed necessary to work in a flowing stream, the work area would be isolated and all the flowing water would be temporarily diverted around the work site to maintain downstream flows during construction. Protection measures require that the length of the dewatered stream channel and duration of dewatering activity are minimized. As a result, the direct effects of the activity on critical habitat are minimized by dewatering the shortest stream reach necessary to complete the program activity. Because the duration of dry channel conditions is kept to a minimum, stream habitat functions will quickly return to the site when re-

watered. As a result, dewatering activities are not anticipated to cause sudden instream habitat changes that would diminish the long-term functional value of designated critical habitat.

2.4.1.2 Installation of Boulder and Wood Structures

Instream habitat structures described in the proposed action (certain details of which can be found in CDFG 2010) are expected to beneficially alter designated critical habitat for steelhead, particularly through the physical characteristics of the treated site. For example, placement of engineered-log jams is likely to permanently alter the distribution and magnitude of water depths and velocities through the project reach and, perhaps to some extent, downstream. This is considered a beneficial effect because the structures will be deliberately designed and installed to improve freshwater rearing sites for steelhead through an increase in habitat complexity (Lisle 1986, CDFG 2010).

To minimize the likelihood of detrimental impacts, installation of boulder and wood structures would be dictated by site-specific geomorphic characteristics and hydraulic analyses. Additionally, CDFW requires engineering and geomorphic planning for boulder clusters, engineered wood structures, and engineered log jams. Under the proposed action, the final engineering plans would be reviewed by NMFS and (or) CFDW engineering staff prior to project implementation. Based on these requirements, the installation of boulder and wood structures is expected to improve the functional value of freshwater rearing and migratory habitat for steelhead in the action area.

2.4.1.3 Crossing Streams with Heavy Equipment

Select Program Activities require that heavy equipment occasionally cross streams, increasing the potential for designated critical habitat to experience temporary degradation within discrete, localized areas. The mechanism of the effects involve stream substrate compaction and colmation (i.e., gravel and cobble layer clogged with fine sediment), which in turn can temporarily decrease (1) refugia space for benthic macroinvertebrates, (2) riparian vegetation recruitment, and (3) reproductive success of fish spawning on gravel (Brunke and Gonser 1987, Zeh and Donni 1994). In-channel use of heavy equipment has the potential to modify stream habitat by levelling stream contours that may result in the loss of pools, and overall channel roughness features that reduce habitat complexity.

However, specific protection measures were incorporated into the proposed action to minimize disturbance from instream construction. For example, CDFW has excluded projects impacting more than 500-linear feet from the proposed action, and a protection measure that states:

> "Soil compaction shall be minimized by using equipment with a greater reach or that exerts less pressure per square inch on the ground, resulting in less overall area disturbed and less compaction of disturbed areas." (CDFW 2017a, pg B-31)

Because gravel-cobble substrates are important habitats for steelhead spawning and rearing, these protection measures minimize adverse impacts to habitat containing these substrate types and, in turn, conserves the ability of these habitats for providing PBFs to steelhead. Measure VI-12 also provides assurances to prevent substrate compaction by requiring that disturbed soils be

decompacted at project completion as heavy equipment exits the construction area. Finally, applicants for individual projects are required to submit detailed project descriptions that describe how the applicant proposes to access the project site; because this information will be reviewed by the CDFW Program manager to evaluate consistency with covered Program activities, and restoration objectives in general, this effects analysis presumes that all protection measures will be adequately applied to minimize impacts associated with crossing streams with heavy equipment. Overall, the impacts attributed to the use of heavy equipment in the stream channel will be minimized by the above protection measures and offset by the associated restoration projects that are intended to increase access to previously inaccessible habitat, and improve the quality of existing steelhead habitat.

2.4.1.4 Fish-Passage Barrier Modification and Improvement at Stream Crossings

Modification of introduced migration barriers is expected to restore or improve freshwater migration corridors for threatened and endangered steelhead. The introduced barriers that are expected to be the focus of the modifications involve road crossings, culverts, concrete grade-control structure, flood-control channels, and small dams. Although we generally anticipate beneficial effects of this Program activity, the programmatic nature of the proposed action generates uncertainty regarding the performance of the fish passage at modified sites. This uncertainty may translate into risk for threatened SCCC and endangered SC steelhead.

Areas of uncertainty include whether a particular modification would promote a headcut (and passage impediment) farther upstream of the modified site. Another area of uncertainty involves the degree and scope of sediment transport and hydraulic analyses that would inform the modification. Inadequate analyses can lead to improper design modifications and long-term impacts to critical habitat, for example through reoccurring in-channel maintenance to maintain steelhead rearing and/or migration habitat. Hence, there exists a need to review design plans, hydraulic and geomorphic analyses, methods of construction, and monitoring and maintenance plans to ensure the final design would promote attainment of NMFS' fish-passage criteria.

Removal or physical modification of dams represents a special class of fish-passage barrier modification and improvement, viewed as a complex project, because the effort to develop and implement remediation designs for the effects of dams can be complicated. With regard to designing modifications or improvements, the proposed action does not specify an established scientific process to guide the development of simple or complex dam-removal projects. Uncertainties exist regarding who is responsible for deciding if projects are complex and what level of analysis and information would be provided under the Program. As a result, the potentially realized benefits of the physical alteration of a dam to restore freshwater migration corridors is somewhat uncertain. Under the proposed action, CDFW requires that fish passage projects meet CDFW's Culvert Criteria for Fish Passage and NMFS' (2001) fish-passage guidelines. However, the proposed action lacks assurances that current passage guidelines would in fact be adopted in any modifications or improvements to small dams. If current NMFS' fish passage design metrics and guidance are not incorporated into the design, uncertainty exists regarding the safe, timely, and efficient upstream and downstream passage of steelhead at project sites.

The proposed modification of instream barriers and small dam removal may result in the loss of scour pools on the downstream side of introduced migration barriers. The created scour pool, and in some cases one or more pools downstream of the crossing, are typically lost owing to the required change in channel slope between upstream and downstream elevations of the project reach. The loss of pools in the action area could contribute to the overall decline in the functional value of freshwater rearing areas in streams of the action area. The loss of pool habitat likely decreases the variance of channel structure, depth, and velocity, and therefore the diversity of habitat available to the different life stages (Fausch 1993). Hence, pool loss in action area streams may decrease both the amount and quality of freshwater rearing habitats. However, modification of instream barriers and fish passage improvement at stream crossings are expected to have a low severity of impact on critical habitat since the instream structure is typically modified to allow fish passage, with some passage projects incorporating pool habitats. In addition, we anticipate steelhead would be able to access extensive reaches upstream that are perennial with pools, following the barrier modification.

2.4.1.5 Water Conservation Measures and Water Measuring Devices

Implementing water conservation measures is expected to benefit endangered and threatened steelhead by increasing the amount and extent of surface water, and therefore living space, for juvenile steelhead. The proposed action includes measures to ensure reductions in streamflow will be small, short-term, and not result in substantive impacts to critical habitat (See Appendix B). For instance, the proposed action requires that diversions would be screened, groundwater pumping would cease when streamflow is below 0.7 cfs, withdrawal rates would not exceed 5% of streamflow, and specific days for groundwater pumping would be assigned to participating landowners when streamflows are below 1.0 cfs. Given the expected magnitude (i.e., small relative to the amount of available surface flow) and timing (i.e., when surface flow is available) of the water withdrawal, the effects are expected to be confined to the localized area in the vicinity of the withdrawal area.

The installation of water measuring devices is not expected to have an effect on listed species or critical habitat because the devices are anticipated to be installed in places where steelhead and critical habitat for this species do not exist. For example, diversion ditches are expected to be the primary location for the measurement devices.

2.4.1.6 Alteration of Streamside Vegetation

Streamside vegetation is expected to be altered, and in some cases eliminated, when restoration sites are physically modified to accommodate application of a particular Program Activity. Consequently, alteration or loss of streamside vegetation is of concern, owing to the functional values of such vegetation and the benefits they provide to aquatic systems in general and instream rearing fish populations in particular (PBF 2). These benefits include shelter (Bustard and Narver 1975, Wesche et al. 1987), a source of woody debris and therefore fish habitat (review by Bryant 1983, Lisle 1986, Shirvell 1990), a filtering system for sediment (Cooper et al. 1987), and temperature regulation and streambank stability (review by Platts 1991).

However, NMFS expects that the amount and extent of vegetation that could be altered or lost as a result of Program Activities would be minimal, because the work areas are often already

degraded and devoid of functionally valuable vegetation (i.e., restoration practices would be applied only to degraded areas). If vegetation is present, effects resulting from alteration or loss of streamside vegetation are expected to be minimal, because few shrubs or trees are expected to be present, and short lived because, under the proposed action, applicants would replace vegetation and monitor the revegetated area for at least three years after construction to ensure success criteria are achieved. NMFS expects that the vegetative conditions of a particular work area would be improved following application of the practices, primarily because the practices are intended to improve habitat functions and values for threatened and endangered steelhead.

Overall, the proposed protection measures are expected to greatly reduce the amount and extent of the impacts and effects due to Program Activities (Appendix B). Vegetation monitoring would ensure the desired habitat functions and values of the treated site are attained because the monitoring would indicate whether additional adjustments are necessary to obtain the proposed 80% survival of plantings or 80% ground cover for broadcast planting of seed after a period of 3 years. Because Program Activities will be subject to NMFS review and coordination, NMFS will, if necessary, collaborate with CDFW and potentially the applicant to develop additional protection measures beyond those provided by CDFW to further minimize effects of alteration or loss of streamside vegetation.

2.4.1.7 Alteration of Water Quality

Program Activities are expected to temporarily increase turbidity concentration and suspended-sediment levels within the project work sites and downstream, within the overall action area. Chronic effects are not expected to occur owing to the protection measures discussed below.

First and foremost, restoration sites will be designed to minimize contact of fine sediment with flowing water and the restoration will occur during the dry season (June 15 to November 1). CDFW has proposed numerous protection measure that requires any work using heavy equipment within the stream channel to occur in isolation from flowing water. If there is any flowing water (or isolated pools capable of supporting steelhead) when the construction occurs, the project proponent is required to construct cofferdams upstream and downstream of the excavation site and divert all flowing water around the work area with the area being limited to a 500-foot long dewatered area. The number of access routes, and number and size of staging areas shall be limited to the minimum necessary to complete the Program activity.

Certain Program Activities, such as upslope watershed restoration, streambank stabilization, and riparian-restoration projects are expected to have an entirely beneficial effect on steelhead designated critical habitat. Examples of short-term benefits to steelhead and their habitat include erosion-control treatments to minimize sediment delivery routes to steelhead streams, while long-term benefits include reduced sedimentation from bank erosion, decrease turbidity levels, and improved long-term water quality through pollutant filtering.

Small dam-removal projects have the potential to result in temporary adverse effects to critical habitat and steelhead, including fine sediment fouling of spawning and rearing habitats in stream reaches downstream of dam removal sites. Substantial transport of smaller substrate (e.g., sand and gravel) from project sites are expected during a bankfull-flow event (i.e., 2-year event), as well as the necessity of a 5-year event to redistribute a significant portion of the larger bedload

(e.g., coarse gravel, cobble, boulder) to downstream stream reaches (Zimmerman and Lapointe 2005, Florsheim et al. 1991). Based on the proposed action and our familiarity with the action area streams, fine sediment may impact stream reaches extending up to 350-feet downstream of dam removal sites for 1 to 2 years. To minimize the potential effects of large or chronic fine sediment releases, the proposed action should include a sediment-management plan to minimize the impacts of accumulated fine sediment upstream of small dams.

2.4.1.8 Avoidance of Traditional Bank Stabilization Methods

Traditional forms of bank stabilization (e.g., rock riprap) result in an altered channel and function relative to a channel that has not undergone anthropogenic changes. These practices impact the distribution and type of riparian vegetation contributing to designated critical habitat for steelhead within the accessible floodplain (Gergel et al. 2002) and interfere to some degree with the natural riverine processes by adjusting to static hardened banks. Specifically, bank stabilization affects riparian recruitment adjacent to hardened banks by decreasing lateral channel migration and causing unnatural streambed scouring (Schmetterling et al. 2001). Further, bank stabilization reduces the quality and availability of designated critical habitat for steelhead by reducing riparian vegetation and cover, eliminating undercut banks (shelter for steelhead), reducing input and deposition of spawning gravels, and eliminating pool habitat types adjacent to the banks. Ultimately, armoring streambanks disrupts instream habitat and alters geomorphic processes such as the natural meander pattern of the river and the natural maturation and succession of the riparian corridor.

In the context of the proposed action and related habitat restoration, it is anticipated that all bank-stabilization activities will avoid methods incorporating rock riprap within the project work sites and within the overall action area. The proposed bank-stabilization measures are not expected to result in measurable, chronic, degrading effects to the channel, as discussed above, owing to the deliberate use of bio-engineered techniques (e.g., boulder-stabilization structures, log-stabilization structures, tree revetment, native-material revetment, mulching, revegetation, willow-wall revetment, brush mattresses, brush checkdams, waterbars) to stabilize a channel and bank.

2.4.2 Effects on Steelhead

This section describes the direct and indirect effects of the proposed action on the SCCC DPS of threatened steelhead and the SC DPS of endangered steelhead and designated critical habitat for these species. Our presentation of the effects on the species generally pertains to both the threatened and endangered species; DPS-specific effects are distinguished only when necessary and appropriate.

2.4.2.1 Capture and Relocation of Steelhead

Dewatering will temporarily preclude sections of streams within the action area from serving as a rearing site and a migration corridor for threatened or endangered steelhead. The ability of juvenile steelhead to migrate upstream through the action area will be hindered for several weeks or up to a few months while one or more dewatering diversions are in place. Downstream

migration of juvenile steelhead from reaches upstream of the action area is not expected to be substantially affected owing to the temporary corridor provided through a bypass. Adult steelhead are not expected in creeks within the action area and, therefore, are not likely to be affected by construction activities.

Although the dewatering process could harm or kill rearing juvenile steelhead, the proposed action includes measures to reduce the likelihood of harm and mortality to juvenile steelhead within the area to be dewatered (Page IX-52 and IX-53 of the CDFW Manual). In this regard, the proposed action requires that project applicants: 1) minimize the length of stream to be dewatered and the duration of dewatering, 2) exclude fish from re-entering the dewatered area using mesh no greater than 1/8-inch in diameter, 3) periodically check the upstream and downstream block nets and pump intake, 4) pump intakes should be covered with 1/8-inch mesh to prevent entrainment of fish, and 5) sediment-laden water will be treated in a manner that will not increase the existing turbidity of the receiving water. While the proposed protection measures generally conform to NMFS guidance on dewatering activities, the description of proposed measures does not specify the number of field workers that would be required to implement the foregoing minimization measures.

The proposed action includes the following general conditions for fish capture and relocation: 1) all fish capture and relocation activities must be performed by qualified fisheries biologists whom possess experience capturing and handling salmonids, 2) relocation activities occur in the morning in regions of California with high summer temperatures, and 3) release location(s) are to be identified prior to capturing fish and should have suitable water temperatures, ample habitat, and low likelihood for fish reentering the worksite. Electrofishing, if determined necessary, is proposed to be conducted according to NMFS' guidelines (NMFS 2000), including NMFS approved modifications for high conductivity waters found in the action area. NMFS' electrofishing guidelines recommend a minimum of three individuals for the safe capture and efficient relocation of steelhead using an electrofisher. However, the proposed action does not identify the number of qualified individuals that would be required to safely conduct electrofishing activities in order to minimize the effects of steelhead capture and relocation activities.

Although CDFW proposes measures to minimize effects on steelhead due to dewatering and fish relocation, injury and mortality to a small number of juvenile steelhead is possible and probable. A very small number of fish (i.e., less than 5 individuals) will likely avoid capture in the dewatered work area. NMFS expects that the number of juvenile steelhead that will be killed as result of stranding or crushing during dewatering activities is low, typically less than 3 to 5 percent of the total number captured. The number of restoration projects is not expected to exceed 10 projects per year per DPS; from 2011 to 2015, the number of FRGP projects per construction season that included dewatering and required fish relocation ranged from 0 to 3 (Corps 2015). We expect that all restoration projects would require dewatering and that the number of juvenile steelhead requiring relocation at each site would not exceed 20 individuals (based on FRGP reporting for restoration projects in southern California). Therefore, NMFS anticipates that up to 200 juvenile steelhead would be captured on an annual basis owing to Program Activities, and no more than 10 individuals would be killed during the capture and relocation activities. This expectation is based on the spatial distribution of the proposed

restoration projects throughout the SCCC and SC DPS, the small area affected during dewatering at each site, and NMFS' familiarity with action area, including abundance and distribution of steelhead.

2.4.2.2 Water Quality Effects

Because the effects of short-lived fine-sediment releases from Program Activities on critical habitat are somewhat uncertain, only a general characterization of the possible effects on steelhead can be made. High concentrations of suspended sediment can disrupt normal feeding behavior, reduce feeding efficiency, and decrease food availability (Cordone and Kelly 1961, Bjornn *et al.* 1977, Berg and Northcote 1985). Chronic elevated sedimentation and turbidity can also reduce salmonid growth rates (Crouse *et al.* 1981), increase salmonid plasma cortisol levels (Servizi and Martens 1992), cause salmonid mortality (Cordone and Kelly 1961, Sigler *et al.* 1984), and reduce the survival and emergence of salmonid eggs and fry (Chapman 1988). Sediment related impacts are largely expected to occur during winter storm events when any projects disturbed sediment has the potential to be mobilized. Increases in sediment and turbidity levels resulting from Program Activities are expected to be minor, relative to background levels, due to the small work footprint of most projects, which makes the mobilization of large volumes of project related sediment unlikely.

2.4.2.3 Use of Explosives

Injury or mortality of steelhead could occur from ground vibration or water overpressure rises from blasting operations related to small-dam removal. Blast-induced ground vibrations, measured in inches per second (i/s), can have deleterious effects on fish embryos at certain stages of their development. Blast induced overpressures in water, measured in pounds per square inch (psi), can injure or kill juvenile and adult fish. Studies have shown that adult fish are less sensitive to blast induced overpressures than juvenile fish (Kolden and Aimone-Martin 2013). A recent review of literature on the effects of blasting on salmonids indicated that the most sensitive life stages of salmonid embryos, which begin to experience mortality at vibrations around 5.8 i/s (Kolden and Aimone-Martin 2013). This led the State of Alaska to establish a 2013 blasting standard limit of 2.0 ips for projects where salmonids are present (Timothy 2013).

The proposed action does not provide the stream conditions (i.e., dewatered or dry) under which explosives shall be utilized, or the analyses to assess potential impacts to steelhead exposed to the blast and associated pressure waves. Because instream work is proposed to occur on June 15, the potential exists that juvenile steelhead may be present in the project area during proposed blasting activities. We expect that the length of stream channel to be dewatered for this activity would be determined on the results of a blast analysis and would not exceed 500-feet. Therefore, this element of the Program represents an adverse effect to threatened and endangered steelhead owing to dewatering and fish relocation activities, similar to small dam removal projects not requiring blasting. An estimated number of these annual project types was not provided, however we anticipate this Program activity may require the capture and relocation of up to 150 juvenile steelhead, of which no more than 6 individuals would be killed. Relocating juvenile steelhead from the area that would be affected by the use of explosives is expected to eliminate potential widespread mortality of steelhead due to a blast.

2.4.2.4 Beneficial Effects

Under the proposed action, Program Activities will be designed and implemented consistent with the techniques and minimization measures described in the CDFW Manual to maximize benefits of individual projects while minimizing effects to threatened and endangered steelhead. Furthermore, all project designs will be reviewed and approved by CDFW and/or NMFS engineering staff before implementation to ensure their success. Program Activities are expected to increase available habitat, habitat complexity, stabilize channels and streambanks, increase spawning gravels, decrease sedimentation, and increase shade and cover for steelhead. Although some Program Activities may cause mild short-term effects to steelhead, all of the expected short-term adverse effects are anticipated to be outweighed by the beneficial improvements to steelhead habitat and survival of the species over the long-term.

For example, instream habitat structures and improvement projects are designed to provide predator escape and resting cover, increase spawning habitat, improve upstream and downstream migration corridors, and habitat complexity for steelhead. Some structures will be designed to reduce sedimentation, protect unstable banks, and stabilize existing slides, provide shade and create pool habitat. From 2013 to 2015, about 5,400 square-feet of instream habitat structures were successfully installed throughout the action area (CDFW 2017b) and similar results are expected in the south-central and southern California DPS regions based on the completed projects in this region.

Fish-passage projects (e.g., Instream barrier modification and fish-passage improvement at stream crossings) are designed to improve or restore access to upstream steelhead rearing and spawning habitat. Many of the barriers in the action area prevent steelhead from accessing vast expanses of their historic habitat located upstream of barriers (NMFS 2012, Stoecker 2002). Long-term beneficial effects are expected to result from these Program Activities by improving passage at sites that are partial barriers, or by providing passage at sites that are total barriers. Reestablishing access to historic rearing and spawning habitat is expected to facilitate recovery of steelhead throughout the action area, and the reintroduction of steelhead into previously inaccessible habitat will likely increase reproductive success and ultimately fish population size in watersheds where the amount of habitat is limited. Fish-passage projects have been successfully implemented under the Program (e.g., Quiota Creek bottomless culverts, Arroyo Hondo Creek culvert, Cleveland National Forest dam removal). From 2013 to 2015, over 14 miles of stream within the action area was made accessible (CDFW 2017b) and this result is expected to continue under Program implementation.

Streambank stabilization projects are expected to reduce sedimentation from watershed and bank erosion, decreasing turbidity levels, and improving water quality for steelhead over the long-term. Over 4 miles of streambank were successfully treated between 2013 and 2015 (CDFW 2017b). Because streambank stabilization projects undergo engineering review for site appropriateness and effectiveness under the proposed action, similar rates of success are expected to continue.

Lastly, riparian restoration projects are expected to improve shade and cover, protect rearing juvenile steelhead, reduce stream temperatures, and improve water quality through pollutant

filtering. Additionally, the beneficial effects of constructing livestock exclusionary fencing in or near streams as outlined in the riparian restoration portion of the CDFG Manual (pg. VII-97) include the rapid growth of grasses, shrubs, and other vegetation released from overgrazing and the reduction of excessive nitrogen, phosphorus, and sediment loads in the streams (Line et. al. 2000).

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonable certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Threatened and endangered steelhead in the action area are likely to be affected by the continuation of the future non-federal activities which are described in the Environmental Baseline section, and further discussed below.

Non-federal activities that are reasonably certain to occur within the action area include urban development, flood-control activities, agricultural development, operation and maintenance of non-federal dams, water withdrawals/diversions, mining, state or privately sponsored habitat restoration activities on non-federal lands, and roadwork.

Urban development will likely increase the amount of impervious surfaces within some of the watersheds, which is expected to raise the potential for dry and wet-season runoff and input of potentially toxic elements in steelhead streams. Flood-control activities may reduce riparian vegetation, alter stream hydraulics and geomorphology, and impede successful steelhead migration. Increased urbanization is expected to cause elevated rates of treated wastewater releases to streams which can increased nitrogen loads and result in adverse effects on aquatic organisms. Residential growth on or along floodplains of rivers is expected to disrupt fluvial processes resulting in the loss of instream habitat and riparian vegetation. Agricultural development is expected to increase runoff and water usage which may increase the input of fertilizers, herbicides, and pesticides into steelhead streams. New surface and groundwater withdrawals in the action area are expected to translate into decreased living space for steelhead. Ongoing mining activities will likely modify stream channel geomorphology and increase runoff of fine sediments into streams.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated critical habitat for the conservation of the species.

The purpose of this synthesis is to develop an understanding of the likely short-term and long-term responses of listed species to the proposed action. NMFS also considers the effects analysis of the proposed action to the species as a whole and to the entire designated critical habitat for SCCC threatened steelhead and SC endangered steelhead.

Restoration projects implemented through the Program are anticipated to restore steelhead habitat within coastal streams from northern San Luis Obispo County to the U.S-Mexico border. Implementation of these projects in areas occupied by steelhead have the potential to subject the species to an elevated exposure risk for a range of direct and indirect effects depending on the Program activity. Proposed protection measures within the Program are expected to significantly reduce the potential risk and/or degree of impact for many of these effects.

Adverse effects to SCCC and SC steelhead and their critical habitat are expected in the form of short-term behavioral changes with a minimal amount of mortality. The release of fine sediment from dam-removal projects has the potential to cause short-term effects to juvenile feeding behavior. The lack of certainty concerning the application of current NMFS fish-passage guidelines has the potential to alter critical habitat due to channel incision and bank instability that can reduce the quality of migratory corridors, and rearing and spawning habitat. Overall, coordination with NMFS during project design, in combination with the CDFWs proposed protection measures, are expected to greatly reduce the potential for such effects.

Dewatering and relocation of captured individuals is expected to have the most notable adverse effect on steelhead in the action area. Steelhead present during the implementation of restoration projects may be disturbed, displaced, injured, or killed by project activities, and steelhead present in some work areas will be subject to capture and relocation. Anticipated mortality rates from relocation activities, as reported by CDFW (Corps 2015), are expected to be as low as 0.6-percent and no higher than 5-percent of fish relocated. Few, if any fish, are expected to remain in construction areas after relocation efforts.

Generally, habitat-restoration projects authorized through this consultation are expected to be designed and implemented consistent with standard techniques and protection measures, including measures in the proposed action and Appendix B of this biological opinion, NMFS' electrofishing guidelines, NMFS' fish passage and screening guidelines, and the CDFW Manual (CDFG 2010), all for the purpose of maximizing the benefits of each restoration project while minimizing adverse effects on steelhead. All of the restoration projects are intended to restore degraded steelhead habitat. Although there will be short-term impacts to designated critical habitat associated with a small percentage of projects implemented annually, NMFS anticipates most projects would improve local instream habitat conditions and characteristics for multiple life stages of steelhead and contribute to improving the long-term survival and recovery of the species.

In summary, the Program Activities described in the proposed action are restoration projects that are intended to restore natural watershed functions that have been disrupted by anthropogenic activities. Inherent within these Program Activities is the potential that there will be an increase background suspended sediment loads. With regard to fine sediments, releases into flowing water are not expected until the first rains after construction activities are completed and the

flows are reintroduced into the reconfigured channel. Because of the proposed protection measures, it is anticipated that the expected increase in background sediment levels resulting from most restoration activities is unlikely to adversely affect steelhead and critical habitat. For small dam removal projects, temporary adverse effects to critical habitat 350-feet downstream of the project sites are anticipated. The expected magnitude and duration of sedimentation resulting from Program activities is not anticipated to appreciably reduce the survival, reproduction, or distribution of steelhead within or downstream of each project location.

Therefore, the effects of the individual Program Activities and their combined effects are not likely to appreciably reduce the numbers, or abundance of SCCC threatened steelhead or SC endangered steelhead, and are not likely to appreciably diminish the value of designated critical habitat for these species.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of the endangered Southern California DPS of steelhead or the threatened South-Central California Coast DPS of steelhead, and is not likely to destroy or adversely modify designated critical habitat for these species.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and Section 7(o)(2) provide that a taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

In this biological opinion, NMFS has enough information available to indicate that the proposed action with implementation of the protection measures is likely to cause capture, relocation, collection, injury, and mortality of individual threatened and endangered steelhead through the following activities.

1) Small dam removal and other instream projects, which would necessitate isolating the work area from flowing water; and

2) Small dam removal projects that release large quantities of fine sediment downstream, which is expected to create inhospitable conditions for developing embryos.

In this context, the amount and extent of take that is anticipated to result from the proposed action in the threatened SCCC DPS of steelhead and endangered SC DPS of steelhead are listed in Tables 1-2 and 1-3. This level of take was estimated from the information provided in the request for consultation, habitat conditions in the action area and the anticipated effects of the proposed action, and our knowledge of the ecology and behavior of steelhead in, including what we know about their abundance and distribution in the action area.

Table 1-2. Estimated annual amount and extent of incidental take anticipated to result from the Program activities throughout the SCCC DPS. Annual incidental take is based on the assumption that 10 projects are implemented in this DPS.

Source of Take	Steelhead Life Stage	Form of Take	Annual Number of Individuals Expected to be Taken
Modification and removal of small dams[1]	Juvenile	Capture, Injury	150
Modification and removal of small dams	Juvenile	Kill	6
Modification and removal of small dams	Adult	Capture	2
Construction activities[2]	Juvenile	Capture, Injury	200
Construction activities	Juvenile	Kill	10
Construction activities	Adult	Capture	1

[1]Includes individuals that will be captured and potentially injured when preparing a worksite for the use of explosives for small dam removal
[2]Program activities that incorporate a dewatering element

Table 1-3. Estimated annual amount and extent of incidental take anticipated to result from the Program activities throughout the SC DPS. Annual incidental take is based on the assumption that 10 projects are implemented in this DPS.

Source of Take	Steelhead Life Stage	Form of Take	Annual Number of Individuals Expected to be Taken
Modification and removal of small dams	Juvenile	Capture, Injury	100
Modification and removal of small dams	Juvenile	Kill	4
Modification and removal of small dams	Adult	Capture	1
Construction activities	Juvenile	Capture, Injury	150
Construction activities	Juvenile	Kill	8
Construction activities	Adult	Capture	1
*Footnotes listed in Table 1-2 apply to Table 1-3.			

2.8.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy of the species.

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are not nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR §402.02). NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize and monitor incidental take of SCCC and SC steelhead.

1) Avoid and minimize harm and mortality of adult and juvenile steelhead during dewatering and relocation activities.

2) Report to NMFS all take associated with minimizing and monitoring the *Effects of the Proposed Action*.

3) Submit adequate information for NMFS' review and/or agreement to ensure Program impacts are minimized within the area affected by the proposed action.

2.8.4 Term and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with the terms and conditions, which implement the reasonable and prudent measures (50 CFR §402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR §402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action may lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:

   A. A minimum of 2 qualified fisheries biologists shall be on-site the day dewatering begins, to relocate any stranded steelhead and check the upstream and downstream block nets. If water is present, one qualified fisheries biologist shall be on-site for the remainder of the instream work period to ensure the diversion remains in place and check the upstream and downstream block nets at least 3 times per day (beginning of work day, during construction, end of construction activities for the day). If any steelhead become entangled in the nets or densities of fish accumulate at the upstream net, this shall be reported to NMFS (Jay Ogawa, NMFS, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213) for the purpose of developing a plan to further minimize harm to steelhead.

   B. A minimum of one qualified fisheries biologist and two assistants shall perform all seining, electrofishing, and steelhead-relocation activities. There shall be a minimum of two individuals netting fish during electrofishing activities to ensure maximum efficiency and removal of steelhead prior to dewatering. Steelhead shall be enumerated, measured and transported to the pre-determined release site as soon as possible to minimize stress after capture. A crew of four or more is typically required to effectively complete relocation activities depending on the complexity of the project site and the distance to predetermined relocation site(s).

   C. The Corps and/or CDFW shall contact NMFS (Jay Ogawa, 562-980-4061) immediately if one or more steelhead are found dead, injured, or stranded at any Program activity work site or monitored restoration site. The purpose of the contact shall be to review the activities resulting in take and to determine if additional protective measures are required. All steelhead mortalities shall be retained, frozen as soon as practical, and placed in an appropriate-sized sealable bag that is labeled with the date and location of the collection and fork length and weight of the specimen(s). Frozen samples shall be retained by the biologist until additional instructions are provided by NMFS. Subsequent notification must also be made in writing to Jay Ogawa, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, California 90802-4213 within five days of noting dead or injured steelhead. The written notification shall include 1) the date, time, and location of the carcass or injured specimen; 2) a color photograph of the steelhead; 3) cause of injury or death; and 4) name and affiliation of the person whom found the specimen.

D. The Corps and/or CDFW shall contact NMFS immediately (Jay Ogawa, 562-980-4061) prior to the capture and relocation of any steelhead if fish survey data indicates that a pending relocation effort is likely to exceed the level of take described in Tables 1-2 or 1-3. The purpose of the contact is to review the anticipated capture and relocation effort to determine the proper course of action.

2. The following terms and conditions implement reasonable and prudent measure 2:

A. The Corps and/or CDFW shall notify NMFS (Jay Ogawa, 562-980-4061 or jay.ogawa@noaa.gov) two weeks prior to capture and relocation of steelhead to provide NMFS an opportunity to provide watershed specific guidance and/or attend the relocation.

B. The relocation data that will be collected as required by CDFW proposed protection measures (Appendix B) shall be recorded, along with information about stream discharge, water temperature, and electrofishing settings used. The data shall be entered and saved into an electronic spreadsheet (Microsoft Office Excel). The electronic spreadsheet and report describing all relocation activities and implemented protection measures shall be emailed to NMFS (jay.ogawa@noaa.gov) no later than March 15 of each year for a period of 5 years.

C. The Corps and/or CDFW shall submit an annual steelhead rescue and relocation summary of all take (including relocated individuals) associated with Program Activities described in this biological opinion. The summary shall be submitted to NMFS (Jay Ogawa, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213) no later than March 15 of each year and shall include the following information:

i. The number of steelhead killed, injured, and captured during implementation of each Program activity.
ii. An explanation of the cause of take.
iii. A discussion of potential operational changes and/or additional protection measures that may decrease the likelihood of future take owing to Program activities.

D. CDFW shall take additional measures when using explosives for blasting and removal of small dams to protect steelhead in the vicinity of the project area. These measures shall include:

i. The applicant must perform an analysis of peak overpressures that would occur as a result of the proposed blasting operations along with an analysis of the setback distance required to achieve a peak overpressure of 10psi.
ii. The applicant must install a fish-exclusion zone upstream and downstream of the dam as determined to minimize or avoid overpressure effects.
iii. The applicant must perform a stream-reconnaissance survey with two fisheries biologists 500-feet upstream and downstream of the dam to collect information on the sub-lethal effects of the blast, and to recover any injured or dead steelhead.

The survey should occur no more than 30 minutes following blasting activities, or as soon as the project site is deemed safe for entry.

3. The following terms and conditions implement reasonable and prudent measure 3:

   A. CDFW shall submit the annual report (as described in Appendix B) summarizing all Program Activities described in this biological opinion that were implemented during the previous year. The report shall contain post-construction implementation and effectiveness monitoring reports for each project. The annual report shall be submitted to NMFS (Jay Ogawa, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, California 90802-4213) no later than August 15 of each year.

   B. CDFW, Corps, and/or the project applicant shall collaborate with NMFS concerning design plans for small dam removal, instream barrier modification, and fish-passage improvement projects, as early as possible (no less than 90 days before implementation as described in the proposed action) for review and comment to increase the likelihood that impacts to steelhead and their habitat are minimized. At a minimum CDFW shall provide to NMFS: hydrologic and hydraulic analyses, geomorphic assessment, existing and proposed longitudinal profile, cross-sections, and all relevant construction detail drawings of each project. CDFW and/or the project applicant shall revise the design according to NMFS' comments for the purpose of ensuring the final design would promote attainment of NMFS' fish-passage criteria and the life history and habitat requirements of steelhead. CDFW shall provide NMFS with a minimum of 45 calendar days to review and develop comments regarding the draft design phase. Draft design materials shall be sent to Jay Ogawa, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, California 90802-4213.

   C. The determination as to whether a specific Program Activity is a "complex project" shall be a joint decision made during early consultation between the Corps, CDFW, and NMFS. The factors that will be assessed in determining project complexity shall include 1) the height of the dam, 2) the gradation and amount of sediment stored upstream of the dam, 3) local hydrology, 4) channel morphology, 5) sediment transport processes, 6) hydraulic conditions in the stream, and 7) any anthropogenic factors present.

      i. Program Activities classified as complex projects will require the applicant to retain a professional engineer and/or geomorphologist to prepare design plans (plan, profile, details, and cross sections) and conduct a scour analysis for NMFS' review and concurrence. Upon receipt of these engineering design plans, NMFS will review and provide comments to the Corps and CDFW within 45 days including specific recommendations associated with these more complex project types to protect steelhead and their habitat.

      ii. Complex project technical assistance shall consist of one or more meetings between NMFS or CDFW engineers, the Corps, and project applicants that include a site visit and concept development discussions that will include consideration of project objectives and measures to minimize effects to steelhead and their habitat. Project applicants must submit 30%, 60% and 90% design drawings and a detailed project

narrative for complex projects. NMFS will review the project plans and provide comments within 30 days. If changes to the project design are identified at any of these design phases that NMFS determines may affect steelhead in a manner that is not offset by the proposed protection measures, a subsequent meeting will be scheduled between all parties, and NMFS will require 30 days from the date of the meeting to review and provide written comments to the Corps and CDFW on how to minimize project impacts.

D. If the minimal data requirements described in Section 1.3.4.1 provided by CDFW indicate a proposed small dam removal project site contains greater than 50-percent impounded fine sediment (i.e., sand and smaller particles), and its unregulated release may cause chronic (i.e., extending beyond the first year post-project) impacts to steelhead and downstream habitats that were not identified in the project description, the Project applicant will be required to develop a Sediment Management Plan. Under the Sediment Management Plan, the applicant will be required to mechanically remove all of the fines within the bankfull channel (i.e., 2 year flood event), or clearly demonstrate using both geomorphic and sediment transport analyses that the proposed project is sufficient to remove the sediment using natural stream processes in 1-2 storm events based on the hydrological record of that stream, or nearest gaged drainage of comparable size.

E. All Program activities that include a fish-passage element shall be designed, constructed, and monitored in accordance with guidance provided in NMFS' *Anadromous Salmonid Passage Facility Design* publication or most current NMFS' fish-passage guidelines.

F. For all Program activities involving instream barrier modification for fish passage improvement (including small dam removal), CDFW shall submit steelhead post-implementation survey results documenting the effectiveness of establishing fish passage upstream of the project site. These monitoring results shall be submitted to NMFS (Jay Ogawa, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802) no later than August 15 of each year.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). NMFS has no conservation recommendation for this proposed action.

2.10 Reinitiation of Consultation

This concludes formal consultation for U.S. Army Corps of Engineers permitting of steelhead habitat restoration projects within watersheds of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

3.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are CDFW and the U.S. Army Corps of Engineers. Other interested users could include (e.g., permit or license applicants, citizens of affected areas, others interested in the conservation of the affected ESUs/DPS). Individual copies of this opinion were provided to the U.S. Army Corps of Engineers and CDFW. This opinion will be posted on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

3.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

3.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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5. APPENDICES

5.1 Appendix A. Data and Required Analyses for FRGP Program Activities
The following data and analysis requirements, as they apply to a particular Program activity, shall be provided to CDFW and the Corps for review to determine if the proposed project is eligible to be authorized under RGP 78 and this programmatic biological opinion. The sources for these proposed requirements are described under the proposed action.

1) Instream Habitat Restoration

Concept Description

- Description of the type of off-channel or side channel feature to be constructed, its dimensions, bathymetry, and over what range of stream flows the habitat will be connected to the stream;
- Site constraints and project limits (e.g., existing infrastructure, preservation of floodplain conditions, property limits), including risk to infrastructure or other properties due to increased flow through a project side channel or reconnected floodplain; and
- Description of how geomorphic and hydraulic processes will maintain habitat. Include a description of how flow will enter and exit the off-channel feature (e.g., hydraulic connections to main channel, groundwater inflow, etc.). Describe how the proposed off-channel feature is anticipated to change and adjust over time.

Biological Assessment

- A narrative description of the evidence that this type of habitat is limited (e.g., site specific habitat typing; investigations of changes in land use and stream form);
- The biological imperative for a project that intervenes on behalf of the stream to correct anthropogenic changes to channel form and function;
- The habitat objective relative to the target species and life stages (e.g., spawning habitat, high flow winter refugia, summer rearing habitat);
- The target species and life stages intended to benefit from the project and their current utilization of the project reach, including predatory species (e.g., centrarchids); and
- If the off-channel feature is designed to receive water intermittently (e.g., functional only for a specific time period for the purpose of providing high flow winter refugia), provide a description of what, if any, features or behaviors will reduce or prevent stranding of the target or any other aquatic or semi-aquatic species.

Site Hydrology and Hydraulics

- Availability, sources, and quality of water across seasons and especially during periods of low flow;
- Description of shallow groundwater-surface water relationships if project performance is linked with or depends on groundwater contributions. The description should include evidence of; a) the connection between stream flow and groundwater, and b) the annual change in shallow groundwater or water table elevations; Calibrated water level rating curves developed through modeling, direct measurements, and/or gage records of the

main channel near upstream and downstream ends of project channel across the range of design flows; and
- Calculation of the tidal prism for the purpose of determining appropriate channel geometry for projects in tidally influenced areas.

Site Physiography

- An assessment of existing habitat elements (i.e., water temperature, dissolved oxygen, salinity; habitat type: pool, riffle, flatwater; estimate of instream shelter and shelter components; water depth; dominant substrate type, etc.);
- Description of existing stream geomorphology, hydrology, shallow earth and geologic relations in and beneath areas of proposed excavation;
- A qualitative assessment of the vertical and lateral stability of the main channel relative to the pre- and post-project potential for an abrupt change in the course of the project stream (avulsion);
- Qualitative description of sediment supply, composition, and mode of transport through the project reach, and areas that may be impacted by the project within, and upstream and downstream of the project area. Assess if project is likely to be impacted by accretion or channel degradation (e.g., accumulation of fine sediments, blockage of entrance or exits, etc.). Assess likely design life of improvements if sediment issues are significant; and
- Projects that propose to reestablish stream flow through disconnected water bodies, such as oxbow lakes, must include an assessment of the still water habitat values that may be detrimentally impacted or lost altogether by the reestablishment of surface flow.

2) Instream Barrier Modification for Fish Passage Improvement

Data Requirements and Analysis

- Soil boring in the impoundment upstream of the dam and larger grab samples of any suspicious layers for contaminant analysis,
- Analysis of bank stability and bed erosion with regards to impacting infrastructure on the overbanks, including bed material samples and cross-sections surveys,
- Analysis of debris and sediment to be transported downstream that may impact infrastructure and habitat,
- Analysis of the potential to trigger a headcut that may impact upstream infrastructure and habitat, including a survey of the longitudinal profile within the expected zone of adjustment,
- A map of any exposure of bedrock or cohesive layers within the expected zone of adjustment and test those materials for problematic characteristics,
- Analysis the impact on peak flood flows and flooding extents/channel capacity by removing the dam,
- A habitat typing survey (see Manual, Part III, Habitat Inventory Methods) that maps and quantifies all upstream and downstream spawning areas that may be affected by sediment released by removal of the small dam, and
- Analysis of fish passage for appropriate species and life stages.

3) Fish Passage Improvements at Stream Crossings

Data Requirements and Analysis (for projects that include rock chutes)

- Target species, life stages and migration timing at project site,
- Calculation of lower and upper fish passage stream flows for each species life stage and design flow,
- Water surface profiles at existing conditions for upper and lower fish passage stream flows and design flow,
- Water surface profiles with proposed boulder weirs for upper and lower fish passage stream flows and design flow,
- Rock and engineered streambed material sizing calculations for both bed and banks.
- Geotechnical information as necessary to ensure project design is structurally appropriate,
- Calculations of depths and velocities along length of individual rock chutes,
- If at a water diversion, ditch/pump hydraulic calculations showing rock chutes provide sufficient head to divert maximum diversion flow+ bypass flow at minimum stream flow considering head losses at flow measurement devices, fish screens, pipes, open ditches, head gates,
- Design drawings showing site topography, control points, structural dimensions in plan, elevation, longitudinal profile, cross-sectional views, and important component details, including construction notes on placement of bed material and boulders, and
- Post-construction evaluation and monitoring plan.

Data Requirements and Analysis (for projects that include roughened channels)

- Target species, life stages, and migration timing at project site,
- Calculation of lower and upper fish passage stream flows and design flows,
- Water surface profiles at existing conditions for upper and lower fish passage stream flows and design flows,
- Water surface profiles with proposed boulder weirs for upper and lower fish passage stream flows and design flows,
- Rock and engineered streambed material sizing and thickness calculations for bed and banks,
- Geotechnical information as necessary to ensure project design is structurally appropriate,
- Calculations of depths and velocities along length of roughened channel at the upper and lower fish passage and design flows,
- Calculations of the overall drop and slope along the roughened channel,
- If at a water diversion, ditch/pump hydraulic calculations showing roughened channel provides sufficient head to divert maximum diversion flow and bypass flow at minimum stream flow considering head losses at flow measurement devices, fish screens, pipes, open ditches, head gates,

- Design drawings showing site topography, control points, structural dimensions in plan, elevation, longitudinal profile, cross-sectional views, and important component details, including construction notes on the placement of bed material and boulders, and
- Post-construction evaluation and monitoring plan.

4) At-Grade Diversions Design Plan Criteria

Data Requirements and Analysis

- Instream and ditch/pump hydraulic calculations showing there is sufficient head to divert maximum diversion flow and bypass flow at minimum streamflow considering head losses at flow measurement devices, fish screens, pipes, open ditches, headgates, etc.
- Design drawings showing structural dimensions in plan, elevation, longitudinal profile, cross-sectional views, and important component details.

5) Bridge and Bottomless Culverts Design Plan Criteria

Data Requirements and Analysis

- Identify and apply fish passage technique: stream simulation, hydraulic design, not applicable, etc.
- Calculation of 100-year flow and any other flow design
- Water surface profiles and average channel velocities for the design flows and the 100-year flow
- Description of geomorphic setting of bridge and why bridge design is appropriate for the setting
- Potential for debris loads or jams at bridge site
- Scour analysis
- Justification for increases in water surface elevation or velocities near the bridge (if any) and the use of any scour protection.
- Geotechnical assessment may be necessary to ensure project design is structurally appropriate.
- Design drawings showing site topography, control points, dimensions of bridge/culvert structure in plan, elevation, longitudinal profile, and cross-sectional views, and important component details.
- HEC-RAS model files including boundary conditions and other model parameters.

6) Boulder Weir Design Plan Criteria

Data Requirements and Analysis

- Target species, life stages, and migration timing at project site.
- Calculation of lower and upper fish passage stream flows for each species life stage and project design flow.

- Water surface profiles at existing conditions for upper and lower passage stream flows, and project design flow.
- Spacing of drops over, cross-sectional shape of, and pool depths above and below boulder weirs.
- Rock sizing calculations.
- Geotechnical information as necessary to ensure project design is structurally appropriate.
- If specific low flow notches are planned, calculations of depths and velocities within notches.
- When a boulder weir project includes a water diversion component, ditch/pump hydraulic calculations showing boulder weirs provide sufficient head to divert maximum diversion flow and bypass flow at minimum stream flow considering head losses at flow measurement devices, fish screens, pipes, open ditches, headgates, etc.
- Design drawings showing site topography, control points, structural dimensions in plan, elevation, longitudinal profile, and cross-sectional views along with important component details, including construction notes on the placement of bed material and boulders.
- Post-construction evaluation and monitoring plan.

7) Engineered Log Jams Design Plan Criteria

Engineered Log Jams Design Plan Criteria Installation of large logs in streams to improve fish habitat is a proven channel restoration technique, and the California Salmonid Stream Habitat Restoration Manual, includes several alternatives for relatively small (i.e., three or four logs) installations tightly anchored to the streambanks. Those installations are designed to increase local fish habitat in terms of pool depth, cover, and velocity refugia. Over the last few decades, restorationists have expanded the use of logs in channel restoration by constructing large (i.e., 20 to 30 logs) instream structures that serve as hydraulic controls designed to create not only fish habitat but geomorphic complexity and/or bank stabilization. These structures represent channel obstructions that must withstand the full-force of streamflow hydraulics (e.g., the 100-year flood event), and therefore require robust structural design based upon engineering analyses. In reference to those analyses, these large wood structures are colloquially known as engineered log jams (ELJs). Consequently, ELJs must be designed in accordance with standards of professional practice. All of the following are required for ELJs.

Data Requirements

- Purpose and Site Selection Statement – What is the purpose of the ELJ and where will it be constructed. An important element in this statement is how the ELJ will fit, affect, and be affected by the existing channel configuration. Clearly define the project goals.
- Risk and Uncertainty Analysis - Under this item is expected thoughtful discussions regarding the risk afforded by the ELJ on existing habitat, infrastructure and property, and public safety as well as the uncertainty involved in the installation and effectiveness of the proposed ELJ. Both the River Rat approach (Skidmore and others, 2011) and Washington manual (Cramer, 2012) include good discussions regarding risk and uncertainty. It is expected that ELJ designers will fully embrace those discussions and recommendations.

- As-built map and details to support future inspection monitoring.
- Inspection monitoring program.

Constraints Analysis

- Property ownership along channel reach;
- Recreational activities (e.g., boating and fishing);
- Floodplain partitioning (property boundaries, levees, roads, etc.);
- Existing infrastructure (structures, pipelines, over-head utilities); • Existing riparian, wetlands, and floodplain habitat areas;
- Construction access; and
- Wood availability and quality.

Biological Assessment

- Document the biological imperative to modify the channel form and function;
- Target species and life stages intended to benefit from the project and their current utilization of the project reach;
- Habitat objective relative to the target species and life stages (e.g., spawning habitat vs. winter refugia vs. summer rearing);
- Potential impacts to existing habitat areas; and
- The predatory species that may benefit from the project.

Geology & Geomorphology

- Description of bedrock and hillside geomorphology if those features will be encountered or affected by the project;
- Scaled map and description of fluvial geomorphologic features (channel plan form, existing bars, pools, riffles) and riparian vegetation;
- Documentation of natural channel slope in reach of crossing;
- Demonstration of natural channel bankfull width;
- Detailed geotechnical characterization of foundational earth materials (i.e., depth of alluvial gravel deposits and depth to/exposure of bedrock);
- Qualitative assessment of streambank/floodplain stability (i.e., how erodible are these features and what is the avulsion potential?);
- Qualitative description of sediment supply, composition, and transport (likelihood and relative significance of aggradation or degradation); and
- Gradation of bed material at several locations in the project reach.

Hydrology & Hydraulics

- Water supply, quality, and sources through the seasons;
- Flood frequencies and inundation depths;
- Calculation of design flow and 100-year flow –structures must be able to withstand the stream power associated with a 100-year flow event;

- Longitudinal profile through the project site with sufficient extent up- and downstream to evaluate changes in water surface elevations associated with the large wood obstruction;
- Water surface profiles and average channel velocities for design and 100-year flows;
- Design calculations, i.e. shear stress and scour analyses;
- If the goal of the ELJ is to split streamflow for a particular purpose (e.g., a side channel) then hydraulic calculations demonstrating that the obstruction provides sufficient head to divert maximum diversion flow and bypass flows at minimum stream flows is required; and
- HEC-RAS model files including boundary conditions and other model parameters.

Engineering Design and Structural Stability Analyses

- Reasons for selecting the particular log jam types (e.g., bar apex vs. flow deflection, etc.);
- Buoyancy and drag as a function of flow analysis;
- Local scour analysis at each ELJ – the importance of bed scour associated with these structures cannot be overstated because such scour has the potential to undermine the structure and cause it to collapse. Both the Washington manual (Cramer, 2012) and River Rat (Skidmore and others, 2011) include multiple discussions on bed scour and include methods for analyzing scour. It is expected that ELJ designers will fully embrace those discussions and recommendations.
- Factor of safety stability analysis (force balance): driving forces of buoyancy, drag, lift, and incipient motion vs. resisting forces of passive earth pressure, surcharge weight, and skin friction;
- Material design life; and
- Design drawings showing site topography, control points, structural dimensions in plan, elevation, and cross-sectional views, and important component details. Plan view must be of sufficient channel length to show ELJ alignment with respect to the existing channel.

8) Fish Screen Design Plan Criteria

Data Requirements and Analysis

- Target species and life stages to be protected at proposed screening site (e.g. will steelhead fry be present?).
- Fish screen structure placement (e.g., on-stream, in-canal, in-reservoir, or pumped).
- Evidence of infeasibility for an on-stream screen if an in-canal or in-reservoir project is proposed.
- Applicable approach velocity and sweeping velocity criteria.
- Records of diversion flows and stream flows, including maximums and minimums, during irrigation season.
- Stream flow vs. depth rating curve at diversion intake.
- Water depth and approach velocity calculations in front of the fish screen throughout range of diversion flows.
- Sweeping velocity calculations at several locations along the length of the screen throughout range of diversion and bypass flows.

- Evidence that flow uniformity criterion will be met.
- Screen exposure time calculation.
- Velocity calculations between end of screen and bypass entrance.
- Flow depth calculations within bypass conduit and in stream at bypass outlet at minimum bypass flow.
- Velocity calculations in stream at bypass outlet.
- Drop height and impact velocity calculation at bypass outlet, if applicable.
- Estimated bypass flow needed to meet fish screen criteria (cuffs).
- Fish screen area calculation performed in accordance with CDFW Fish Screening Criteria (6/19/00).
- For paddle wheel driven cleaning systems, fish screen area calculations showing passive screening criteria are met when paddle wheel driven wipers no longer operate.
- Description of fish screen cleaning mechanism, including proposed frequency of cleaning.
- Description of fish screen openings, including porosity and dimensions of round, square, or slotted openings.
- Assessment of sediment transport/scour conditions at fish screen for on channel installations.
- Specific information describing the type of corrosion-resistant screening material, bypass control/pipe and other materials that will directly affect fish.
- Design drawings showing site topography, and dimensions of fish screen structure in plan, elevation, longitudinal profile, and cross-sectional views along with important component details. Drawings should show smooth joints at bypass pipe bends and screen faces flush with adjacent walls and/or piers.
- Any additional information which may be required to show that screen will meet current CDFW/NMFS screening criteria.
- Operation and maintenance plan which includes preventive and corrective maintenance procedures, inspection and reporting requirements, maintenance logs, etc.
- Post construction evaluation and monitoring plan.

Additional information can be found at:

- http://www.dfg.ca.gov/fish/Resources/Projects/Engin/Engin_ScreenCriteria.asp
- http://www.dfg.ca.gov/fish/REsources/HabitatManual.asp
  http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_screen_criteria_for_pumped_water_intakes.pdf
- http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_passage_design_criteria.pdf
- Fish Screening Criteria for Anadromous Salmonids National Marine Fisheries Service – Southwest Region. 1997

11) Bank Protection Design Plan Criteria

Data Requirements and Analysis (for projects that include bank protection)

- Calculation of design flow and 100-year flow,

- Water surface profiles and average channel velocities for design and 100-year flows,
- Geotechnical assessment may be necessary to ensure project design is structurally appropriate,
- Design calculations, i.e., shear stress, rock sizing; root strength and suitability of selected vegetation; and determination of spur, groin, bendway weir dimensions, spacing, angle, etc,
- Alternatives analysis and justification for using rock slope protection, and
- Design drawings showing site topography, control points, dimensions of the bank protection in plan, elevation, longitudinal profile, and cross-sectional views, and important component details, and planting plans.

12) Upslope Watershed Restoration

- All road decommissioning will be done in accordance with techniques described in the Handbook for Forest and Ranch Roads, (PWA, 1994c.) and Volume II, Part X of the Manual. All road upgrade and decommissioning sites and techniques shall be approved by the Grantor Project Manager before any equipment work takes place.
- All crossings treated in fish bearing reaches of streams will follow the National Marine Fisheries Service (NMFS 2001) Guidelines for Salmonid Passage at Stream Crossings and the criteria for adult and juvenile salmonid fish passage as described in Volume II, Part IX of the Manual.
- Seeding and mulching of all exposed soils shall be done for all slopes which may deliver sediment to a stream. Woody debris will be concentrated on finished slopes adjacent to stream crossings. The standard for success is 80% ground cover for broadcast planting of seed, after a period of three years. Mulching and seeding will take place as sites are completed to avoid unforeseen erosion. Planting of tree seedlings will take place after December 1 or when sufficient rainfall has occurred to insure the best chance of survival of the seedlings.
- Sites that are expected to erode and deliver sediment to the stream are the only locations where work will be authorized for reimbursement under the terms of this agreement. Reimbursement will not be authorized for work done to improve aesthetics only.
- The landowner or responsible party must sign an access agreement stating they agree to maintain the erosion control project for a period of not less than 10 years. Maintenance will consist of repair to the road or stream crossing to a level that will effectively reduce sediment from entering the stream. In the event of an act of nature which results in partial or complete failure of the project, the landowner or applicant will not be held responsible for costs incurred after the act of nature. Acts of nature include, but are not limited to floods, earthquakes, volcanic eruptions, and wind storms.

13) Riparian Habitat Restoration

For projects which result in disturbance within the riparian corridor or other hydrologically linked upland areas that may deliver sediment to a class I or II channel, the grantee will be required to replant disturbed and compacted areas with native plant species at a ratio of 2 plants to 1 plant removed. The species used should be in the composition that will result in mature riparian vegetation found in the region. Unless otherwise specified in the agreement, the standard

for success is 80% survival of plantings or 80% annual survival of ground cover for broadcast planting of seed after a period of three years. Exposed soils will be covered using CDFW approved techniques to prevent delivery of sediment to a stream (i.e., mulching/seeding).

Data Requirements and Analysis

19) Location of the restoration site(s): This section shall include a regional map, general map illustrating planting locations (polygons), location of any other existing or proposed restoration actions in the general vicinity, ownership information, and directions to the site.
20) Site suitability evaluation: This section shall provide the rationale behind selecting the restoration site including information on the soils, hydrology (including risk of scour by high flows, characterization of water table depths and water availability for irrigation if proposed), and native riparian species present at a nearby reference site(s). This information should be based on fieldwork completed during the planning and design phases for the project. Any reports, data, and other information that support site suitability decisions should be included in the plan.
21) Site preparation and installation methods: This section shall provide a description of the methods that will be used to install the plants with a detailed discussion of each plant species and type of planting stock (container, stem cutting, pole cutting, bare-root stock, etc.), time of the year when the planting will occur, planting densities based on plant type (e.g., trees, bushes, herbaceous, etc.), and any other pertinent information regarding implementation of the project. Any necessary site prep work (i.e., heavy equipment work, stabilization, soil work, etc.) shall be described in this section of the plan. Exposed soils should be appropriately covered to prevent delivery of sediment to a stream (i.e., mulching/seeding). Other restoration work to be completed during project implementation shall also be described in sufficient detail to allow for proper evaluation.
22) Materials: This section shall provide a list of appropriate successional stage native plant species, size of specimens for each species, number of plants, the source of plant materials, and fertilizers if any, for the project. Projects should use a composition of species that will result in mature riparian vegetation found in the region. Information regarding the need for plant protection and the materials necessary to accomplish protection shall be included. If fertilizer is proposed, discuss the rationale including the pros/cons of fertilizer use. If erosion control fabric and/or structures are proposed they are required to be and should be identified as plastic-free. Information regarding the prevention and spread of native plant diseases shall be included. Provide information on native riparian plant diseases, host plants, disease resistant plants and how these influenced selection of native plant species for the project.
23) Schematic: This section shall include a detailed planting design that depicts exactly where the plants will go in the restoration area. Include the number of plants and the species to be planted in each location, spacing between plants, and total acreage planned for revegetation. • Maintenance of plants: This section shall include a description of methods that will be used to maintain plants in good condition, control non-native vegetation, prevent plant disease, and prevent herbivory of the plantings, including a discussion of how maintenance actions will be triggered by changes in plant

health over time. If the planting will be irrigated, this section shall include an irrigation plan that includes the type of irrigation, the pros/cons of use, and the watering regime that will be used to successfully establish the plantings. The irrigation plan should be designed to discourage the growth of invasive plants while encouraging deep rooting of planted materials to ensure maximum survival following the plant establishment period.

24) Success criteria: This section shall include the performance criteria that will be used to evaluate project success. Performance criteria should be developed for species diversity, structural diversity, overall vegetative cover by species (if important) and how cover will be measured (absolute vs. relative), density (by species), plant vigor, and survivorship. In addition, intermediate thresholds (incremental progress toward performance criteria) should be developed in conjunction with an adaptive management plan that triggers remedial activities that would be implemented if intermediate thresholds were not being met. This will allow the revegetation specialist to increase the likelihood that performance criteria are met by the end of the monitoring period. Unless otherwise specified in the agreement, the standard for success is 80% survival of plantings or 80% annual survival of ground cover for broadcast planting of seed after a period of three years
25) Monitoring methods: This section shall include a detailed description of how the project will be monitored to evaluate whether performance criteria are being met. This section should include a detailed description of the methods used for data collection, sample size, data entry and storage, statistical analyses to be performed, photo point locations, and a description of the monitoring report format.
26) Adaptive management and contingency measures: This section shall describe the projects adaptive management strategies and what actions shall be implemented if the monitoring data indicates that the performance criteria may not be met. This section shall identify the party responsible for implementing remedial measures and the source(s) of funding to complete actions.

14) Water Conservation Measures

Data Requirements and Analysis

- Describe when and where flow is a limiting factor for anadromous fish; describe which life history stages are limited by flow; describe how much flow will be needed to improve growth, survival, adult migration and smelt outmigration.
- Describe any instream flow studies that have been conducted. Include a copy of the study in the Supplemental Information.
- Describe how the proposed project will result in water conservation that will directly benefit the anadromous fishery/stream ecosystem. Describe the amount of water that will be made available and how that water will address fish needs as measured by improvements to water quantity and quality (i.e., increased instream flow, expected change in temperature and chemistry) in relation to critical times of the year (i.e., improve conditions for migration, spawning or rearing). Be as specific as possible. For water quantity, state the expected range of additional yield over what reach(es) and season. For water quality, state which parameters and the expected range(s) of approved values over what reach(es) and season.

- Describe the reach of stream that will be enhanced by the proposed project (which might only extend downstream to the next diversion). If other diversions occur within the dedicated reach, describe how the project will be monitored to assure that the project is providing enhanced conditions and that flow remains in the system and is not being diverted by downstream users (i.e., existing restrictions on downstream users, agreements with adjacent landowners/water groups). Describe what entity will conduct the monitoring and any funding sources to assure that monitoring is completed.
- Start date of dedicated flow left instream, end date of dedicated flow left instream, and total number of days that flow was dedicated to instream use.
- Flow rate in cfs of water conserved (i.e., maintained in the stream), stream stage changes.
- If groundwater will be used as a substitute for the surface water being conserved, demonstrate that the water being pumped will not impact the project stream reach, and that the use of this groundwater will not result in a loss of surface water flow in the project river.
- Indicate type of required listed species surveys that will be performed and type of protocols to be used;
- If the project is identified in an assessment or recovery plan, provide the name of the plan/assessment, in the format: author, date, title, name, source, source address.
- Demonstrate a valid right for the water that is proposed for dedication, transfer or conservation by providing documentation of the type of water right held (e.g., claimed under pre-1914 appropriative or riparian rights, established through post-1914 appropriative rights, adjudicated water rights, etc.) and the volume of water the diversion is authorized to divert from the stream.
- Document the water right priority within the dedicated reach. Verify that 1) the water being proposed for conservation is senior enough to provide water for instream flow during the dedication period, and that 2) the conserved water will not be subsequently removed from the stream by either upstream water right holders, or downstream water rights holders within the dedicated reach.
- Based on the water right and its priority, describe any variances between the water right held and the amount of water realized as the result of higher priority water right use (such as when natural flows are insufficient to fulfill all of the existing appropriations in a particular year and the most junior (recent) water right holders must refrain from diversion until the rights of the senior holders are fulfilled).
- Validate the requested change in water right with the court and the State Water Resources Control Board (SWRCB) if the right is included in adjudication. Verify if a Supplemental Decree is required from the court.
- Water conservation projects that will utilize Chapter 10, Section 1707 of the California Water Code to dedicate the water conserved to instream beneficial use must describe how the 1707 dedication process will be accomplished as part of this project, including the data needed to apply for and successfully complete the transaction with the SWRCB (and the court if the dedicated water right has been adjudicated), how these data will be developed, and the time line estimated for the dedication process. An early consultation/coordination meeting with the SWRCB, and the CDFW Water Rights Coordinator in the region where the dedication will occur, will be necessary in order to accomplish this task.

- Describe all of the water right changes needed to implement the project and any communications or coordination with the SWRCB. Provide a copy of the SWRCB Petition for Change Involving Water Transfers - Instream Flow Dedication form and any supplemental documentation for water dedicated through the 1707 petition.
- For water conservation projects that utilize forbearance agreements or instream flow leases: Describe the local organization that will be responsible for developing the agreement and/or lease, and its experience and organizational capacity to develop such agreements and to coordinate post-project water monitoring and water use in the watershed.
- Water Use Verification: Include copies of all water right reports filed with the SWRCB (Initial and Supplemental Statements of Water Diversion and use, Progress Reports by Permittee, and Reports of Licensee), water master, or any other reporting entity for the last 5 year period. Provide sufficient information to confirm that pre-or post-1914 water rights remain valid and have not been subject to more than five years of consecutive non-use (Water Code section 1241). Use a spreadsheet to:
    - Document the quantity and seasonality of existing water use (including consumptive water use. If the 1707 petition includes a Section 1725 Petition for Temporary Transfer of Water/Water Rights, the water dedicated to instream flow will be limited to the amount of water that would have been stored or consumptively used);
    - Quantify the continuous rate of diversion (in cfs) as it occurs throughout the day for each day of diversion over the past 5 years and provide adequate documentation.
- For water right permit holders: If water has not been fully put to beneficial use, describe when the permit is scheduled to go to license or provide documentation of any Petition(s) for Extension of Time that have been filed.
- Provide an estimate of the water losses due to delivery/distribution inefficiencies such as evapotranspiration, conveyance losses, and/or percolation into the ground based on the amount of water diverted compared to the water realized for use at the point of delivery (record of use); and
- Identify any plans or programs for future water needs, and how this water will be obtained.

The applicant is proposing the following Business Management practices (BMPs):

- The application must include instream and ditch/pump hydraulic calculations showing there is sufficient head to divert maximum diversion flow and bypass flow at minimum stream flow considering head losses at flow measurement devices, fish screens, pipes, open ditches, and head gates.
- Measuring devices must be approved by Department of Water Resources (DWR) for watersheds with DWR water master service. Otherwise, measuring devices must conform to the 2001 Bureau of Reclamation Water Measurement Manual (BOR 2001).
- Design drawings must show structural dimensions in plan, elevation, longitudinal profile, and cross-sectional views along with important component details.
- All flows will be diverted around work areas as described in the biological opinion Section 1.3.4. *Fish Relocation and Dewatering Activities*.

- Fish removal may be required at project sites and BMPs are described in the biological opinion Section 1.3.4. *Fish Relocation and Dewatering Activities*.
- Riparian disturbance will be minimized as described in the Protection Measures. *Measures to Minimize Loss or Disturbance of Riparian Vegetation.*
- All water diversions will be screened in accordance with NMFS Southwest Region *Fish Screening Criteria for Salmonids* (NMFS 1997).
- For projects with piping, landowners will enter an agreement with NOAA Restoration Center (RC) or the Corps stating that they will maintain the pipe for at least 10 years.

5.2 Appendix B. CDFW Proposed Mitigation Measures for the FRGP

The following mitigation measures are described under the proposed action.

A. **General Measures for Protection of Biological Resources**

1) Timing To avoid impacts to aquatic habitat the activities carried out in the restoration program typically occur during the summer dry season where flows are low or streams are dry (Flosi *et al.* 2010; CSSHRM).

    a. Work around streams is restricted to the period of June 15 through November 1 or the first significant rainfall, whichever comes first (USACE, 2015; RGP 12). Actual project start and end dates, within this timeframe, are at the discretion of the Department of Fish and Wildlife (i.e., on the Shasta River projects must be completed between July 1 and September 15 to avoid impacts to immigrating and emigrating salmonids). This is to take advantage of low stream flow and avoid the spawning and egg/alevin incubation period of salmon and steelhead (CDFW, 2018; MND).

    b. Upslope work generally occurs during the same period as stream work. Road decommissioning and other sediment reduction activities are dependent on soil moisture content. Non jurisdictional upslope projects do not have seasonal restrictions in the Incidental Take Statement but work may be further restricted at some sites to allow soils to dry out adequately. In some areas equipment access and effectiveness is constrained by wet conditions (CDFW, 2018).
    c. The approved work window for individual work sites will be further constrained as necessary to avoid the nesting or breeding seasons of birds and terrestrial animals. At most sites with potential for raptor (including Northern Spotted Owls) and migratory bird nesting, if work is conditioned to start after July 9, potential impacts will be avoided and no surveys will be required. For work sites that might contain nesting Marbled Murrelets, the starting date will be September 16 in the absence of surveys. The work window at individual work sites could be advanced if surveys determine that nesting birds will not be impacted (USACE, 2015).
    d. For restoration work that may affect swallow nesting habitat (such as removal or modification of bridges, culverts or other structures that show evidence of past swallow nesting activities), construction shall occur after August 31 to avoid the swallow nesting period. Suitable nesting habitat shall be netted prior to the breeding season to prevent nesting. Netting shall be installed before any nesting activity begins, generally prior to March 1. Swallows shall be excluded from areas where construction activities cause nest damage or abandonment (USACE, 2015).
    e. All project activities shall be confined to daylight hours (USACE, 2015).

2) Projects shall not disturb or dewater more than 500 feet of contiguous stream reach (USACE, 2015).

3) During all activities at project work sites, all trash that may attract predators shall be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas (USACE, 2015 & USACE, 2014; RGP 78).

4) Staging/storage areas for equipment, materials, fuels, lubricants, and solvents, will be located outside of the stream's high water channel and associated riparian area where it cannot enter the stream channel. Stationary equipment such as motors, pumps, generators, compressors, and welders located within the dry portion of the stream channel or adjacent to the stream, will be positioned over drip-pans. Vehicles will be moved out of the normal high water area of the stream prior to refueling and lubricating. The grantee shall ensure that contamination of habitat does not occur during such operations. Prior to the onset of work, CDFW shall ensure that the grantee has prepared a plan to allow a prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur (USACE, 2015).

5) The number of access routes, number and size of staging areas, and the total area of the work site activity shall be limited to the minimum necessary to complete the restoration action while minimizing riparian disturbance without affecting less stable areas, which may increase the risk of channel instability. Existing roads shall be used to access work sites as much as practicable (USACE, 2015 & USACE, 2014).

6) The access and work area limits shall be identified with brightly colored flagging or fencing. Flagging and fencing shall be maintained in good repair for the duration of project activities. All areas beyond the identified work area limits shall not be disturbed (USACE, 2015).

7) Any construction debris shall be prevented from falling into the stream channel. Any material that does fall into a stream during construction shall be immediately removed in a manner that has minimal impact to the streambed and water quality (Flosi *et al.* 2010).

8) Where feasible, the construction shall occur from the bank, or on a temporary pad underlain with filter fabric. (Flosi *et al.* 2010).

9) Any work within the stream channel shall be performed in isolation from the flowing stream and erosion protection measures shall be in place before work begins (USACE, 2015).
    a. Prior to dewatering, the best means to bypass flow through the work area to minimize disturbance to the channel and avoid direct mortality of fish and other aquatic invertebrates shall be determined (Flosi *et al.* 2010).

b. If there is any flow when work will be done, the grantee shall construct cofferdams upstream and downstream of the excavation site and divert all flow from upstream of the upstream dam to downstream of the downstream dam (USACE, 2015).

c. No heavy equipment shall operate in the live stream, except as may be necessary to construct cofferdams to divert stream flow and isolate the work site (USACE, 2015).

d. Cofferdams may be constructed with clean river run gravel or sand bags, and may be sealed with sheet plastic. Upon project completion, sand bags and any sheet plastic shall be removed from the stream. Clean river run gravel may be left in the stream channel, provided it does not impede stream flow or fish passage, and conforms to natural channel morphology without significant disturbance to natural substrate (USACE, 2015).

e. Dewatering shall be coordinated with a qualified fisheries biologist to perform fish and wildlife relocation activities (Flosi *et al.* 2010).

f. The length of the dewatered stream channel and the duration of the dewatering shall be kept to a minimum (Flosi *et al.* 2010; see also USACE, 2015 & USACE 2014) and shall be expected to be less than 300 contiguous feet or 500 total feet per site (CDFW, 2018).

g. When bypassing stream flow around work area, stream flow below the construction site shall be maintained similar to the unimpeded flow at all times (Flosi *et al.* 2010).

h. The work area shall be periodically pumped dry of seepage. Pumps shall be placed in flat areas, away from the stream channel. Pumps shall be secured by tying off to a tree or staked in place to prevent movement by vibration. Pump intakes shall be covered with 0.125 inch mesh to prevent entrainment of fish or amphibians that failed to be removed. Pump intakes shall be periodically checked for impingement of fish or amphibians, and shall be relocated according to the approved measured outlined for each species bellow (Flosi *et al.* 2010).

i. If necessary, flow shall be diverted around the work site, either by pump or by gravity flow, the suction end of the intake pipe shall be fitted with fish screens meeting CDFW and NOAA criteria to prevent entrainment or impingement of small fish. Any turbid water pumped from the work site itself to maintain it in a dewatered state shall be disposed of in an upland location where it will not drain directly into any stream channel (USACE, 2015).

j. Fish shall be excluded from the work area by blocking the stream channel above and below the work area with fine-meshed net or screen. Mesh shall be no greater than 1/8-inch diameter. The bottom edge of the net or screen shall be completely

secured to the channel bed to prevent fish from reentering the work area. Exclusion screening shall be placed in areas of low water velocity to minimize fish impingement. Screens shall be regularly checked and cleaned of debris to permit free flow of water (USACE, 2015).

10) Where the disturbance to construct cofferdams to isolate the work site would be greater than to complete the action (for example, placement of a single boulder cluster), the action shall be carried out without dewatering and fish relocation. Furthermore, measures shall be put in place immediately downstream of the work site to capture suspended sediment. This may include installation of silt catchment fences across the stream, or placement of a filter berm of clean river gravel. Silt fences and other non-native materials will be removed from the stream following completion of the activity. Gravel berms may be left in the stream channel provided it does not impede stream flow or fish passage, and conforms to natural channel morphology without significant disturbance to natural substrate (USACE, 2015).

11) Best management practices associated with fish screens and measures to minimize effects to salmonids associated with fish screen construction, maintenance, and repair are presented below:

    a. Screening projects shall only take place on diversions with a capacity of 60 cfs or less. Screening larger diversions shall require separate consultation. Fish screens shall be operated and maintained in compliance with current law, including Fish and Game Code, and CDFW fish screening criteria (USACE, 2015).

    b. Notwithstanding Fish and Game Code section 6027, fish screens and bypass pipes or channels shall be in-place and maintained in working order at all times water is being diverted (Flosi *et al.* 2010).

    c. If a screen site is dewatered for repairs or maintenance when targeted fish species are likely to be present, measures shall be taken to minimize harm and mortality to targeted species resulting from fish relocation and dewatering activities. The responsible party shall notify CDFW before the project site is de-watered and streamflow diverted. The notification shall provide a reasonable time for personnel to supervise the implementation of a water diversion plan and oversee the safe removal and relocation of salmonids and other fish life from the project area. If the project requires site dewatering and fish relocation, the responsible party shall implement the dewatering and relocation measures as described in this document to minimize harm and mortality to listed species (Flosi *et al.* 2010).

    d. If a fish screen is removed for cleaning or repair, measures shall be undertaken to ensure juvenile fish are not passively entrained into the diversion canal. The area shall be isolated, cleared of fish, and dewatered prior to screen maintenance or replacement. If dewatering the work area is infeasible, then the area in front of the screen shall be cleared of fish utilizing a seine net that remains in place until the project is complete. In the case of a damaged screen, a replacement screen shall be

installed immediately or the diversion shut down until a screen is in place (Flosi *et al.* 2010 & USACE, 2015).

e. Fish screens shall be inspected and maintained regularly (not less than two times per week) to ensure that they are functioning as designed and meeting CDFW fish screening criteria. During the diversion season, screens shall be visually inspected while in operation to ensure they are performing properly. Outside the diversion season when the screening structure is dewatered, the screen and associated diversion structure shall be more thoroughly evaluated (Flosi *et al.* 2010 & USACE, 2015).

f. Existing roads shall be used to access screen sites with vehicles and/or equipment whenever possible. If it is necessary to create access to a screen site for repairs or maintenance, access points shall be identified at stable stream bank locations that minimize riparian disturbance. (Flosi *et al.* 2010).

g. Sediment and debris removal at a screen site shall take place as often as needed to ensure that screening criteria are met. Sediment and debris shall be removed and disposed at a location where it will not re-enter the water course (Flosi *et al.* 2010).

h. Stationary equipment used in performing screen maintenance and repairs, such as motors, pumps, generators, and welders, located within or adjacent to a stream shall be positioned over drip pans (Flosi *et al.* 2010).

i. Equipment which is used to maintain and/or repair fish screens shall be in good condition and checked and maintained on a daily basis to prevent leaks of materials that could be deleterious to aquatic life, wildlife, or riparian habitat (Flosi *et al.* 2010).

j. To the extent possible repairs to a fish screen or screen site shall be made during a period of time when the target species of fish are not likely to be present (for example, in a seasonal creek, repair work should be performed when the stream is dry) (Flosi *et al.* 2010).

k. Equipment used to maintain and/or repair fish screens shall not operate in a flowing stream except as may be necessary to construct cofferdams to divert stream flow and isolate the work site (Flosi *et al.* 2010).

l. Turbid water which is generated by screen maintenance or repair activities shall be discharged to an area where it will not re-enter the stream. If CDFW determines that turbidity/siltation levels resulting from screen maintenance or repair activities constitute a threat to aquatic life, all activities associated with the turbidity/siltation shall cease until effective CDFW-approved sediment control devices are installed and/or abatement procedures are implemented (Flosi *et al.* 2010).

m. Maintenance and repair of fish screens shall only take place during the dry season.

12) Any equipment entering the active stream (for example, in the process of installing a cofferdam) shall be preceded by an individual on foot to displace wildlife and prevent them from being crushed (USACE, 2015).

13) If any non-special status wildlife are encountered during the course of construction, said wildlife shall be allowed to leave the construction area unharmed, and shall be flushed, hazed, or herded in a safe direction away from the project site. “Special status wildlife” is defined as any species that meets the definition of “endangered, rare, or threatened species” in section 15380, article 20 in Title 14 of the California Code of Regulations, also known as the “CEQA Guidelines” (USACE, 2015).

14) Any red tree vole nests encountered at a work site shall be flagged and avoided during construction (USACE, 2015).

15) For any work sites containing western pond turtles, salamanders, foothill yellow-legged frogs, California red-legged frogs, or tailed frogs, the grantee shall provide to the CDFW grant manager for review and approval, a list of the exclusion measures that will be used at their work site to prevent take or injury to any individual pond turtles, salamanders, or frogs that could occur on the site. The grantee shall ensure that the approved exclusion measures are in place prior to construction. Any turtles or frogs found within the exclusion zone shall be moved to a safe location upstream or downstream of the work site, prior to construction (USACE, 2015).

16) All habitat improvements shall be done in accordance with techniques in the California Salmonid Stream Habitat Restoration Manual. The most current version of the manual is available at: http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp (CDFW, 2018).

17) The grantee shall have dependable radio or phone communication on-site to be able to report any accidents or fire that might occur (USACE, 2015).

18) Installation of bridges, culverts, or other structures shall be done so that water flow is not impaired and upstream and downstream passage of fish is assured at all times. Bottoms of temporary culverts shall be placed at or below stream channel grade (USACE, 2015).

19) Temporary fill shall be removed in its entirety prior to close of work-window (Flosi *et al.* 2010).

B. Specific Measures for Endangered, Rare, or Threatened Species That Could Occur at Specific Work Sites

1) Rare Plants

The work sites for the 2018 FHR project are within the range of a variety of rare plant species. The plant species found on a State or Federal special status list that might be associated with the 2018 FHR project, was determined from a search of CDFW's Natural Diversity Database. Because of the large number of widely scattered work sites proposed, it is not feasible to survey individual work sites in advance and still be able to implement the restoration projects, due to time limits on the availability of restoration funds. Lists of special status plant species that might occur at individual work sites are presented in Appendix A. Past experience with grant projects from previous years has shown that the potential for adverse impacts on rare plants at salmonid restoration work sites is very low. Few sites surveyed for rare plants between 1999 and 2012 were found to have rare plant colonies; disturbance of rare plants was avoided in all cases. In order to avoid impacts to rare plants during the 2018 FHR project, the following mitigation measures will be implemented:

a. A qualified biological consultant shall survey all work sites for rare plants prior to any ground disturbing activities. Rare plant surveys will be conducted following the "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" (CDFW, 2018). These guidelines are available in Appendix C or on the web at: https://www.wildlife.ca.gov/Conservation/Plants (USACE, 2015).

b. If any special status plant species are identified at a work site, CDFW shall require one or more of the following protective measures to be implemented before work can proceed (USACE, 2015):
    i. Fencing to prevent accidental disturbance of rare plants during construction,
    ii. On-site monitoring by a qualified biologist during construction to assure that rare plants are not disturbed, or
    iii. Redesign of proposed work to avoid disturbance of rare plants.

a. Plant surveys will also include any host plants for butterflies identified as occurring in the area either in the CNDDB or the official species list. These host plants are as follows for each butterfly (USACE, 2015):

Butterfly	Host Plant
Mission Blue Butterfly (*Icaricia icarioides missionensis*) - Endangered	Silver Bush Lupine (*Lupinus albifrons*)
San Bruno Elfin Butterfly (*Callophrys mossii bayensis*) - Endangered	Stonecrop (*Sedum spathulifolium*)
Callippe Silverspot Butterfly (*Speyeria callippe callippe*) - Endangered	Johnny Jump Up (*Viola pedunculata*)
Myrtle's Silverspot (*Speyeria zerene myrtleae*) - Endangered	Hookedspur Violet (*Viola adunca*)
Bay Checkerspot Butterfly (*Euphydryas editha bayensis*) - Threatened	Native Plantain (*Plantago erecta*)

1. If any host plant species are identified at a work site, CDFW shall require one or more of the following protective measures to be implemented before work can proceed:

    a. Fencing to prevent accidental disturbance of larval host plants during construction,

    b. On-site monitoring by a qualified biologist during construction to assure that larval host plants are not disturbed, and

    c. Redesign of proposed work to avoid disturbance of larval host plants.

2. If it becomes impossible to implement the project at a work site without impacts to larval host plants, then activity at that work site shall not proceed (USACE, 2015). If it becomes impossible to implement the project at a work site without potentially significant impacts to rare plants, then activity at that work site shall be discontinued (CDFW, 2018).

3. CDFW shall ensure that the grantee or responsible party is aware of these site-specific conditions, and shall inspect the work site before, during, and after completion of the action item (USACE, 2015).

C. **Riparian and re-vegetation**

1) Planting of seedlings shall begin after December 1, or when sufficient rainfall has occurred to ensure the best chance of survival of the seedlings, but in no case after April 1 (CDFW, 2018).

2) Any disturbed banks shall be fully restored upon completion of construction. Revegetation shall be done using native species. Planting techniques can include seed casting, hydroseeding, or live planting methods using the techniques in Volume II, Part XI of the California Salmonid Stream Habitat Restoration Manual (CDFW, 2018).

3) Disturbed and compacted areas shall be re-vegetated with native plant species. The species shall be comprised of a diverse community structure that mimics the native riparian corridor. Planting ratio shall be 2:1 (two plants to every one removed) (CDFW, 2018).

4) Unless otherwise specified, the standard for success is 80 percent survival of plants or 80 percent ground cover for broadcast planting of seed after a period of 3 years (CDFW, 2018).

5) To ensure that the spread of introduction of invasive exotic plants shall be avoided to the maximum extent possible, equipment shall be cleaned of all dirt, mud, and plant material prior to entering a work site. When possible, invasive exotic plants at the work site shall be removed. Areas disturbed by project activities will be restored and planted with native plants. (CDFW, 2018).

6) Mulching and seeding shall be done on all exposed soil which may deliver sediment to a stream. Soils exposed by project operations shall be mulched to prevent sediment runoff and transport. Mulches shall be applied so that not less than 90% of the disturbed areas are covered. All mulches, except hydro-mulch, shall be applied in a layer not less than two (2) inches deep. Where feasible, all mulches shall be kneaded or tracked-in with track marks parallel to the contour, and tackified as necessary to prevent excessive movement. All exposed soils and fills, including the downstream face of the road prism adjacent to the outlet of culverts, shall be reseeded with a mix of native grasses common to the area, free from seeds of noxious or invasive weed species, and applied at a rate which will ensure establishment (Flosi *et al.* 2010 & CDFW PSN 2018).

7) If erosion control mats are used in re-vegetation, they shall be made of material that decomposes. Erosion control mats made of nylon plastic, or other non-decomposing material shall not be used (CDFW, 2018).

8) CDFW shall retain as many trees and brush as feasible, emphasizing shad producing and bank stabilizing trees and brush to minimize impacts to the riparian corridor (Flosi *et al.* 2010).

9) If riparian vegetation is to be removed with chainsaws, the grantee shall use saws that operate with vegetable-based bar oil when possible (Flosi *et al.* 2010).

10) Disturbed and decompacted areas shall be re-vegetated with native species specific to the project location that comprise a diverse community of woody and herbaceous species (Flosi *et al. 2010*).

D. Cultural Resources

Ground-disturbance will be required to implement the project at certain locations that, despite efforts to identify cultural resources, have the potential to affect these resources. The procedure for a programmatic evaluation of archeological resources is provided in Appendix E. Potential for inadvertent impacts will be avoided through implementation of the following mitigation measures (CDFW, 2018):

1) The grantee shall contract with an archaeologist(s) or other historic preservation professional that meets The Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61, and 48 FR 44716) to complete cultural resource surveys at any sites with the potential to be impacted prior to any ground disturbing activities. This work may be augmented with the aid of a Native American cultural resources specialist that is culturally affiliated with the project area. Cultural and paleontological resource surveys shall be conducted using standard protocols to meet CEQA Guideline requirements. Paleontological survey protocols are listed in Appendix D.

2) If cultural and/or paleontological resource sites are identified at a project location, CDFW will require one or more of the following protective measures to be implemented before work can proceed: a) fencing to prevent accidental disturbance of cultural resources during construction, b) on-site monitoring by cultural and/or paleontological resource professionals during construction to assure that cultural resources are not disturbed, c) redesign of proposed work to avoid disturbance of cultural resources.

3) The grantee shall report any previously unknown historic, archeological, and paleontological remains discovered at a project location to CDFW for reporting to the Corps as required in the RGP.

4) CDFW shall ensure that the grantee or responsible party is aware of these site specific conditions, and shall inspect the work site before, during, and after completion of the action item.

5) Inadvertent Discovery of Cultural Resources – If cultural resources, such as lithic debitage, ground stone, historic debris, building foundations, or bone, are discovered during ground-disturbance activities, work shall be stopped within 30 meters (66 feet) of the discovery, per the requirements of CEQA (January 1999 Revised Guidelines, Title 14 CCR 15064.5 (f)). Work near the archaeological finds shall not resume until an archaeologist that meets the Secretary of the Interior's Standards and Guidelines suited to the discovery, has evaluated the

materials and offered recommendations for further action. Cultural materials not associated with human interments shall be documented and curated in place.

6) Inadvertent Discovery of Human Remains – if human remains are discovered during project construction, work shall stop at the discovery location, within 20 meters (66 feet), and any nearby area reasonable suspected to overlie adjacent to human remains (Public Resources Code, Section 7050.5). The county coroner shall be contacted to determine if the cause of death must be investigated. If the coroner determines that the remains are of Native American origin, it is necessary to comply with state laws relating to the disposition of Native American burials, which fall within the jurisdiction of the Native American heritage Commission (NAHC) (Public Resources Code, Section 5097). The coroner will contact the NAHC. The descendants or most likely descendants of the deceased will be contacted, and work shall not resume until they have made a recommendation to the landowner or the person responsible for the excavation work for means of treatment and disposition, with appropriate dignity, of the human remains and any associated grave goods, as provided in Public Resources Code, Section 5097.98.

7) Procedures for treatment of an inadvertent discovery of human remains:

    a) Immediately following discovery of known or potential human remains all ground-disturbing activities at the point of discovery shall be halted.
    b) No material remains shall be removed from the discovery site, a reasonable exclusion zone shall be cordoned off.
    c) The CDFW Grant Manager and property owner shall be notified and the CDFW Grant Manager shall contact the county coroner.
    d) The grantee shall retain the services of a professional archaeologist to immediately examine the finds and assist the process.
    e) All ground-disturbing construction activities in the discovery site exclusion area shall be suspended.
    f) The discovery site shall be secured to protect the remains from desecration or disturbance, with 24-hour surveillance, if prudent.
    g) Discovery of Native American remains is a very sensitive issue, and all project personnel shall hold any information about such a discovery in confidence and divulge it only on a need-to-know basis, as determined by the CDFW.
    h) The coroner has two working days to examine the remains after being notified. If the remains are Native American, the coroner has 24 hours to notify the NAHC in Sacramento (telephone 916/653-4082).
    i) The NAHC is responsible for identifying and immediately notifying the Most Likely Descendant (MLD) of the deceased Native American.
    j) The MLD may, with the permission of the landowner, or their representative, inspect the site of the discovered Native American remains and may recommend to the landowner and CDFW Grant Manager means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment with 48 hours of being granted access to the site (Public Resource Code, Section 5097.98(a)). The

recommendation may include the scientific removal and non-destructive or destructive analysis of human remains and items associated with Native American burials.

k) Whenever the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner or his/her authorized representative rejects the recommendation of the MLD and mediation between the parties by the NAHC fails to provide measures acceptable to the landowner, the landowner or his/her authorized representatives shall re-inter the human remains and associated grave offerings with appropriate dignity on the property in a location not subject to further subsurface disturbance in accordance with Public Resource Code, Section 5097.98(e).

l) Following final treatment measures, CDFW shall ensure that a report is prepared that describes the circumstances, nature and location of the discovery, its treatment, including results of analysis (if permitted), and final disposition, including a confidential map showing the reburial location. Appended to the report shall be a formal record about the discovery site prepared to current California standards on DPR 523 form(s). CDFW shall ensure that report copies are distributed to the appropriate California Historic Information Center, NAHC, and MLD.

8) Pursuant to RGP78 and in accordance to 36 C.F.R. Section 800.13, in the event of any discovery during construction of human remains, archeological deposits, or any other type of historic property, CDFW shall notify the Corps archeological staff (Steve Dibble at 213-452-3849 or John Killeen at 213-452-3861) within 24 hours. Construction work shall be suspended immediately and shall not resume until the Corps re-authorized project construction.

9) If it becomes impossible to implement the project at a work site without disturbing cultural or paleontological resources, then activity at that work site shall be discontinued.

E. Geology and Soils

There is no potential for a significant adverse impact to geology and soils; implementation of the restoration project will contribute to an overall reduction in erosion and sedimentation. Existing roads will be used to access work sites. Ground disturbance at most work sites will be minimal, except for road improvements or decommissioning. Road improvements and decommissioning will involve moving large quantities of soil from road fills and stream crossings to restore historic land surface profiles and prevent chronic erosion and sediment delivery to streams. In order to avoid temporary increases in surface erosion, the following mitigation measures will be implemented (CDFW, 2018):

1) CDFW will implement the following measures to minimize harm to listed salmonids resulting from culvert replacement activities and other instream construction work:
    i) All stream crossing replacement or modification designs, involving fish passage, shall be reviewed and approved by NOAA (or CDFW) engineers prior to onset of work.

    ii) If the stream in the project location was not passable to, or was not utilized by all life stages of, all covered salmonids prior to the existence of the road crossing, the project shall pass the life stages and covered salmonid species that historically did pass there.

Retrofit culverts shall meet the fish passage criteria for the passage needs of the listed species and life stages historically passing through the site prior to the existence of the road crossing.

2) CDFW shall implement the following measures to minimize harm to listed salmonids resulting from road decommissioning activities:

    i) Woody debris will be concentrated on finished slopes of decommissioned roads adjacent to stream crossings to reduce surface erosion; contribute to amounts of organic debris in the soil; encourage fungi; provide immediate cover for small terrestrial species; and to speed recovery of native forest vegetation.

    ii) Work sites shall be winterized at the end of each day to minimize the eroding of unfinished excavations when significant rains are forecasted. Winterization procedures shall be supervised by a professional trained in erosion control techniques and involve taking necessary measures to minimize erosion on unfinished work surfaces. Winterization includes the following: smoothing unfinished surfaces to allow water to freely drain across them without concentration or ponding; compacting unfinished surfaces where concentrated runoff may flow with an excavator bucket or similar tool, to minimize surface erosion and the formation of rills; and installation of culverts, silt fences, and other erosion control devices where necessary to convey concentrated water across unfinished surfaces, and trap exposed sediment before it leaves the work site.

3) Effective erosion control measures shall be in-place at all times during construction. Construction within the 5-year floodplain shall not begin until all temporary erosion controls (i.e., straw bales, or silt fences that are effectively keyed-in) are in place down slope or down stream of project activities within the riparian area. Erosion control measures shall be maintained throughout the construction period. If continued erosion is likely to occur after construction is completed, then appropriate erosion prevention measures shall be implemented and maintained until erosion has subsided.

4) An adequate supply of erosion control materials (gravel, straw bales, shovels, etc.) shall be maintained onsite to facilitate a quick response to unanticipated storm events or emergencies.

5) Use erosion controls that protect and stabilize stockpiles and exposed soils to prevent movement of materials. Use devices such as plastic sheeting held down with rocks or sandbags over stockpiles, silt fences, or berms of hay bales, to minimize movement of exposed or stockpiled soils (Flosi *et al.* 2010).

6) When needed, instream grade control structures shall be utilized to control channel scour, sediment routing, and headwall cutting (Flosi *et al.* 2010).

7) Temporary stockpiling of excavated material shall be minimized. However, excavated material shall be stockpiled in areas where it cannot enter the stream channel. Available sites at or near the project location shall be determined prior to the start of construction. If

feasible, topsoil shall be conserved for reuse at project location or use in other areas (Flosi *et al.* 2010).

8) For projects located within the Corps San Francisco District, an annual limit on the number of sediment-producing projects per HUC 10 watershed shall be implemented to ensure that potential sediment impacts will remain spatially isolated, thus minimizing cumulative turbidity effects. Sediment producing projects include instream habitat improvement, instream barrier removal, stream bank stabilization, fish passage improvement, upslope road work, and fish screen construction (unless the screen is located in a diversion ditch and is disconnected from the waterway). The limit of projects shall be as follows (USACE, 2015).

Square mile of HUC 10 watershed	Maximum number of instream and upslope projects per year
<50	2
51-100	3
101-150	4
151-250	5
251-350	6
351-500	9
>500	12

9) Each year, all instream projects shall be separated both upstream and downstream from other proposed instream projects by at least 1500 linear feet in fish bearing stream reaches. In non-fish bearing reaches, the distance separating sediment-producing projects will be 500 feet (CDFW, 2018).

10) Upon project completion, all exposed soil present in and around the project site shall be stabilized within 7 days. Soils exposed by project operations shall be mulched to prevent sediment runoff and transport. Mulches shall be applied so that not less than 90% of the disturbed areas are covered. All mulches, except hydro-mulch, shall be applied in a layer not less than two (2) inches deep. Where feasible, all mulches shall be kneaded or tracked-in with track marks parallel to the contour, and tackified as necessary to prevent excessive movement. All exposed soils and fills, including the downstream face of the road prism adjacent to the outlet of culverts, shall be reseeded with a mix of native grasses common to the area, free from seeds of noxious or invasive weed species, and applied at a rate which will ensure establishment (CDFW, 2018).

11) Soil compaction shall be minimized by using equipment with a greater reach or that exerts less pressure per square inch on the ground, resulting in less overall area disturbed and less compaction of disturbed areas (Flosi *et al.* 2010).

12) Disturbed soils shall be decompacted at project completion as heavy equipment exits the construction area (Flosi *et al. 2010*.)

13) At the completion of the project, soil compaction that is not an integral element of the design of a crossing should be de-compacted (CDFW, 2018).

F. Hazards and Hazardous Materials

The project will not create a significant hazard to the public or the environment. At work sites requiring the use of heavy equipment, there is a small risk of an accident upsetting the machine and releasing fuel, oil, and coolant, or of an accidental spark from equipment igniting a fire. The potential for these impacts will be reduced to a less than significant level through implementation of the following mitigation measures (CDFW, 2018):

1) Heavy equipment that will be used in these activities will be in good condition and will be inspected for leakage of coolant and petroleum products and repaired, if necessary, before work is started.

2) When operating vehicles in wetted portions of the stream channel, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, the responsible party shall, at a minimum, do the following:

    i) Check and maintain on a daily basis any vehicles to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life, wildlife, or riparian habitat;

    ii) Take precautions to minimize the number of passes through the stream and to avoid increasing the turbidity of the water to a level that is deleterious to aquatic life; and

    iii) Allow the work area to "rest" to allow the water to clear after each individual pass of the vehicle that causes a plume of turbidity above background levels, resuming work only after the stream has reached the original background turbidity levels.

3) All equipment operators shall be trained in the procedures to be taken should an accident occur. Prior to the onset of work, CDFW shall ensure that the grantee has prepared a Spill Prevention/Response plan to help avoid spills and allow a prompt and effective response should an accidental spill occur. All workers shall be informed of the importance of preventing spills. Operators shall have spill clean-up supplies on site and be knowledgeable in their proper deployment (USACE, 2015 & Flosi *et al.* 2010).

4) All activities performed in or near a stream will have absorbent materials designed for spill containment and cleanup at the activity site for use in case of an accidental spill. In an event of a spill, work shall cease immediately. Clean-up of all spills shall begin immediately (Flosi *et al.* 2010). The responsible party shall notify the State Office of Emergency Services at 1-800-852-7550 and CDFW immediately after any spill occurs, and shall consult with CDFW regarding clean-up procedures (CDFW, 2018).

5) All fueling and maintenance of vehicles and other equipment and staging areas shall occur at least 65 feet from any riparian habitat or water body and place fuel absorbent mats under pump while fueling. The Corps and CDFW will ensure contamination of habitat does not

occur during such operations. Prior to the onset of work, CDFW will ensure that the grantee has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur (USACE, 2015 & CDFW, 2018).

6) Location of staging/storage areas for equipment, materials, fuels, lubricants, and solvents, will be located outside of the stream's high water channel and associated riparian area. The number of access routes, number and size of staging areas, and the total area of the work site activity shall be limited to the minimum necessary to complete the restoration action. To avoid contamination of habitat during restoration activities, trash will be contained, removed, and disposed of throughout the project (USACE, 2015).

7) Petroleum products, fresh cement, and other deleterious materials shall not enter the stream channel (Flosi *et al.* 2010).

8) Stationary equipment such as motors, pumps, generators, compressors, and welders, located within the dry portion of the stream channel or adjacent to the stream, will be positioned over drip-pans (CDFW, 2018).

9) No debris, soil, silt, sand, bark, slash, spoils, sawdust, rubbish, cement, concrete or washings thereof, asphalt, paint, or other coating material; oil or petroleum products; or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into waters of the state. When operations are completed, any excess materials or debris shall be removed from the work area and disposed of in a lawful manner (Flosi *et al.* 2010).

10) All internal combustion engines shall be fitted with spark arrestors (CDFW, 2018).

11) The grantee shall have an appropriate fire extinguisher(s) and firefighting tools (shovel and axe at a minimum) present at all times when there is a risk of fire (CDFW, 2018).

12) Vehicles shall not be parked in tall grass or any other location where heat from the exhaust system could ignite a fire (CDFW, 2018).

13) The grantee shall follow any additional rules the landowner has for fire prevention (CDFW, 2018).

14) The potential for mercury contamination is largely predicted by the presence of historic hydraulic gold mines and mercury (cinnabar) mines (California's Abandoned Mines: A Report on the Magnitude and Scope of the Issue in the State, DOC 2000). Therefore, only a few limited areas within the geographic scope of this grant program have any potential for gravels contaminated with elemental mercury, they are: Middle Klamath River, Salmon River, Scott River, and the Lower, Middle and Upper Trinity River. (Though studies by USGS failed to find significant levels of methyl mercury near these mines) (CDFW, 2018).

i) Given the limited geographical potential for encountering mercury contamination (from historic mining) within the geographic scope, and the limited number of projects within these areas that will either disturb the channel bottom or import gravels for instream restoration; the following avoidance and mitigation measures will be adhered to: any gravel imported from offsite shall be from a source known to not contain historic hydraulic gold mine tailings, dredger tailings, or mercury mine waste or tailings (CDFW, 2018).

G. Hydrology and Water Quality

1) Instream work shall be conducted during the period of lowest flow (Flosi *et al.* 2010).

2) Before work is allowed to proceed at a site, CDFW shall inspect the site to assure that turbidity control measures are in place (CDFW, 2018).

3) The wastewater from construction area shall be discharged to an upland location where it will not drain sediment-laden water back to stream channel (Flosi *et al.* 2010).

4) For projects within the Corps San Francisco District, if instream work liberates a sediment wedge, 80% of the wedge shall be removed before the sediment is liberated. The require amount can be modified if NOAA or CDFW hydrologists or hydraulic engineers agree that removing a smaller amount will better protect and enhance fish habitat in the area of the project (e.g., leaving some sediment to replenish areas downstream that lack suitable substrate volume or quality) (USACE, 2015).

5) To control erosion during and after project implementation, CDFW shall implement best management practices, as identified by the appropriate Regional Water Quality Control Board (USACE, 2015).

6) Sediment-laden water caused by construction activity shall be filtered before it leaves the right-of-way or enters the stream network or an aquatic resource area. Silt fences or other detention methods shall be installed as close as possible to culvert outlets to reduce the amount of sediment entering aquatic systems (CDFW, 2018).

7) If CDFW determines that turbidity/siltation levels resulting from an activity or activities constitute a threat to aquatic life, all activities associated with the turbidity/siltation shall cease until effective CDFW approved sediment control devices are installed and/or abatement procedures are implemented (CDFW, 2018).

8) Poured concrete shall be excluded from the wetted channel for a period of two weeks after it is poured. During that time the poured concrete shall be kept moist, and runoff shall not be allowed to enter flowing stream. Commercial sealants shall be applied to the poured concrete surface where concrete cannot be excluded from the stream flow for two weeks. If sealant is used, water shall be excluded from the site until the sealant is dry (CDFW, 2018).

9) Prior to use, all equipment shall be cleaned to remove external oil, grease, dirt, or mud. Wash sites shall be located in upland locations so that dirty wash water does not flow into the stream channel or adjacent wetlands (Flosi *et al.* 2010).

10) Water conservation projects that include water storage tanks and a Forbearance Agreement, for the purpose of storing winter water for summer use, require registration of water use pursuant to the Water Code §1228.3, and require consultation with CDFW and compliance with all lawful conditions required by CDFW. Diversions to fill storage facilities during the winter and spring months shall be made pursuant to a Small Domestic Use Appropriation (SDU) filed with the State Water Resources Control Board (SWRCB). CDFW will review the appropriation of water to ensure fish and wildlife resources are protected. The following conditions shall then be applied (CDFW, 2018):

    i) Seasonal Restriction: No pumping is allowed when stream flow drops below 0.7 cubic feet per second (cfs) except as permitted by CDFW in the event of an emergency.

    ii) Bypass Flows: Pumping withdrawal rates shall not exceed 5% of stream flow. If CDFW determines that the streamflow monitoring data indicate that fisheries are not adequately protected, then the bypass flows are subject to revision by CDFW.

    iii) Cumulative Impacts: Pumping days shall be assigned to participating landowner(s) when stream flows drop below 1.0 cfs to prevent cumulative impacts from multiple pumps operating simultaneously.

    iv) Pump Intake Screens: Pump intake screens shall comply with the "2000 California Department of Fish and Game Screening Criteria"* for California streams that provide habitat for juvenile Coho Salmon, Chinook Salmon, and steelhead trout. The landowner shall be responsible for annual inspection and maintenance of screens. Additionally, the landowner shall be responsible for cleaning screens as needed to keep them free of debris and ensure that screen function complies with the criteria specifications.

    v) These conditions do not authorize incidental take of any species, removal of riparian vegetation, or bed, bank, or channel alteration.

    CDFW shall be granted access to inspect the pump system. Access is limited to the portion of the landowner's real property where the pump is located and those additional portions of the real property which must be traversed to gain access to the pump site. Landowners shall be given reasonable notice and any necessary arrangements will be made prior to requested access including a mutually-agreed-upon time and date. Notice may be given by mail or by telephone with the landowner or an authorized representative of the landowner. The landowner shall agree to cooperate in good faith to accommodate CDFW access.

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* Fish Screening Criteria are from "State of California Resources Agency Department of Fish and Game Fish Screening Criteria, June 19, 2000." The "approach velocity" shall be calculated according to Section 2C "Screens which are not Self Cleaning."

H. Transportation/Traffic

The Project will not affect transportation/traffic, because erosion control and culvert replacement projects will occur in wildland/rural sites with very little use. There is a potential that culvert replacement at some work sites could temporarily interfere with emergency access. This potential impact will be avoided through implementation of the following mitigation measure at any sites where emergency access. This potential impact will be avoided through implementation of the following mitigation measure at any sites where emergency access might be necessary (CDFW, 2018):

1) During excavation for culvert replacement, the grantee shall provide a route for traffic around or through the construction site.

I. Specific Measures for *Oncorhynchus mykiss* (steelhead trout) That Could Occur at Specific Work Sites

While all the work proposed under this program will enhance habitat for the species, work sites proposed for projects could involve instream work in their habitat. In order to avoid any potential for negative impacts to the species, the following measures will be implemented (CDFW, 2018; see also Flosi *et al.* 2010, USACE, 2015 & USACE, 2014):

1) Project work within the wetted stream shall be limited to the period between June 15 and November 1, or the first significant rainfall, or whichever comes first. This is to take advantage of low stream flows and to avoid the spawning and egg/alevin incubation period of salmon and steelhead trout. Actual project start and end, within this timeframe, are at the discretion of the Department of Fish and Wildlife (i.e., on the Shasta River, projects must be completed between July 1 and September 15 to avoid impacts to immigrating and emigrating salmonids). Whenever possible, the work period at individual sites shall be further limited to entirely avoid periods when salmonids are present (for example, in a seasonal creek, work will be confined to the period when the stream is dry).

2) Suitable large woody debris removed from fish passage barriers that is not used for habitat enhancement, shall be left within the riparian zone so as to provide a source for future recruitment of wood into the stream, reduce surface erosion, contribute to amounts of organic debris in the soil, encourage fungi, provide immediate cover for small terrestrial species and to speed recovery of native vegetation.

3) Prior to dewatering a construction site, fish and amphibian species shall be captured and relocated by CDFW personnel (or designated agents). The following measures shall be taken to minimize harm and mortality to listed salmonids resulting from fish relocation and dewatering activities:

    a) Fish relocation and dewatering activities shall only occur between June 15 and November 1 of each year.

b) Fish relocation shall be performed by a qualified fisheries biologist, with all necessary State and Federal permits. Captured fish shall be moved to the nearest appropriate site outside of the work area. A record shall be maintained of all fish rescued and moved. The record shall include the date of capture and relocation, the method of capture, the location of the relocation site in relation to the project site, and the number and species of fish captured and relocated. The record shall be provided to CDFW within two weeks of the completion of the work season or project, whichever comes first.

c) Electrofishing shall be conducted by properly trained personnel following NOAA *Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act*, June 2000.

d) Prior to capturing fish, the most appropriate release location(s) shall be determined. The following shall be determined:
   i) Temperature: Water temperature shall be similar as the capture location.
   ii) Habitat: There shall be ample habitat for the captured fish.
   iii) Exclusions from work site: There shall be a low likelihood for the fish to reenter the work site or become impinged on exclusion net or screen.
   iv) The most efficient method for capturing fish shall be determined by the biologist. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrating by pumping-down the pool and then seining or dip netting fish.
   v) Handling of salmonids shall be minimized. However, when handling is necessary, always wet hands or nets prior to touching fish.
   vi) Temporarily hold fish in cool, shaded, aerated water in a container with a lid. Provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise do not remove fish from this container until time of release.
   vii) Air and water temperatures shall be measured periodically. A thermometer shall be placed in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds 18° C, fish shall be released and rescue operations ceased.
   viii) Overcrowding in containers shall be avoided by having at least two containers and segregating young-of-year (YOY) fish from larger age-classes to avoid predation. Larger amphibians, such as Pacific giant salamanders, shall be placed in the container with larger fish. If fish are abundant, the capturing of fish and amphibians shall cease periodically and shall be released at the predetermined locations.
   ix) Species and year-class of fish shall be visually estimated at time of release. The number of fish captured shall be counted and recorded. Anesthetization of measuring fish shall be avoided.
   x) If feasible, initial fish relocation efforts shall be performed several days prior to the start of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional electrofishing passes immediately prior to construction. In many instances, additional fish will be captured that eluded the previous day's efforts.

xi) If mortality during relocation exceeds three percent, capturing efforts shall be stopped and the appropriate agencies shall be contacted immediately.
xii) In regions of California with high summer temperatures, relocation activities shall be performed in the morning when the temperatures are cooler.
xiii) CDFW shall minimize the amount of wetted stream channel that is dewatered at each individual project site to the fullest extent possible.

xiv) Additional measures to minimize injury and mortality of salmonids during fish relocation and dewatering activities shall be implemented as described in Volume II, Part IX, pages 52 and 53 of the *California Salmonid Stream Habitat Restoration Manual.*

e) If these mitigation measures cannot be implemented, or the project actions proposed at a specific work site cannot be modified to prevent or avoid potential impacts to anadromous salmonids or their habitat, then activity at that work site shall be discontinued.

J. Additional Minimization Measures

1) Prior to dewatering a construction site, fish and amphibian species should be captured and relocated to avoid direct mortality and minimize take. This is especially important if listed species are present within the project site. The following measures are consistent with those defined as *reasonable and prudent* by NOAA for projects concerning several Northern California Evolutionary Significant Units for Coho Salmon, Chinook Salmon, and steelhead trout (Flosi *et al.* 2010).

2) Fish relocation activities must be performed only by qualified fisheries biologist, with a current CDFW collectors permit, and experience with fish capture and handling. Check with a CDFW biologist for assistance (Flosi *et al.* 2010).

3) In regions of California with high summer air temperatures, perform relocation activities during morning periods (Flosi *et al.* 2010).

4) Periodically measure air and water temperatures. Cease activities when water temperatures exceed temperatures allowed by DFG and NOAA (Flosi *et al.* 2010).

5) Exclude fish from re-entering work area by blocking the stream channel above and below the work area with fine-meshed net or screens. Mesh should be no greater than 1/8 inch. It is vital to completely secure bottom edge of net or screen to channel bed to prevent fish from re-entering work area. Exclusion screening should be placed in areas of low water velocity to minimize impingement of fish. Screens should be checked periodically and cleaned of debris to permit free flow of water (Flosi *et al.* 2010).

6) Prior to capturing fish, determine the most appropriate release location(s). Consider the following when selecting release site(s) (Flosi *et al.* 2010):

a) Similar water temperature as capture location,
b) Amble habitat for captured fish,
c) Low likelihood of fish re-entering work site or becoming impinged on exclusion net or screen.

7) Determine the most efficient means for capturing fish. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrating by pumping-down pool and then seining or dip-netting fish (Flosi *et al.* 2010).

8) Electrofishing should only be conducted by properly trained personnel following CDFW and NMFS guidelines (Flosi *et al.* 2010).

9) Minimize handling of Salmonids. However, when handling is necessary, always wet hands or nets prior to touching fish (Flosi *et al.* 2010).

10) Temporarily hold fish in cool, shaded, aerated water in a container with a lid. Provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise and do not remove fish from this container until time of release (Flosi *et al.* 2010).

11) Place a thermometer in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds those allowed by DFG and NOAA, fish should be released and rescue operations ceased (Flosi *et al.* 2010).

12) Avoid overcrowding in containers. Have at least two containers and segregate young-of-year (YOY) fish from larger age-classes to avoid predation. Place larger amphibians, such as pacific giant salamanders, in container with larger fish (Flosi *et al.* 2010).

13) If fish are abundant, periodically cease capture, and release fish at pre-determined location (Flosi *et al.* 2010).

14) Visually identify species and estimate year-classes of fish at time of release. Count and record the number of fish captured. Avoid anesthetizing or measuring fish (Flosi *et al.* 2010).

15) Submit reports of fish relocation activities to DFG and NOAA in a timely fashion (Flosi *et al.* 2010).

16) If feasible, plan on performing initial fish relocation efforts several days prior to the start of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional electrofishing passes immediately prior to construction. In many instances, additional fish will be captured that eluded the previous day's efforts (Flosi *et al.* 2010).

17) If mortality during relocation exceeds 5%, stop efforts and immediately contact the appropriate agencies (Flosi *et al.* 2010).

18) All electrofishing shall be performed by a qualified fisheries biologist and conducted according to the National Marine Fisheries Service (NMFS), Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000 (Flosi *et al.* 2010).

19) The responsible party will provide fish relocation data to DFG on a form provided by the DFG, unless the relocation work is performed by DFG personnel (Flosi *et al.* 2010).

20) Additional measures to minimize injury and mortality of salmonids during fish relocation and dewatering activities shall be implemented as described in Part IX, pages 52 and 53 of CSSHRM (Flosi *et al.* 2010).

K. **MONITORING AND REPORTING**

CDFW shall implement the following measures to ensure that individual restoration projects authorized annually through the RGP (RGP12 and RGP78) will minimize take of listed salmonids, monitor and report take of listed salmonids, and to obtain specific information to account for the effects and benefits of salmonid restoration projects authorized through the RGP.

CDFW shall provide the Corps, NOAA, and USFWS notification of projects that are authorized through the RGP. The notification shall be submitted at least 90 days prior to project implementation and must contain specific project information including; name of project, type of project, location of project including hydrologic unit code (HUC), creek, watershed, city or town, and county.

1) CDFW Grant Manager shall inspect the work site before, during, and after completion of the action item, to ensure that all necessary mitigation measures to avoid impacts are properly implemented.
2) CDFW shall perform implementation monitoring immediately after the restoration activity is completed to ensure that projects are completed as designed.
3) CDFW shall perform effectiveness/validation monitoring on at least 10 percent of restoration projects funded annually. A random sample, stratified by project type and region, shall be chosen from the pool of new restoration projects approved for funding each year. Pre-treatment monitoring shall be performed for newly selected projects, and post-treatment monitoring will be performed within three years following project completion.
4) Current monitoring forms and instructions used by CDFW for the implementation monitoring and effectiveness monitoring are available online at: http://ftp.dfg.ca.gov/Public/FRGP/Qualitative_Monitoring_Forms/. CDFW shall submit a copy of the annual report, no later than March 1 annually to NOAA.
5) The CDFW annual report to NOAA shall include a summary of all restoration action items completed during the previous year. The annual report shall include a summary of the specific type and location of each project, stratified by individual project, 5th field HUC and affected species and evolutionary significant unit (ESU)/Distinct Population

Segment (DPS). The report shall include the following project-specific summaries, stratified at the individual project, 5th field HUC, and ESU level:

a) A summary detailing fish relocation activities including the number and species of fish relocated and the number and species injured or killed. Any capture, injury, or mortality of adult salmonids or half-pounder steelhead shall be noted in the monitoring data and report. Any injuries or mortality from a fish relocation site that exceeds 3.0% of the affected listed species shall have an explanation describing why.

b) The number and type of instream structures implemented within the stream channel.

c) The length of stream bank (feet) stabilized or planted with riparian species.

d) The number of culverts replaced or repaired, including the number of miles of restored access to unoccupied salmonid habitat.

e) The distance (miles) of road decommissioned.

f) The distance (feet) of aquatic habitat disturbed at each project site.

6) CDFW shall incorporate project data into a format compatible with the CDFW/NOAA/Pacific Fisheries Management Council Geographic Information System (GIS) database, allowing scanned project-specific reports and documents to be linked graphically within the GIS database.

L. References

CDFW (California Department of Fish and Wildlife). 2018. The Fisheries Restoration Grant Program's Mitigated Negative Declaration for the 2018 Fisheries Habitat Restoration Project.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 2010. California Salmonid Stream Habitat Restoration Manual.

USACE (U.S. Army Corps of Engineers). 2014. Department of the Army Regional General Permit No. 78 (Corps File No. SPL-2003-01123-BAH).

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