Staff Summary for April 16-17, 2025

14. Western Joshua Tree Conservation Plan

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

Receive a summary of initial comments on and discuss the draft *Western Joshua Tree Conservation Plan*.

Summary of Previous/Future Actions

• Determined that listing western Joshua tree under the California Endangered Species Act may be warranted	September 2020
• Public notice that western Joshua tree is protected as a candidate species under the California Endangered Species Act	October 2020
• Received from Department the draft *Western Joshua Tree Conservation Plan*	December 11-12, 2024
• Discussed draft plan	February 12-13, 2025
• **Today receive update from the Department and discuss draft plan**	**April 16-17, 2025**
• Potentially take action on draft plan	June 18-19, 2025

Background

At its September 2020 meeting, the Commission determined that listing western Joshua tree (WJT; *Yucca brevifolia*) under the California Endangered Species Act (CESA) may be warranted and accepted for consideration the petition submitted to list WJT as threatened or endangered. The Commission provided public notice of that decision; consequently, WJT is a candidate species under CESA.

In March 2022, the Department completed and made publicly available a status review report for WJT, as required under CESA. On July 10, 2023, the Governor signed the Western Joshua Tree Conservation Act, authorizing the Commission to postpone final consideration of the WJT CESA petition until the Department submits an updated status review, no later than January 1, 2033. Among other provisions, the act requires the Department to draft a conservation plan for WJT in collaboration with the Commission, governmental agencies, California Native American tribes, and the public. The plan must:

- incorporate a description of management actions necessary to conserve WJT and objective, measurable criteria to assess the effectiveness of such actions;
- include guidance for avoiding and minimizing impacts to WJT and protocols for the successful relocation of western Joshua trees; and
- include tribal co-management principles, provide for the relocation of western Joshua trees to tribal lands upon request from a tribe, and incorporate traditional ecological knowledge.

The Department submitted a draft *Western Joshua Tree Conservation Plan* to the Commission (exhibits 1 and 2), which was publicly received at the Commission's December 2024 meeting.

The act further stipulates that the Commission "shall take final action" on the plan by June 30, 2025, and that the Department and Commission periodically review and update the plan if necessary.

At the Commission's February 2025 meeting, the Department gave a presentation describing how the draft plan was developed and the contents of the draft plan and its appendices. The Commission received public comments on the draft plan and discussed elements of the plan, the process laid out in the act, and the next steps in revising the draft plan. During discussion, the Commission requested that the Department provide additional opportunities (i.e., workshop) for the public to engage with the Department on the plan.

Today's Update

Today, the Commission will receive a presentation from the Department providing a summary of the feedback received to date, the workshops and outreach since the last Commission meeting, and plan amendments the Department proposes (Exhibit 3). The Commission will also hear public comments and provide additional feedback on the draft plan, in anticipation of considering final action on the plan in June 2025. The Department has summarized anticipated changes based on prior comments (Exhibit 4).

Significant Public Comments

1. Five scientists from the Ecology and Evolutionary Biology Department at the University of California Santa Cruz urge the Commission to consider comments and recommendations to the plan, including incorporating more realistic emissions scenarios, prioritizing areas with climatically suitable habitat loss, facilitating dispersal, increasing groundwater research, expanding the effectiveness criteria, and prioritizing recruitment and nurse trees (Exhibit 5).
2. The California Construction and Industrial Materials Association requests the Department's annual report assessing the conservation status of WJT, as required by California Fish and Game Code Section 1927.7, to be able to review the plan, and urges that the plan incorporate an accurate climate refugia map (Exhibit 6).
3. Preservation Ranch suggests some changes to the plan, including more specificity regarding climate refugia, greater emphasis on federal coordination, and increased transparency on the conservation fund and its coordination with other funding sources (Exhibit 7).
4. The Large-Scale Solar Association elaborates on concerns with buffer zones, seed collection, and tree relocation protocols, and requests more time for public engagement before the Commission acts on the plan (Exhibit 8).
5. Eight environmental organizations state that the plan will help fill knowledge gaps, contemplates the need for separate guidance for developed and undeveloped areas, and advocates for the siting of renewable energy projects to avoid impacts to habitats, The organizations generally agree with the determinations and management actions proposed in the plan (Exhibit 9).

6. The Mojave Desert Land Trust communicates its support for the plan and recounts its part in founding the Joshua Tree Conservation Coalition. The trust stresses the nonregulatory, collaborative, and voluntary nature of the plan (Exhibit 10).
7. A commenter submits a suggested process to allow more flexibility in certain aspects of WJT permitting, including California Environmental Quality Act compliance, impacts to tree roots (including in urban areas), tree censusing, mitigation, tree relocation, dead trees, and issuance timelines. The commenter includes a "Suggested Joshua Tree Permit Matrix" to illustrate some of these ideas (Exhibit 11).
8. Four commenters, including the Sierra Club's California/Nevada Desert Committee, broadly support the plan, its goals, and its measures. One commenter includes a video demonstrating the variety of insects attracted by Joshua tree blooms, and another states that the fees charged for removing trees are too low to provide adequate protection (Exhibit 12).
9. Three commenters express concerns with the plan and WJT permitting, including the size of the ground disturbance avoidance buffer around trees, inhibiting the Yucca Valley sewer project and potentially preventing residents from connecting to the sewer line, and the amount of fees borne by homeowners (Exhibit 13).

Recommendation (N/A)

Exhibits

1. Draft Western Joshua Tree Conservation Plan Volume 1, received November 22, 2024
2. Draft Western Joshua Tree Conservation Plan Volume 2: Appendices, received November 22, 2024
3. Department presentation
4. Summary of Changes to Western Joshua Tree Conservation Plan, received from Department on April 2, 2015
5. Letter from five scientists at the University of California Santa Cruz, received April 2, 2025
6. Letter from Adam Harper, Senor Director of Policy, California Construction and Industrial Materials Association , received April 1, 2025
7. Letter from Heidi Brannon, Preservation Ranch, March 31, 2025
8. Letter from Shannon Eddy, Executive Director, Large-Scale Solar Association, received April 3, 2025
9. Letter from eight environmental non-governmental organizations, received April 3, 2025
10. Email from Krystian Lahage, Mojave Desert Land Trust, received April 3, 2025
11. Letter from Julie Gilbert, received April 3, 2025
12. Emails from four commenters, received March 7, 2025 through April 3, 2025
13. Emails from three commenters, received March 9 through March 26, 2025

Motion (N/A)

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Western Joshua Tree Conservation Plan

VOLUME I: WESTERN JOSHUA TREE CONSERVATION PLAN

Draft Presented to the California Fish and Game Commission

DECEMBER 2024

This page is intentionally left blank.

DRAFT

Western Joshua Tree Conservation Plan

DECEMBER 2024

Prepared for:
California Fish and
Game Commission

Prepared by:
California Department of
Fish and Wildlife

CONTACTS:
Isabel Baer, Environmental Program Manager
Drew Kaiser, Conservation Plan Technical Lead

With Assistance from
Ascent Environmental, Inc. dba Ascent,
ASM Affiliates, and Piñon Heritage Solutions

Suggested citation:
California Department of Fish and Wildlife (CDFW). 2024. Western Joshua Tree Conservation Plan. Draft Presented to the California Fish and Game Commission, December 12, 2024.

Photographs not accompanied with a credit are Adobe Stock images.

TABLE OF CONTENTS

Appendices

Figures

Tables

TRIBAL RECOGNITION, LAND ACKNOWLEDGEMENT, AND CDFW ACTION COMMITMENT

The California Department of Fish and Wildlife (CDFW) recognizes that the lands we care for were originally and are still inhabited and cared for by California Native American tribes. We honor and pay respect to their elders and descendants — past, present, and emerging — as they continue their relationship with these lands. These Tribes continue to maintain their political sovereignty and cultural traditions as vital members of Joshua tree habitat. We acknowledge their tremendous contributions to the lands managed by CDFW and thank them for their ongoing stewardship. It is important to CDFW that we be inclusive of these contributions and provide the ability for Tribes to carry forward these traditional cultural teachings, reflecting our relationships and commitment to righting historical wrongs and bringing California Native American people back to the land to help in the restoration and healing of California.

CDFW recognizes the importance of taking action to support tribal values, traditions, and interests. The Western Joshua Tree Conservation Plan embodies the intent for action through co-management of western Joshua tree conservation with Tribes. Tribal co-management planning and strategies also incorporate Traditional Ecological Knowledge. CDFW is preparing the Conservation Plan in collaboration with California Native American tribes and the Native American Land Conservancy. Tribes participating in consultation with CDFW as of the date of publication of the Conservation Plan are listed in Section 3.1 and Appendix C. CDFW will continue ongoing consultation with Tribes to further refine actions based on tribal input and co-management participation in the conservation of western Joshua tree and its habitat.

LIST OF ABBREVIATIONS

Acronym or Abbreviation	Definition
A&M	avoidance and minimization
ACTCI	Agua Caliente Tribe of Cupeño Indians
BLM	US Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA ITP	California Endangered Species Act incidental take permit
CESA	California Endangered Species Act
CNRA	California Natural Resources Agency
Combat Center	Marine Corps Air Ground Combat Center
Commission	California Fish and Game Commission
Conservation Fund	Western Joshua Tree Conservation Fund
Conservation Plan	Western Joshua Tree Conservation Plan
CSLC	California State Lands Commission
CSP	California State Parks
DOD	US Department of Defense
DRECP	Desert Renewable Energy Conservation Plan
DWR	California Department of Water Resources
EO	executive order
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
E&A	education and awareness
FTBMI	Fernandeño Tataviam Band of Mission Indians

GIS	geographic information system
HCP	habitat conservation plan
INRMP	integrated natural resources management plan
ITP	incidental take permit
KVIC	Kern Valley Indian Community
LC&M	land conservation and management
LUPA	land use plan amendment
MDSL	Mojave Desert Sentinel Landscape
MIST	minimum impact suppression techniques
MOU	memorandum of understanding
MSHCP	multi-species habitat conservation plan
NALC	Native American Land Conservancy
NASA	National Aeronautics and Space Administration
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NGO	non-governmental organization
NPS	National Park Service
NWCG	National Wildfire Coordinating Group
OHV	off-highway vehicles
RCIS	Regional Conservation Investment Strategies
Ripley State Park	Arthur B. Ripley Desert Woodland State Park
R&I	research and information
sq km	square kilometer
sq mi	square miles
SVRA	State vehicular recreation area
SWAP	State Wildlife Action Plan
TCM	Tribal co-management

TEK	Traditional Ecological Knowledge
THPO	Tribal historic preservation officer
TPBMI	Twenty-Nine Palms Band of Mission Indians
Tribes	California Native American tribes
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WCB	California Wildlife Conservation Board
WHPP	wildlife habitat protection plan
WJTCA ITP	Western Joshua Conservation Act incidental take permit
WJTCA	Western Joshua Tree Conservation Act

FOREWORD

Western Joshua trees are beloved members of California's spectacular biodiversity. They are emblematic of Mojave Desert vegetation and Native American tribes have nurtured and coexisted with Joshua trees since time immemorial. Their spiky silhouettes have long captivated our interest, and their survival in desert ecosystems is a testament to life's ability to adapt. But western Joshua trees are facing an increasing variety and intensity of threats. Climate change, habitat loss, and wildland fire are the primary threats to western Joshua tree and represent significant challenges for us to overcome.

With this Western Joshua Tree Conservation Plan, we hope to lay the groundwork for long-term conservation of the species and the desert ecosystems on which it depends. Our conservation work will depend on science including Traditional Ecological Knowledge, principles of tribal co-management, and collaboration to succeed. Conservation of western Joshua tree will not be easy, but I believe that we can do it through dedicated partnerships with California Native American tribes, agencies, and other organizations, and by embracing the western Joshua tree management actions and strategies outlined in this plan.

I'm proud of the California Department of Fish and Wildlife's work in preparing this plan and of the many collaborative partnerships we've forged in its preparation. I look forward to continuing our western Joshua tree conservation efforts in the future.

Charlton H. Bonham
CDFW Director

This page is intentionally left blank.

1 INTRODUCTION

> *"Joshua tree forests tell a story of survival, resilience, and beauty borne through perseverance."*
> *- Jane Rodgers, Superintendent, Joshua Tree National Park.*

Western Joshua tree (*Yucca brevifolia*) is an iconic plant species with substantial ecological and cultural importance in California. The California Fish and Game Commission (Commission) made western Joshua tree a candidate for listing as a threatened species under the California Endangered Species Act (CESA) in September 2020. As a result, western Joshua tree now benefits from the protections afforded by CESA (discussed in Section 1.1.2). In addition, the Western Joshua Tree Conservation Act (WJTCA) was passed and signed into law in July 2023 to conserve western Joshua tree and its habitat. WJTCA requires the California Department of Fish and Wildlife (CDFW) to develop and implement a Western Joshua Tree Conservation Plan (Conservation Plan) in collaboration with the Commission, governmental agencies, California Native American tribes (Tribes), and the public (Fish & G. Code, § 1927.6, subd. (a)). CDFW developed the Conservation Plan based on the best available information, consisting of "credible science" as defined in the California Fish and Game Code section 33, including Traditional Ecological Knowledge (TEK); collaboration with California Native American tribes; collaboration with federal, state, and local government agencies; and public feedback. This chapter provides an overview of the need for western Joshua tree conservation, the vision and objectives of the Conservation Plan, CDFW's collaboration with other entities in developing the Conservation Plan, and the Conservation Plan organization.

The Conservation Plan provides guidelines for western Joshua tree conservation, criteria to help define effectiveness of management actions, monitoring of management outcomes, and a process of adaptive management to refine and improve the management actions over time. Western Joshua tree conservation will require action from many different people, governments, and organizations. The management actions in the Conservation Plan can be

voluntarily adopted and implemented by project proponents, land managers, and philanthropists to help conserve and protect the species from harm. California Native American tribes and the State can work together to co-manage conservation consistent with the Conservation Plan's guidance. The management actions can be incorporated into project approvals by local, state, and federal government agencies that authorize projects or resource management programs in western Joshua tree's range in California. Researchers can implement management actions related to research and private citizens and other organizations can implement actions related to education and awareness. While statutory sections from WJTCA are referenced where relevant, the Conservation Plan does not create new statutory or regulatory mandates.

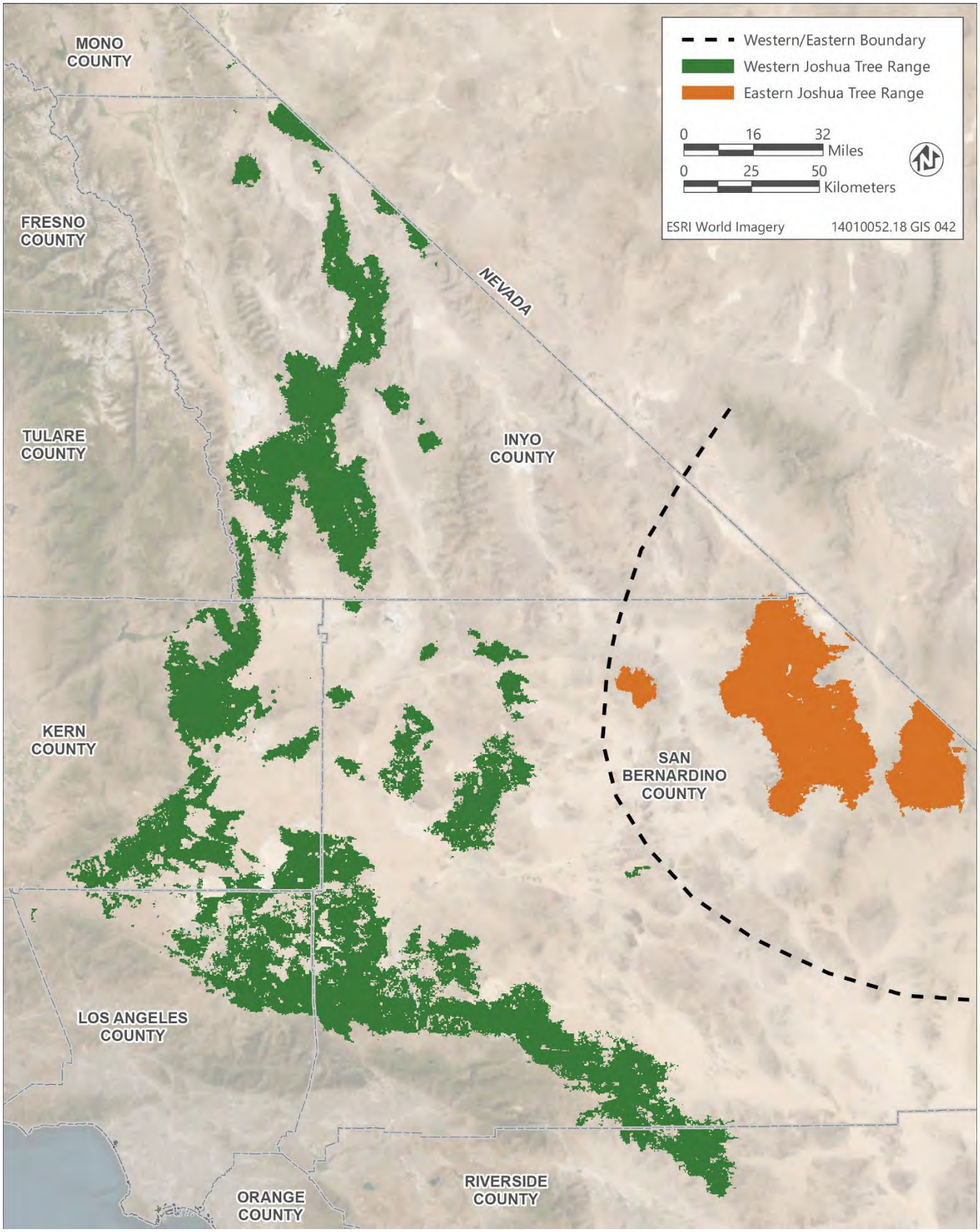
After preparation of a draft for public review and approval of an initial Conservation Plan by the Commission, WJTCA states that CDFW and the Commission "shall, if necessary, periodically update the conservation plan to ensure the conservation of the species" (Fish & G. Code, § 1927.6. subd. (a)). In addition, the Commission shall consider recommendations from CDFW for Conservation Plan amendments "beginning in 2026, and at least every two years thereafter" (Fish & G. Code, §1927.8 subd. (a)). As such, the Conservation Plan is designed to be a living document that will be modified over time to effectively conserve western Joshua tree. Section 6.8, "Monitoring, Species Status Reviews, Plan Amendment, and Adaptive Management," describes the process for evaluating management outcomes and amending the Conservation Plan.

1.1 NEED FOR WESTERN JOSHUA TREE CONSERVATION

1.1.1 Summary Description of Western Joshua Tree

Western Joshua tree is one of two species of Joshua tree; the second species is eastern Joshua tree (*Yucca jaegeriana*) (Figure 1-1). Although eastern Joshua tree is noted in some instances in the Conservation Plan, western Joshua tree is the only species protected by and subject to CESA, WJTCA, and the guidance provided in the Conservation Plan. For the purposes of the Conservation Plan, the term "Joshua tree" means both western Joshua tree and eastern Joshua tree collectively, or it may be used when the information presented is not known to be specific to one of the two species.

Western Joshua tree is an important part of California's desert ecosystem and provides habitat for numerous birds, mammals, insects, reptiles, and other organisms. Western Joshua tree also possesses considerable cultural value for California Native American tribes, many of which use the species to make traditional tools and products and for culinary and medicinal purposes (Louderback et al. 2013; Sutton and Earle 2017). In addition, silhouettes of Joshua trees carry cultural significance for many Tribes (FTBMI, pers. comm., 2024).



Source: Esque et al. 2023; adapted by Ascent in 2024.

Figure 1-1 Western and Eastern Joshua Tree Range in California

In California, western Joshua tree is found within the Mojave Desert, parts of the Great Basin, and in transition zones within the southern Sierra Nevada and Southern California mountains bordering those areas, where precipitation levels are low and vary between wetter and drier conditions annually and over multiyear and multidecade timescales. Western Joshua tree is currently relatively widespread and abundant throughout this range, grows slowly, and may require approximately 50 to 70 years to reach reproductive maturity and begin producing flowers. The species is reliant on its sole obligate pollinator, the yucca moth (*Tegeticula synthetica*), to produce seeds, and on scatter-hoarding rodents to disperse and cache seeds at a soil depth suitable for germination. Joshua tree seedlings may establish most successfully after large mast seeding events. Mast seeding is the production of many seeds by many individuals of a species at the same time and in the same region. Joshua tree mast seeding events currently occur at an average frequency of more than once every 4 years (Yoder et al. 2024). Presence under a nurse plant (i.e., a plant that facilitates the growth and development of other plant species beneath its canopy) and several successive years of sufficiently wet and cool conditions are likely required for successful seedling establishment and sufficient growth for western Joshua trees to withstand drier and hotter conditions. Western Joshua tree is also capable of asexual growth, which may allow individuals to survive in marginal climate conditions for long periods of time. Western Joshua tree ecology and threats to the species are described in detail in Chapter 4, "Summary of Resource Conditions."

The major threats to western Joshua tree include human activities, climate change, and wildland fire. The combined threats to western Joshua tree, coupled with the species' biology and specific habitat requirements, are causes for substantial concern about the ability of the western Joshua tree population to persist in California long-term. Without some level of direct management, the future of the species will largely depend on its ability to withstand continued habitat loss and to adapt to the hotter and drier conditions that are expected due to climate change. Therefore, thoughtful conservation actions and careful land management are needed to sustain and enhance the western Joshua tree population in California.

1.1.2 Background of the Western Joshua Tree Conservation Act

In October 2019, the Center for Biological Diversity submitted to the Commission a petition to list western Joshua tree as threatened under CESA. The petition identified climate change and wildland fires as the greatest threats to the persistence of the species. It also included habitat loss due to development; seed and plant predation, especially during drought; and competition with invasive species as other factors affecting the species' ability to survive and reproduce (Center for Biological Diversity 2019).

The Commission found, based in part on CDFW's evaluation of the petition and related recommendation, that there was sufficient information indicating that listing the species as

threatened under CESA may be warranted. The Commission designated western Joshua tree a candidate species in September 2020 (CDFW 2022), conferring upon western Joshua tree temporary legal protection under CESA.

CDFW evaluated the petition and submitted a written status review report to the Commission in March 2022 (CDFW 2022). The report concluded that western Joshua tree is not likely to be in danger of becoming extinct throughout all, or a significant portion, of its range in the foreseeable future in the absence of special protection and management efforts required by CESA. In June 2022, the Commission considered the status review report and could not reach a decision regarding whether listing the species as threatened was warranted. In February 2023, while the Commission was still considering its final decision on the petition, legislation was introduced to protect western Joshua tree. In response to the legislative proposal, the Commission postponed further consideration of the petition under CESA.

Source: National Park Service.

In July 2023, the California State Legislature passed and the governor signed into law WJTCA, codifiing as Chapter 11.5 of Division 2 of the California Fish and Game Code (commencing with Fish & G. Code, § 1927). WJTCA does the following:

- Provides protections for western Joshua tree by prohibiting the import, export, take, possession, purchase, or sale of any western Joshua tree in California (Fish & G. Code, § 1927.2, subd. (a)). Pursuant to Fish and Game Code Section 86, "take" means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."
- Allows CDFW to authorize take of western Joshua tree if certain conditions are met (Fish & G. Code, § 1927.3, subds. (a)-(b)).
- Authorizes CDFW to enter into a written agreement with any county or city to delegate to the county or city limited authority to authorize take of western Joshua tree if specified conditions are met (Fish & G. Code, § 1927.3, subd. (c)).
- Allows CDFW to authorize, by issuing permits, the removal or trimming of dead western Joshua trees or the trimming of live western Joshua trees that pose a risk to structures or public health and safety if certain conditions are met. (Fish & G. Code, § 1927.4, subd. (a)).

- Authorizes CDFW to enter into a written agreement with any county or city to delegate to the county or city limited authority to authorize the removal or trimming of dead western Joshua trees or the trimming of live western Joshua trees that pose a risk to structures or public health and safety if specified conditions are met (Fish & G. Code, § 1927.4, subd. (b)–(c)).
- Allows permittees to elect to pay specified fees in lieu of completing mitigation obligations (Fish & G. Code, § 1927.3, subd. (a)(3)).
- Establishes the Western Joshua Tree Conservation Fund (Conservation Fund). Any monies in the fund will be continuously appropriated to CDFW solely for the purposes of acquiring, conserving, and managing conservation lands and completing other activities to conserve western Joshua tree. (Fish & G. Code, § 1927.5, subd. (a)).
- Directs CDFW to develop and implement a conservation plan for western Joshua tree in collaboration with the Commission, other governmental agencies, California Native American tribes, and the public. (Fish & G. Code, § 1927.6, subd. (a)). CDFW must consult with California Native American tribes and include co-management principles (Fish & G. Code, § 1927.6, subd. (b)). CDFW must present the draft Conservation Plan at a public meeting of the Commission no later than December 31, 2024, and WJTCA calls for the Commission to take final action on the plan by June 30, 2025. (Fish & G. Code, § 1927.6, subd. (a)).
- Directs CDFW to submit an annual report assessing the conservation status of western Joshua tree to the Commission and the State Legislature by January 31 of each year, starting in 2025 (Fish & G. Code, §1927.7, subd. (a)).
- Requires CDFW to submit to the Commission an updated status review report by January 1, 2033, unless the Commission directs CDFW to complete it sooner (Fish & G. Code, § 1927.2, subd. (c)(2)(F) & 1927.9). The Commission shall consider determining whether the petitioned action to list western Joshua tree under CESA is warranted (Fish & G. Code, §1927.9). In the interim, western Joshua tree is, and will remain, a candidate species under CESA.

1.2 CONSERVATION PLAN VISION, PURPOSE, AND OBJECTIVES

1.2.1 Vision

The vision of the Conservation Plan is to prevent the extinction of western Joshua tree in the wild, preserve functioning ecosystems that support western Joshua tree, and maintain sustainable populations of western Joshua tree in California over the long term, such that listing the species under CESA will not be warranted.

1.2.2 Purpose

The purpose of the Conservation Plan is to fulfill the requirements articulated in Fish and Game Code Section 1927.6. Upon approval by the Commission, the Conservation Plan will guide the conservation of western Joshua tree in California by focusing on the most urgent and important management actions, as informed by science including TEK; collaboration with California Native American tribes; collaboration with federal, state, and local government agencies; and public feedback.

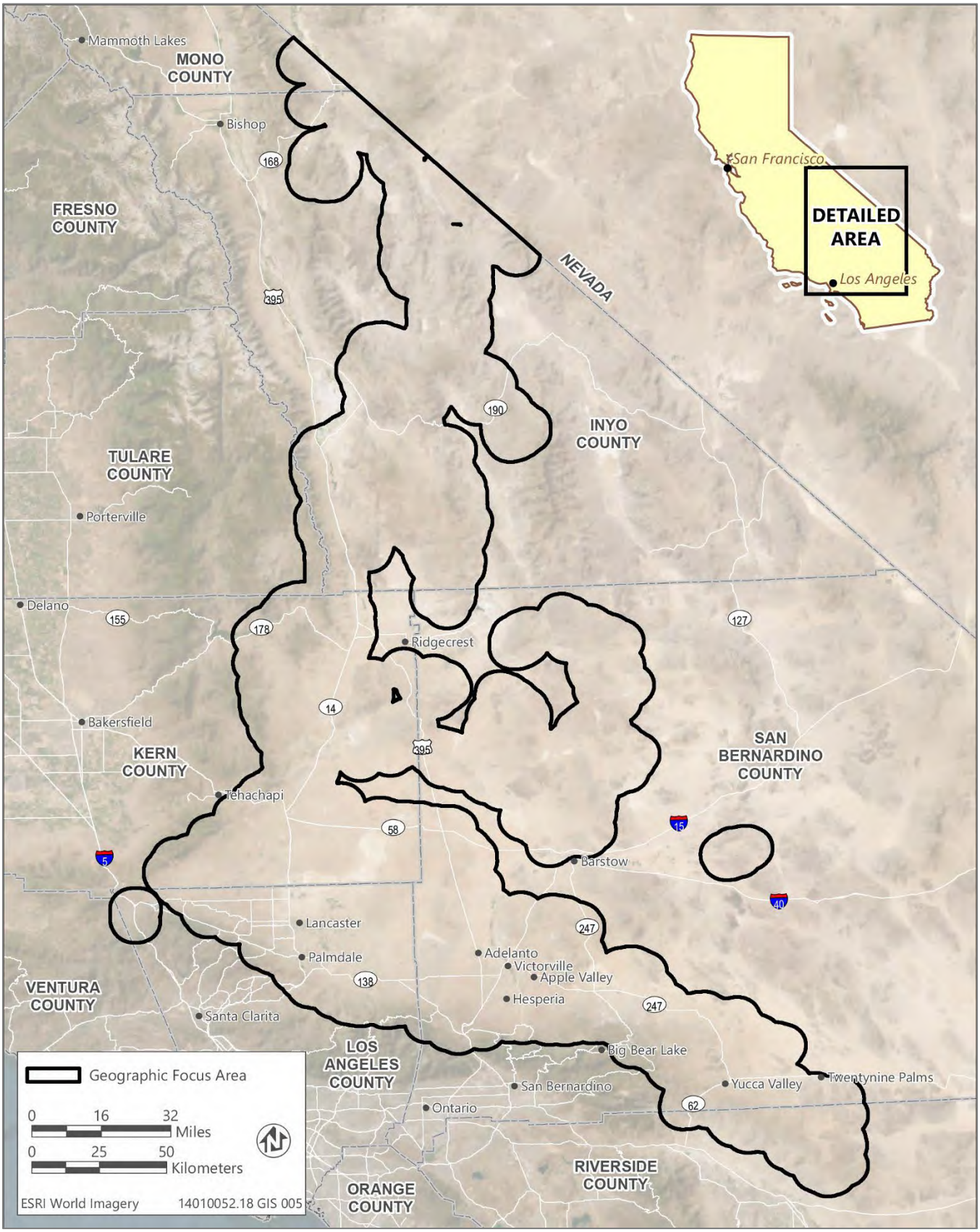
1.2.3 Objectives

The following objectives are identified in WJTCA:

- Describe management actions necessary to conserve western Joshua tree and objective, measurable criteria to assess the effectiveness of such actions (Fish & G. Code, §1927.6, subd. (a)).
- Provide guidance for the avoidance and minimization of impacts to western Joshua trees (Fish & G. Code, § 1927.6, subd. (a)).
- Include in the Conservation Plan protocols for the successful relocation of western Joshua trees and provide for the relocation of western Joshua trees to tribal lands upon a request from a Tribe (Fish & G. Code, § 1927.6, subds. (a)-(b)).
- Include co-management principles and incorporate Traditional Ecological Knowledge into the Conservation Plan (Fish & G. Code, § 1927.6, subd. (b)).
- Prioritize actions and acquiring and managing lands that are identified as appropriate for western Joshua tree conservation (Fish & G. Code, § 1927.6, subd. (c)).

1.2.4 Geographic Focus Area

The Conservation Plan includes a geographic focus area for conservation activities encompassing 37,749 square kilometers (9,327,981 acres, or 14,575 square miles) in southeastern California. It reflects the general location of currently occupied western Joshua tree habitat plus an 8-kilometer (5-mile) buffer in California to encompass areas that could be suitable for implementation of conservation management actions (Figure 1-2). However, application of WJTCA and implementation of the management actions described in the Conservation Plan (see Chapter 5, "Conservation Management Actions and Effectiveness Criteria") are not limited to the geographic focus area. In addition, the geographic focus area may be modified through amendment of this Conservation Plan based on evolving information regarding current and future western Joshua tree habitat resulting from ongoing scientific analysis.



Source: Esque et al. 2023; adapted by Ascent in 2024.

Figure 1-2 Geographic Focus Area

1.3 COLLABORATION, OUTREACH, AND PUBLIC REVIEW

WJTCA requires CDFW to develop this Conservation Plan for western Joshua tree in collaboration with the Commission, governmental agencies, California Native American tribes, and the public (Fish & G. Code, §1927.6 subds. (a)–(b)). This collaboration has occurred throughout the development of the Conservation Plan via in-person and virtual consultation and outreach with Tribes; virtual meetings with federal, state, and local agencies and other interest groups; virtual meetings with the public; and correspondence with interested organizations and individuals.

Additional information on outreach, review, and public proceedings related to the approval of this Conservation Plan is available on the Commission's website, including the process for public review of the draft Conservation Plan prior to final action.

1.3.1 Local, State, and Federal Government Agencies

CDFW conducted two rounds of virtual outreach meetings with local, state, and federal agencies that own, manage, or have jurisdiction over lands within the Conservation Plan's geographic focus area (Figure 1-2). In the first round of meetings, CDFW provided an overview of WJTCA, an overview of the types of permits that may be issued under WJTCA authorizing take of western Joshua tree, and a summary of the Conservation Plan contents required under WJTCA. Meeting attendees had an opportunity to provide feedback on content that should be included in the Conservation Plan, information regarding the current management of western Joshua tree, and ways agencies might collaborate with CDFW in implementing management actions set forth in the Conservation Plan. In the second round of meetings, CDFW provided a summary of the management actions developed since the previous meetings and a description of the draft conservation "management units," which aim to organize where specific management actions should be prioritized and implemented. Attendees were asked for input on additional management actions, details or issues that could be addressed in the Conservation Plan, and opportunities for collaboration with CDFW in implementing the Conservation Plan.

After each round of outreach meetings, CDFW contacted the agencies that requested a follow-up meeting or failed to attend the group outreach meetings. Follow-up meetings focused on discussion of proposed management actions, recommendations, and potential issues with management action implementation (Table 1-1). They also included, where applicable, discussion of current western Joshua tree management activities on agency properties and the potential to incorporate those activities into a written memorandum of understanding (MOU) or other written agreement with CDFW. Email correspondence sent to staff from agencies that did not attend the outreach meetings included a link to the meeting recordings, PDF copies of the

meeting presentations, and a questionnaire (see Appendix A, "Agency Feedback Questionnaire") designed to help CDFW identify existing western Joshua tree management actions by asking for the following information:

- The agency's current management of western Joshua tree or vegetation in general.
- The agency's best management practices for wildland fire suppression or prevention, invasive species control, relocation of western Joshua tree, prevention of soil erosion, grazing, and off-highway vehicle (OHV) recreation within western Joshua tree habitat.
- Western Joshua tree–specific restoration/conservation efforts in the past, present, or future planning (e.g., seed collection/banking, replanting western Joshua tree, replanting/seeding native nurse plants for western Joshua tree, or western Joshua tree relocation).
- The description of existing agency collaborations or written agreements with local California Native American tribes, if any.

CDFW also sought input from agencies regarding potentially acceptable terms for a written MOU between federal, state, and local jurisdictions regarding western Joshua tree conservation. The questionnaire focused on the implementation of management actions recommended in this Conservation Plan (see Section 5.2, "Management Actions Necessary to Conserve Western Joshua Tree"). These and other potential written agreement terms are described in Section 6.3, "Collaboration."

Table 1-1 CDFW Agency Outreach Meetings and Meetings with Individual Agencies

Date	Agency or Agencies	Requested By
February 29, 2024	State and federal agencies	CDFW
February 29, 2024	Local agencies	CDFW
March 27, 2024	California State Parks (CSP)	CSP
May 8, 2024	CSP	CDFW
May 15, 2024	State and federal agencies	CDFW
May 15, 2024	Local agencies	CDFW
May 22, 2024	California State Lands Commission	CDFW
June 12, 2024	CSP	CSP
July 15, 2024	California Department of Forestry and Fire Protection (CAL FIRE)	CAL FIRE

Source: Compiled by Ascent in 2024.

A full list of agencies invited to collaborate, including those that provided specific input for this version of the Conservation Plan, is in Appendix B, "Agency and Public Input Summary Memo."

1.3.2 California Native American Tribes

Collaboration with Tribes and inclusion of tribal co-management principles are critical aspects of CDFW's development of the Conservation Plan. At CDFW's request, the Native American Heritage Commission provided a list of contacts for 170 federally and non-federally recognized Tribes culturally affiliated with the geographic focus area. CDFW sent email invitations to these Tribes to view an online presentation regarding the Conservation Plan and to participate in a related tribal listening session. CDFW also mailed hard-copy letters with the same information to the Tribes, then followed up via phone and email to ensure Tribes received notice of available opportunities to participate in the development of the Conservation Plan and to answer any questions. A summary of CDFW's tribal engagement and collaboration process is described in Appendix C, "Tribal Input Summary Memo."

The Native American Land Conservancy (NALC) secured grant funding from the California Wildlife Conservation Board (WCB) to reimburse Tribes for their time spent contributing to the development of the Conservation Plan, including travel costs incurred from participating in Conservation Plan meetings.

Source: Alessandra Puig-Santana, National Park Service.

In coordination with the Commission, CDFW prepared and mailed formal joint consultation invitation letters to notify Tribes of the development of the Conservation Plan and to request tribal input under CDFW's Tribal Communication and Consultation Policy and the Commission's Tribal Consultation Policy. CDFW emailed the tribal consultation letters to the tribal contacts from the Native American Heritage Commission list on February 22, 2024, and mailed hard copy letters on March 4, 2024. CDFW then called Tribes beginning on March 19, 2024, to describe three available meeting options: facilitated meetings led by NALC, informational meetings/tribal listening sessions with CDFW, and consultation with CDFW and/or the Commission. Facilitated meetings were conducted by NALC staff and funded by the WCB grant. All notes taken by NALC staff at meetings with Tribes were reviewed and approved by participating Tribes prior to their provision to CDFW to inform its development of the Conservation Plan. These meetings began on May 9, 2024, are ongoing, and may be requested at any time. The three meeting options are described below:

1. **Facilitated meetings** provide an opportunity for Tribes to engage in a closed, internal discussion with a facilitator. The goal of these meetings is for the facilitator to help organize thoughts and ideas to reach a mutual written agreement on what information shared by Tribes will be publicly disclosed and included in the draft Conservation Plan. CDFW does not participate in these meetings, and the meetings do not constitute government-to-government consultation. In these meetings, the facilitator provides background information to tribal representatives and allows for open discussion centered around the tribal community. The facilitator works with the Tribe to develop ideas, input, and recommendations to share with CDFW for potential incorporation into the Conservation Plan.

2. **Informational meetings** include CDFW and one or more Tribes. In informational meetings, CDFW informs Tribes about WJTCA and the Conservation Plan and provides Tribes with an opportunity to ask questions and seek clarification. These meetings consist of a phone call or virtual meeting or tribal listening session that can include one or more tribal chairpersons, Tribal Historic Preservation Officers (THPOs), tribal representatives, and/or tribal members. An informational meeting is not considered to be consultation, as defined in CDFW policy.

3. **1:1 consultation**, as defined in CDFW's Tribal Communication and Consultation Policy, means the process of engaging in government-to-government dialogue with Tribes in a timely manner and in good faith to provide Tribes with necessary information and to seek out, discuss, and give full and meaningful consideration to the views of Tribes in an effort to reach a mutually agreed upon resolution of any concerns expressed by the Tribes or CDFW. CDFW acknowledges and respects that Tribes are unique and separate governments within the United States with inherent Tribal Sovereignty, including the rights to independence, self-governance, self-determination, and economic self-sufficiency. These principles form the basis for government-to-government consultations. Consultation may

occur jointly or individually with CDFW or the Commission and a Tribe or one or more designated representative(s) of the Tribe. A consultation may also include multiple Tribes, but each Tribe would need to agree. A Tribe may request consultation at any time. Consultation may be virtual or in-person at a location acceptable to the Tribe.

The Tribes that CDFW and NALC have met with thus far were invited to review and provide comments on a preliminary draft of this Conservation Plan. Tribes will have additional opportunities to review and provide input:

- During the public review period for the draft Conservation Plan following CDFW's submittal of the draft Conservation Plan to the Commission; and
- On an ongoing basis for future versions of the Conservation Plan (see Sections 6.4, "Tribal Co-Management," and Section 6.8). CDFW currently maintains a dedicated email address for communication with Tribes regarding the Conservation Plan: WJT.TribalEngage@wildlife.ca.gov.

CDFW received feedback from tribal members that a meeting with multiple Tribes would be beneficial for Tribes to learn more about WJTCA and the Conservation Plan, and to share knowledge about western Joshua tree. Subsequently, a multi-tribe Western Joshua Tree Community Workshop sponsored by NALC and the Lone Pine Paiute-Shoshone Tribe was held on October 26, 2024 in the town of Lone Pine. The purpose of the workshop was to provide tribal communities an interactive space to gather and access valuable information and resources about WJTCA and the Conservation Plan, and to collaborate by sharing information about the cultivation and preservation of western Joshua trees to assist in the development of the Conservation Plan. Tribes that had previously expressed interest in collaborating on the Conservation Plan were invited via email and follow-up phone calls, as needed, to attend the workshop. Sixteen Tribe members from seven Tribes attended the workshop (see Appendix C for a full list of Tribes that attended the workshop).

Tribal outreach and consultation are ongoing and will continue to inform updates to the Conservation Plan and to identify California Native American tribes' interested in engaging in co-management practices with CDFW and in receiving western Joshua trees relocated from other areas. Section 3.2, "Tribal Values Related to, and Uses of, Joshua Tree," discusses traditional tribal values and uses of western Joshua tree, and Section 3.3, "Traditional Ecological Knowledge for Conservation," describes Traditional Ecological Knowledge for conservation. Section 5.2.3, "Tribal Co-Management," identifies tribal co-management actions that were developed and will be implemented in coordination with California Native American tribes.

1.3.3 Public

CDFW initially engaged with the public by launching a website dedicated to the Conservation Plan on November 22, 2023. The website includes an email address, WJT@wildlife.ca.gov, through which the public can share suggestions, ask questions, and provide feedback. The website also provided the public with notices of two virtual outreach meetings held on April 4 and July 11, 2024. Invitations to the meetings were distributed to subscribers of "CDFW News" and "CDFW western Joshua tree updates" topics through the California Department of General Services public email subscription service approximately 30 days prior to the meetings. Coinciding with the timing and content of the scheduled public meetings, CDFW also held focused meetings with researchers and other interested organizations.

CDFW also emailed the July 2024 public meeting invitation directly to individuals representing communities and organizations working in environmental justice within the Conservation Plan geographic focus area. CDFW sent emails to individuals and organizations that are connected to communities that have been excluded from environmental policy-setting and/or decision-making. These emails were intended to initiate meaningful engagement and to bridge the gap between underserved communities and environmental conversations that affect them most by providing the opportunity to provide input on the Conservation Plan.

As with the government agency meetings, during the first public meeting, CDFW provided an overview of WJTCA, an overview of the types of permits authorizing take of western Joshua tree, and a summary of the Conservation Plan content. In an open forum, meeting attendees had an opportunity to provide feedback, ask questions, and raise issues or concerns they would like to see addressed in the Conservation Plan. Attendees were also encouraged to submit written comments about the Conservation Plan summary to the WJT@wildlife.ca.gov email address by April 30, 2024. During the second meeting, CDFW provided a summary of the management actions and a description of the management units where the management actions would be implemented and presented some mechanisms for implementing the management actions. CDFW also addressed previous questions and concerns posed by the public during and following the first public meeting.

Meeting invitees and attendees included property owners, real estate brokers, trade association representatives, nonprofit land conservancy and conservation association representatives, leaders in the environmental justice community, town council association representatives, regulatory consultants, biologists, local agency staff, and legislative office representatives. A summary of input received during the meetings is provided in Appendix B.

Additional information on public proceedings related to the approval of this Conservation Plan is available on the Commission's website, including the process for public review of the

draft Conservation Plan prior to final action. In addition, the public may continue to provide input to CDFW on the Conservation Plan to inform periodic updates (see Section 6.8).

1.4 ORGANIZATION OF THE CONSERVATION PLAN

The Conservation Plan describes the steps required to achieve the vision of conserving western Joshua tree and its habitat in California such that listing under CESA will not be needed. The Conservation Plan can be divided into two parts: The first part summarizes guiding concepts and currently available information, and the second part describes management actions and the implementation approach for conserving western Joshua tree and achieving the vision of the Conservation Plan. The chapters of the Conservation Plan are briefly described under the following two parts of the Conservation Plan:

Guiding Concepts and Information Needed for Conservation

- Chapter 1, "Introduction," summarizes the western Joshua tree conservation need; identifies the vision, purpose, and objectives of the Conservation Plan; and describes the collaboration process for Conservation Plan development.
- Chapter 2, "Planning Influences," describes existing regulations, policies, and planning initiatives that influence management actions. Identifying planning influences affecting the Conservation Plan facilitates collaboration and helps efficiently determine conservation opportunities.
- Chapter 3, "Traditional Values and Uses of Western Joshua Tree by California Native American Tribes," focuses on the tribal values and uses of western Joshua tree and TEK that influenced the persistence of the species and its habitat over millennia. The information in this chapter is designed to inform the co-management activities that would be co-created by CDFW and participating California Native American tribes.
- Chapter 4, "Summary of Resource Conditions," presents information on the ecology of western Joshua tree; the ecosystem it inhabits; its past, current, and potential range; and environmental stressors and threats that have affected and will affect the persistence of the species. This chapter also identifies gaps in current knowledge needed to inform effective conservation.

Joshua tree seeds.
Source: Sarinah Simmons, National Park Service.

Conservation Management Actions and Implementation Mechanisms

- Chapter 5, "Conservation Management Actions and Effectiveness Criteria," as informed by the information in Chapters 1 through 4, describes the intended use of management actions as guidance for conservation; the specific management actions necessary to conserve western Joshua tree; where specific management actions should be prioritized based on areas of predicted climate refugia, habitat conservation value, existing land use type, and ownership designation within the species' range; and criteria for measuring the effectiveness of those actions.
- Chapter 6, "Implementation," outlines the mechanisms established to implement the Conservation Plan management actions presented in Chapter 5, as well as the roles and responsibilities of the implementing parties. The chapter identifies potential types of written agreements with collaborators, the permitting framework described in WJTCA, Conservation Fund management, land acquisition procedures, the annual reports documenting permitting and mitigation performance metrics (Fish & G. Code, § 1927.7, subd. (a)), and the process for updating and amending the Conservation Plan.

1.5 WESTERN JOSHUA TREE CONSERVATION ADAPTIVE MANAGEMENT FRAMEWORK

To be effective, the Conservation Plan must be able to address near-term threats to the species and preserve existing western Joshua trees and their habitat on the site-specific scale while gathering the additional information needed to enact range-wide conservation in the long term. To achieve this, the Conservation Plan is designed to be implemented in an adaptive management framework within the broader context of WJTCA. An adaptive management framework provides a structured process that allows for taking management actions, closely monitoring and evaluating outcomes, and reevaluating and adjusting decisions as more information is learned. The adaptive management framework for western Joshua tree conservation has five conceptual phases, which are illustrated in Figure 1-3, "Western Joshua Tree Conservation Adaptive Management Framework," and described below.

1. **Prepare the Draft Plan**

   Preparation of the Conservation Plan is the first phase in the framework. The Conservation Plan describes existing resource conditions, California Native American tribes' values, western Joshua tree conservation needs, collaborators in achieving the conservation vision, and guidance for management actions with implementation mechanisms.

2. Public Review and Plan Adoption

The Conservation Plan and any updates to it in the future are circulated for public review, presented at a public meeting, and formally approved by the Commission. This public process will allow public agencies, interested parties, and California Native American tribes to provide input on the Conservation Plan prior to adoption by the Commission.

3. Implement the Conservation Plan

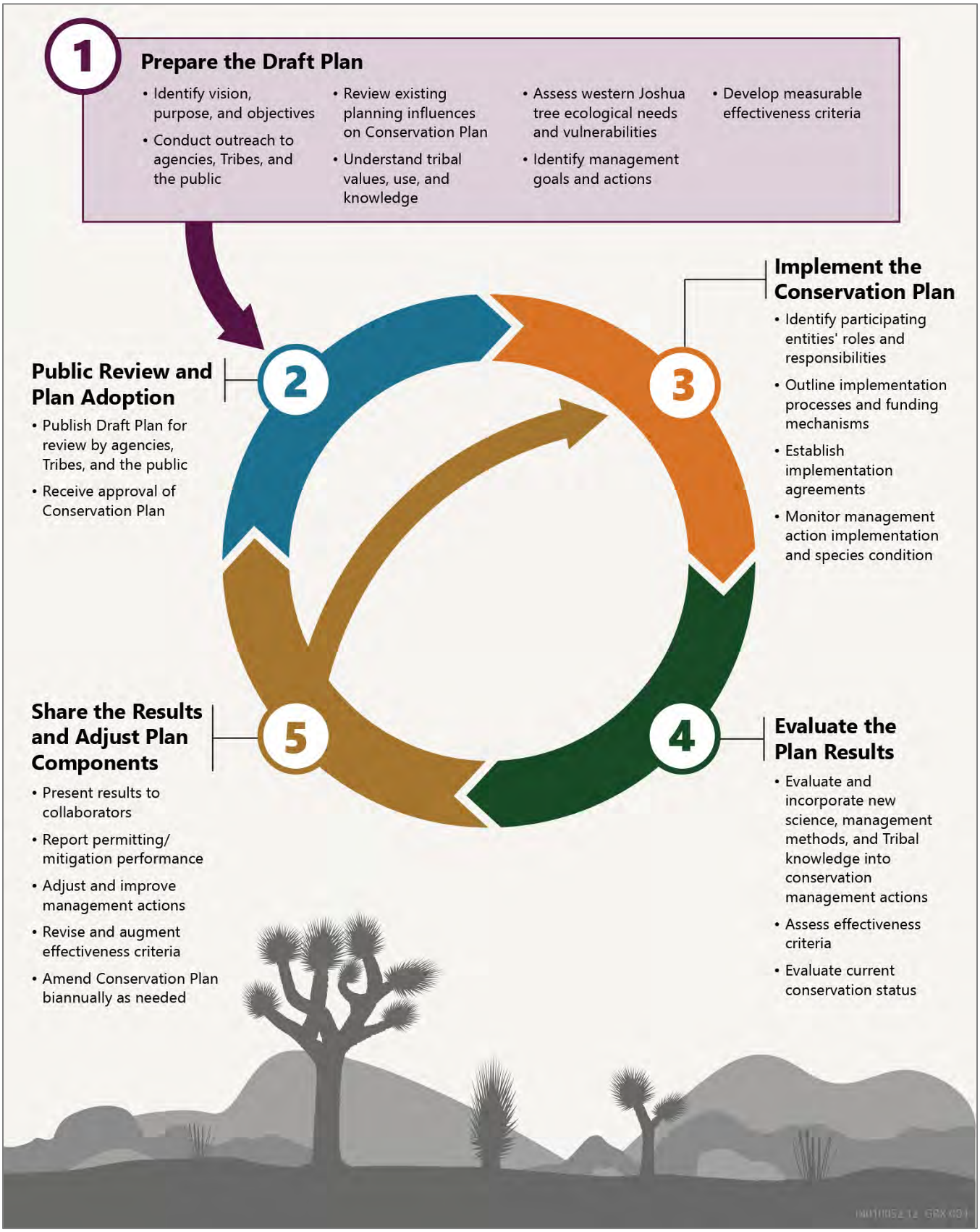
Once the Conservation Plan is approved, the conservation management actions will be implemented through continued collaboration between CDFW and local, state, and federal agencies by establishing interagency written agreements or written memoranda of understanding and by developing co-management written agreements and written memoranda of understanding with tribal collaborators. CDFW will monitor conservation management actions that have been implemented, including those in progress since the species' candidacy for listing under CESA, and others that have been developed specifically in response to WJTCA and the western Joshua tree population condition.

4. Evaluate the Plan Results

CDFW will gather and evaluate new knowledge from the scientific community, agencies, and Tribes needed to achieve or improve effectiveness of management actions. As new information is incorporated into management actions, CDFW will monitor the outcome on western Joshua tree conservation status, as measured by the effectiveness criteria presented in Section 5.3, "Effectiveness Criteria."

5. Share the Results and Adjust Plan Components

CDFW will report on the performance of the permitting and mitigation program and provide an assessment of the conservation status of western Joshua tree in annual reporting, described in Section 6.8.1, "Monitoring and Reporting," and required by WJTCA (Fish & G. Code, § 1927.7, subd. (a)). Management actions will be adjusted based on new scientific and other information, effectiveness of management actions, permit and mitigation performance, and ongoing feedback from collaborators. Through adaptive management, strategy refinements, and new information will be incorporated into the Conservation Plan (Fish & G. Code, § 1927.6, subd. (a)). CDFW will also recommend Conservation Plan amendments to the Commission every 2 years at a public meeting, as necessary (Fish & G. Code, § 1927.8, subd. (a)). Through this process, management actions and implementation mechanisms may be adjusted to improve conservation of western Joshua tree and achieve the vision of this Conservation Plan.



Source: Created by Ascent in 2024.

Figure 1-3 Western Joshua Tree Conservation Adaptive Management Framework

2 PLANNING INFLUENCES

Science including Traditional Ecological Knowledge (TEK) forms the foundation of conservation strategies for western Joshua tree. The planning, policy, and statutory/regulatory context of the geographic focus area also helps guide the management actions. This chapter summarizes existing federal, state, and local plans, as well as adopted policies, legislation, regulations, and ordinances related to western Joshua tree and discusses how they influence the Conservation Plan.

Because western Joshua tree's range is in multiple jurisdictions and under varying land ownership, successful implementation of range-wide conservation strategies will require coordinated efforts between landowners, the public, nongovernmental organizations (NGOs), government agencies, and California Native American tribes (Tribes). Using species distribution modeling data, Table 2-1 summarizes the area and percent of western Joshua tree's total range in California that is on federal, state, local government, and private lands. Figure 2-1 provides a graphic representation of land ownership within the Conservation Plan geographic focus area. Western Joshua tree's range is described further in Section 4.1.1, "Range and Distribution." These species distribution modeling data (Esque et al. 2023) are used throughout this chapter and the Conservation Plan, and represent the presence of western Joshua trees within 0.25-square-kilometer grid cells (approximately 62 acres) but do not provide information on the number or density of trees within these grid cells.

Tribal lands, as referenced in Fish and Game Code section 1927.6, subdivision (b), include lands meeting the definition of "Indian country" in 18 US Code section 1151 held in trust by Tribes (rancherias/reservations) or tribal members (individual allotments usually within rancherias/reservations); fee lands held by Tribes (land purchased and owned by a Tribe typically outside of rancherias/reservations); or fee lands held by tribally led NGOs (e.g., the Native American Land Conservancy [NALC]) or NGOs formed by non-federally recognized Tribes to act on the Tribe's behalf as a vehicle to hold land. However, because complete

mapping for these other categories is not available, other than lands held in trust by Tribes (3.8 square kilometers [1.5 square miles] mapped by the Bureau of Indian Affairs), tribal lands are not included in Table 2-1 calculations or Figure 2-1. Coordination with Tribes will continue to confirm the amount and location of tribal lands for future Conservation Plan updates.

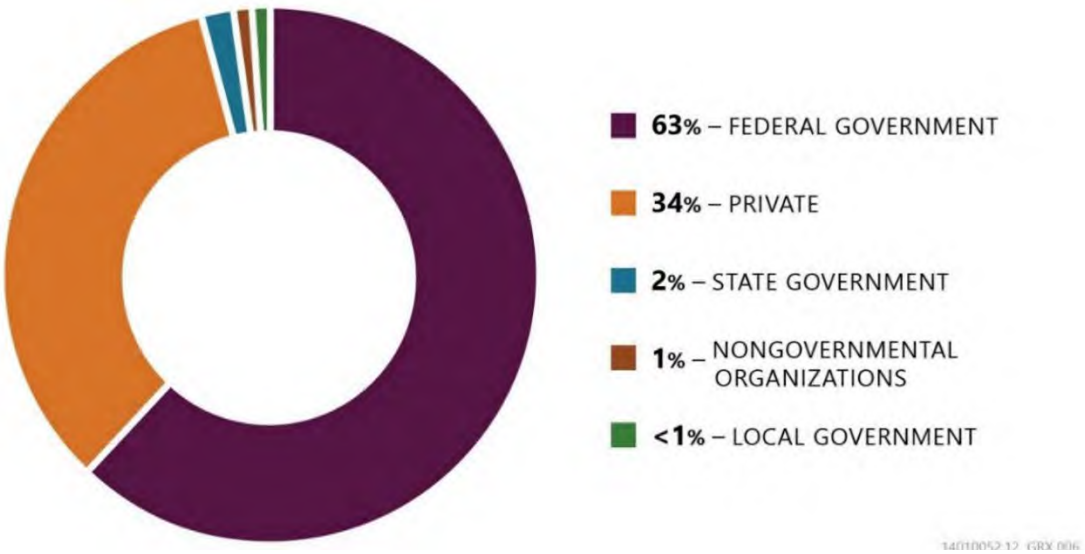
Table 2-1 Land Ownership in Western Joshua Tree Range in California

Entity[1]	Area in Square Kilometers (sq mi)	Percent of California Range (%)
Federal (Total)	**8,203 (3,167.4)**	**63**
US Bureau of Land Management	3,703 (1,429.9)	28
US Department of Defense	2,321 (896.3)	18
National Park Service	1,934 (746.5)	15
US Forest Service	245 (94.6)	2
Natural Resources Conservation Service	0.3 (0.1)	<1
Private, NGOs, Local (Total)	**4,608 (1,779.2)**	**35**
Private Land	4,470 (1,726.0)	34
Nongovernmental Organizations (NGOs)	104 (40.3)	1
Local Government	34 (13.0)	<1
State (Total)	**272 (104.9)**	**2**
California State Parks	149 (57.4)	1
California State Lands Commission	87 (33.7)	1
California Department of Fish and Wildlife	34 (13.2)	<1
Other State lands	2 (0.6)	<1

Notes: sq mi = square miles.

[1] Lands in all ownership categories include lands held as easements for which the landowner is not disclosed.

Source: Esque et al. 2023.



Source: Created by Ascent in 2024.

Figure 2-1 Land Ownership within the Western Joshua Tree Range in California

Figure 2-2 shows the land within the geographic focus area owned by the federal government, state government, local government, NGOs, and private entities. As explained in Section 1.2.4, "Geographic Focus Area," the geographic focus area is currently occupied western Joshua tree habitat plus an 8-kilometer (5-mile) buffer within California to encompass areas that could be suitable for implementation of conservation management actions.

2.1 WESTERN JOSHUA TREE CONSERVATION ACT REQUIREMENTS

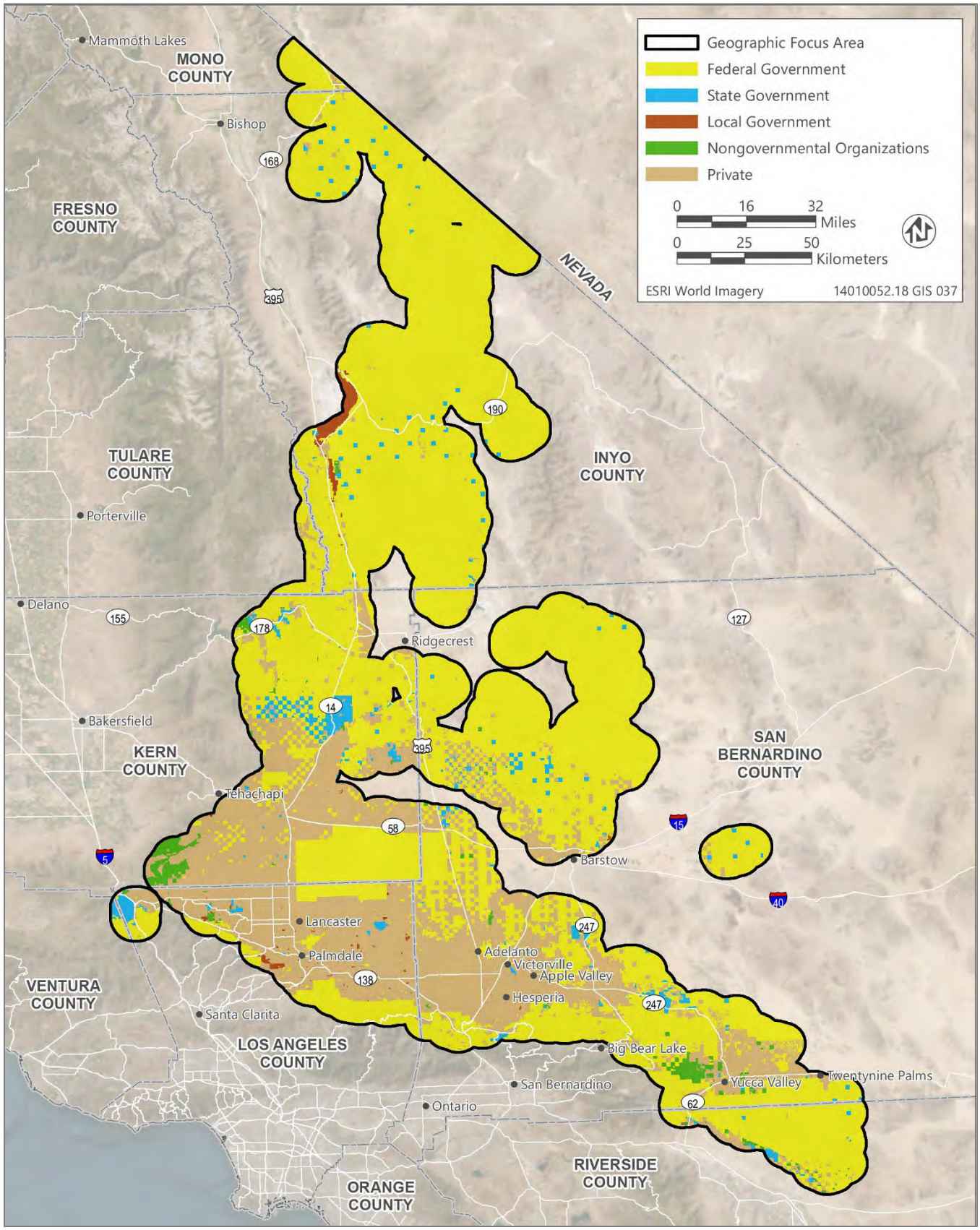
Statutory requirements for the Conservation Plan are set forth in Western Joshua Tree Conservation Act (WJTCA), which is codified at Fish and Game Code section 1927 et seq. The legal status of western Joshua tree under state and federal law also influences conservation planning. The following discussion summarizes key requirements of WJTCA relevant to the Conservation Plan and the current legal protection status of the species.

2.1.1 Conservation Plan

Under Fish and Game Code section 1927.6, CDFW is required to develop and implement a western Joshua tree Conservation Plan in collaboration with the Commission, governmental agencies, Tribes, and the public. Specifically, Fish and Game Code section 1927.6, subdivisions (a) and (b) state what the Conservation Plan must include (see Section 1.2.3, "Objectives") and the schedule for preparation, review, and approval of the Conservation Plan (see Section 1.1.2, "Legal Status of Western Joshua Tree," and Section 1.3.3, "Public"). The Fish and Game Code also defines "conservation" as the use of methods and procedures necessary to bring species listed under California Endangered Species Act (CESA) to the point at which CESA protection is no longer needed and, for species not listed under CESA, to maintain or enhance the condition of the species so that listing will not become necessary (Fish & G. Code, § 1927.1, subd. (c)).

2.1.2 Conservation Fund

The Western Joshua Tree Conservation Fund (Conservation Fund) is the key source of funding for implementation of management actions by CDFW. Fish and Game Code section 1927.5, subdivision (a) establishes the Western Joshua Tree Conservation Fund and requires all fees submitted to CDFW under WJTCA be deposited into the Conservation Fund (Fish & G. Code, § 1927.5, subd. (b)). Moneys in the Fund are appropriated to CDFW solely for the purposes of acquiring, conserving, and managing western Joshua tree conservation lands and completing other activities to conserve western Joshua tree (Fish & G. Code, § 1927.5, subd. (a)). Fish and Game Code section 1927.8, subdivision (b) directs CDFW to annually adjust the amount of western Joshua tree fees. That section requires CDFW to adopt by December 31, 2026, and subsequently amend every 3 years thereafter, regulations adjusting the fees as necessary to ensure the conservation of the species.



Source: Adapted by Ascent in 2024.

Figure 2-2 Land Ownership within the Geographic Focus Area

2.1.3 Reporting and Review

Beginning in 2025, CDFW is required to submit an annual report to the Commission by January 31 of each calendar year assessing the conservation status of western Joshua tree (Fish & G. Code, § 1927.7). Fish and Game Code section 1927.7 outlines the required contents of the report.

Beginning in 2026, and at least every 2 years thereafter, the Commission is required to review the status of western Joshua tree and the effectiveness of the Conservation Plan at a public meeting. Concurrent with each review, CDFW is required to make recommendations to the Commission, as necessary, for amendments to the Conservation Plan to ensure the conservation of the species (Fish & G. Code, § 1927.8, subd. (a)).

CDFW is required to submit an updated status review report to the Commission by January 1, 2033, unless the Commission directs CDFW to complete it sooner (Fish & G. Code, §§ 1927.2, subd. (c)(2) & 1927.9). The report must incorporate any new scientific information relevant to the status of the species and must evaluate the effect of conservation and management efforts being taken pursuant to WJTCA. The Commission will consider the updated status review report in deciding whether petitioned action to list the western Joshua tree under CESA is warranted.

2.2 LEGAL STATUS OF WESTERN JOSHUA TREE

Western Joshua tree's legal status has a fundamental influence on the Conservation Plan. While western Joshua tree's status under state law is of primary importance to the Conservation Plan, its status under federal law is also important, because approximately 63 percent of western Joshua tree's range in California is on federal land. Western Joshua tree currently receives state protection under WJTCA and as a candidate for listing under CESA. The species is not listed under the federal Endangered Species Act (ESA) as of the publication of this Conservation Plan. The following sections describe the listing status of western Joshua tree under CESA and ESA and the influence of these laws on conservation of the species.

2.2.1 State Listing Status

Western Joshua tree is currently a candidate for listing under CESA (Fish & G. Code, § 2050 et seq.). As discussed in Section 1.1.2, western Joshua tree receives the same protections as species listed as endangered or threatened under CESA while it remains a candidate for listing (Cal. Code Regs., tit. 14, § 783.1, subd. (b)). Take of western Joshua tree within California is prohibited (see Fish & G. Code, § 86), except as authorized under CESA, WJTCA, or the Natural Community Conservation Planning Act (NCCPA) (Fish & G. Code, § 1927.2, subd. (a)). While western Joshua tree is a candidate species under CESA, any person or public agency may seek a take authorization for western Joshua tree under either CESA or WJTCA (Fish & G. Code, § 1927.2, subd. (b)).

Pursuant to Fish and Game Code section 1927.9, the Commission is required to reconsider listing western Joshua tree by 2033. In determining whether listing western Joshua tree under CESA is warranted, the Commission shall consider, among other enumerated factors, the Conservation Plan and the effectiveness of any conservation measures funded by the Conservation Fund (Fish & G. Code, § 1927.2, subd. (c)(2)). In making this determination, the Commission may keep the western Joshua tree as a candidate or make one of the following determinations:

1. **Listing is not warranted**. The Conservation Plan identifies management actions that are intended to conserve western Joshua tree and its habitat such that listing under CESA will not be necessary. If the Commission determines that listing western Joshua tree as endangered or threatened pursuant to CESA is not warranted, WJTCA will remain operative and the authorization of take of a western Joshua tree shall be pursuant to WJTCA (Fish & G. Code, § 1927.2, subdiv. (d)). The Conservation Plan would continue to guide management decisions in the long term, unless future evidence indicates that listing of the species is warranted.

2. **Listing is warranted**. If the Commission determines that listing western Joshua tree as endangered or threatened pursuant to CESA is warranted despite the management actions in the Conservation Plan, WJTCA will become inoperative and the authorization of take of western Joshua tree shall be pursuant to only CESA or NCCPA (Fish & G. Code, § 1927.2, subd. (e)).

Regardless of whether western Joshua tree is ultimately listed under CESA, take authorization for western Joshua tree can be issued under a Natural Community Conservation Plan (NCCP) as long as western Joshua tree is a covered species under the NCCP and the NCCP provides for the conservation of the species. NCCPs are discussed further below, in Section 2.3.

CDFW may also develop nonregulatory recovery plans for species listed under CESA (Fish & G. Code, § 2079.1, subd. (a)). CDFW is currently developing recovery planning guidelines, which will provide a framework for how CDFW will approach recovery planning for CESA-listed species. Recovery plans will be based on best available scientific information and will include site-specific management actions necessary for recovery of the species and objective, measurable criteria that would result in the potential delisting of the species (Fish & G. Code, § 2079.1, subd. (c)). The management actions and other recommendations in the Conservation Plan could be incorporated into a future recovery plan for western Joshua tree in the event the species is listed under CESA.

2.2.2 Federal Listing Status

Western Joshua tree is not currently listed under ESA. ESA (16 U.S.C. §§ 1531–1544) requires federal agencies, in consultation with US Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of designated critical habitat of such species.

Fallen western Joshua tree on a desert floor.
Source: National Park Service.

In September 2015, the NGO WildEarth Guardians submitted a petition to the Secretary of the Interior requesting to list Joshua tree (both western Joshua tree and eastern Joshua tree [*Yucca jaegeriana*], collectively) as a threatened species and, if applicable, designate critical habitat under ESA (WildEarth Guardians 2015). At the time of petition, western Joshua tree and eastern Joshua tree were considered two subspecies of the same species, but they are now recognized as individual species. In response to the petition, USFWS completed a special-status assessment (USFWS 2018) and published findings in the Federal Register (84 Federal Register 41694) concluding that listing Joshua tree was not warranted. In November 2019, WildEarth Guardians filed a complaint in the US District Court, Central District of California, challenging USFWS' analyses and decision not to list Joshua tree under ESA. The court ordered USFWS to reconsider its listing decision. USFWS reassessed its initial finding and prepared a revised special-status assessment (USFWS 2023). Using a review of updated information, USFWS again concluded that neither western nor eastern Joshua tree are in danger of extinction now and are not likely to become extinct in the foreseeable future in any significant portion of their ranges. USFWS concluded that the two species do not meet the definition of either an endangered or threatened species under ESA, and determined that listing either species was not warranted. In March 2024, WildEarth Guardians filed a second lawsuit requesting that the court vacate USFWS' 2023 listing decision. Western Joshua tree (and eastern Joshua tree) remains unlisted and not subject to protection under ESA.

Joshua tree is identified as "FWS Focus" on the USFWS website (USFWS n.d.). USFWS does not explicitly define "FWS Focus Species," and the designation does not provide special legal protections to any species. However, the term is used to highlight species that receive a high level of interest or that are the subject of conservation efforts. USFWS staff are actively

engaged in western Joshua tree conservation efforts and host an interagency biological working group for the species (see Appendix B, "Agency and Public Input Summary Memo").

Because western Joshua tree is not listed under ESA, there is no legal requirement for federal agencies to consider the effects of their actions on western Joshua tree under ESA. However, Joshua tree woodland is considered a special vegetation feature that should be assessed under the National Environmental Policy Act (NEPA) according to the US Bureau of Land Management (BLM) Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment (LUPA) (see Section 2.3.3). The US Forest Service (USFS) would consider the effects of their actions on western Joshua tree under NEPA and the National Forest Management Act if the species was designated a USFS species of conservation concern. Securing participation by federal land management agencies to coordinate implementation of management actions for conservation of western Joshua tree on lands under federal jurisdiction would need a written memorandum of understanding (MOU) or other agreement. CDFW has contacted federal land management agencies about potential agreements during preparation of the Conservation Plan and will continue to seek their participation in actions beneficial to western Joshua tree conservation. Federal agencies with existing management plans or practices related to western Joshua tree conservation may agree to entering into a written MOU or other agreement with CDFW to implement management actions in the Conservation Plan.

The National Park Service (NPS) is expected to partner with CDFW on conservation activities because the agency is already conducting research on western Joshua tree climate refugia and implementing land management practices for the benefit of the species within Joshua Tree National Park (e.g., climate refugia plan, wildland fire management, habitat restoration, and assisted migration). CDFW and NPS have been communicating about this research.

Interagency communication and cooperation with other federal agencies, such as the BLM and the US Department of Defense (DOD) could provide an opportunity for CDFW to execute a written MOU or other agreement with these agencies to conserve western Joshua tree on federal lands, similar to existing durability agreements and MOUs between CDFW and BLM.

Source: National Park Service.

CDFW and BLM have executed two agreements: the statewide durability agreement, known as the *Memorandum of Understanding by and between the Bureau of Land Management and the California Department of Fish and Wildlife*, dated November 27, 2012 (BLM and CDFW 2012); and the DRECP durability agreement, known as the *Agreement by and between the United States Bureau of Land Management and the California Department of Fish and Wildlife*, dated October 2, 2015 (BLM and CDFW 2015). Both agreements acknowledge the importance and possibility of using BLM National Conservation Lands to contribute to the satisfaction of CDFW compensatory mitigation requirements in whole or in part. These MOUs lay out a general framework for future project-specific mitigation efforts that involves using one of more of the following tools to protect mitigation on BLM federal lands: (1) protecting mitigation lands using BLM land-use designations (e.g., wilderness areas, National Conservation Lands, areas of critical environmental concern, and wildlife allocations); (2) layering on protective measures in leases, easements, and rights-of-way; and (3) entering into co-management agreements.

The Onyx Ranch durability agreement is the first project-specific durability agreement. The agreement was enacted with a site-specific amendment to the 1983 statewide Sikes Act agreement between BLM and CDFW (*Addendum No. 5 to the Master Memorandum of Understanding between the California Department of Fish and Wildlife and the Bureau of Land Management for Sikes Act Implementation of the Portion of the Rudnick Common Allotment Relinquished Pursuant to Public Law 112-74* [BLM and CDFW 2022]), a grazing relinquishment (BLM 2020), and a co-management agreement (pending). This effort mitigated impacts from 16,453 acres of solar projects and resulted in grazing relinquishment and long-term funding of enhancement actions on 215,000 acres of the western Mojave Desert. Although impacts on western Joshua tree were not specifically being mitigated, the removal of grazing and implementation of enhancement actions for desert habitats will benefit the species. This is another example of the types of future interagency cooperative efforts that could benefit western Joshua tree on some types of federal lands.

There are also other opportunities for CDFW to execute a written MOU or other agreement with these agencies to specifically conserve western Joshua tree on federal lands. The Conservation Plan therefore focuses on the potential to collaborate with federal agencies, with an understanding that the capacity to implement specific management actions may differ among agencies based on their priority mandated responsibilities and that such efforts are more readily feasible on federal lands with conservation designations.

If listing of western Joshua tree under ESA occurs in the future, the species would receive protection under Section 9 of ESA (16 U.S.C. §1538(a)(2), and additional conservation activity would be reasonably expected. For example, USFWS would be required to designate critical habitat, if prudent and determinable, and would be required to periodically monitor and

evaluate the status of the species. In addition, USFWS may issue protective regulations and develop and implement a recovery plan to benefit the conservation of the species (16 U.S.C. § 1533 (d), (f)). Actions on federal land would be subject to interagency consultation under Section 7 of ESA (16 U.S.C. § 1536). Listing under ESA would provide additional opportunities for cooperation between CDFW and federal agencies in developing a written MOU or other agreement and implementing coordinated conservation actions on federal land. In addition, conservation measures to protect western Joshua tree and its habitat on non-federal land may be included in habitat conservation plans (HCPs) under Section 10 of ESA (16 U.S.C. § 1539(a)).

2.3 CONSERVATION PLANNING PROGRAMS

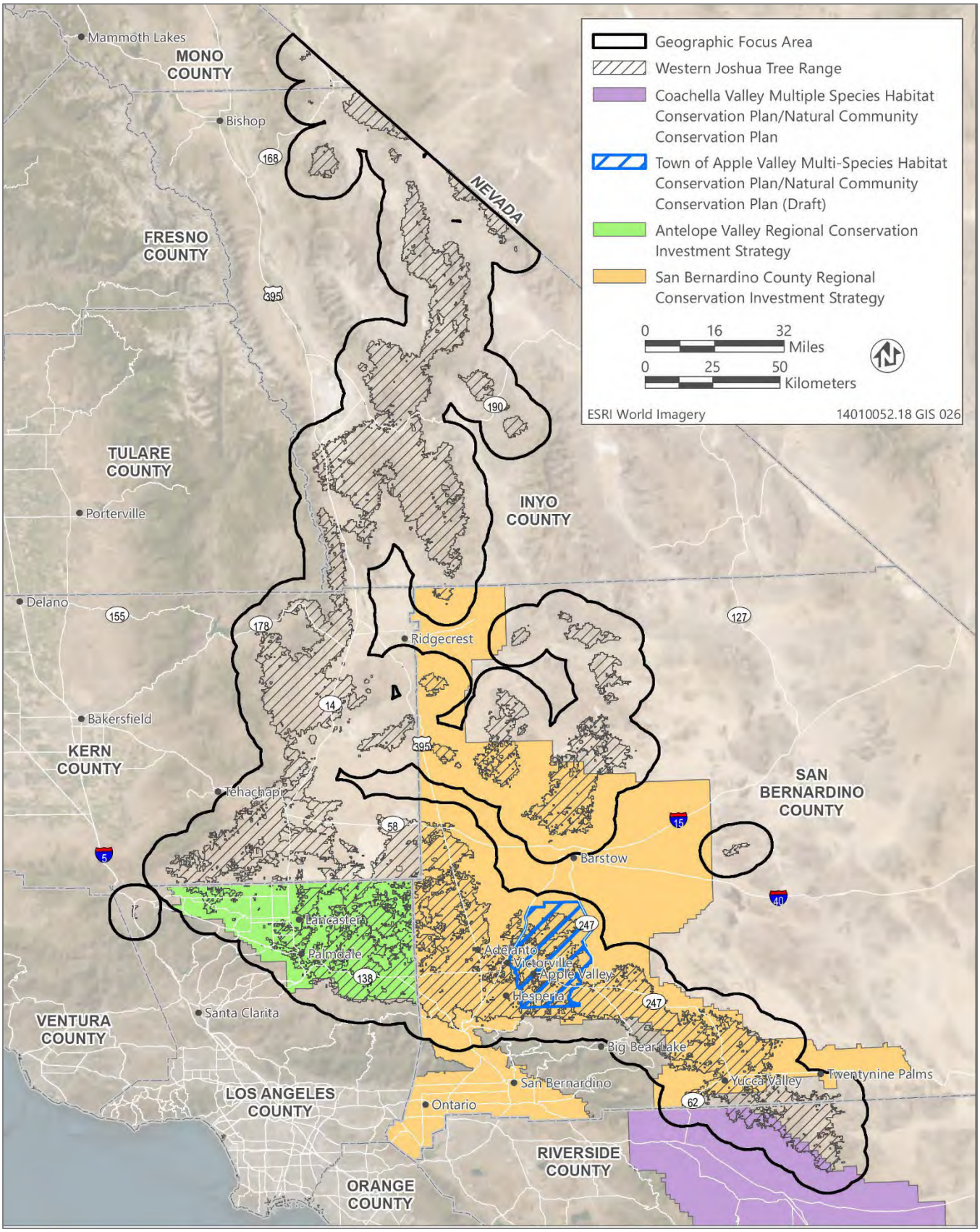
2.3.1 Natural Community Conservation Planning Program

NCCPs are developed under NCCPA (Fish & G. Code, § 2800 et seq.). Required contents of an NCCP and standards related to conservation of biological resources are described in Fish and Game Code, section 2820, subdivision (a). NCCPs must identify and provide measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible and appropriate economic development, growth, and other human uses. NCCPs that have been approved so far cover relatively large geographic areas, allowing for more strategic conservation planning and siting of development activities within the plan area. With the approval of an NCCP, CDFW may authorize the taking of any species that is covered by the NCCP, which significantly streamlines development and other activities within the plan area (Fish & G. Code, § 2835).

In the geographic focus area of the Conservation Plan, no NCCPs that cover western Joshua tree have yet been approved. The geographic focus area overlaps a portion of the Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan (MSHCP/NCCP); however, this approved plan does not provide any specific conservation or management measures for western Joshua tree. The boundaries of the Coachella Valley MSHCP/NCCP are shown in Figure 2-3. Approximately 1 percent of western Joshua tree's range in California is within the Coachella Valley MSHCP/NCCP boundary (Figure 2-3).

2.3.2 Regional Conservation Investment Strategies Program

The CDFW Regional Conservation Investment Strategies (RCIS) Program is a voluntary program that establishes high-quality conservation outcomes at a landscape level and enables advanced mitigation through three primary components: Regional Conservation Assessments (RCAs), Regional Conservation Investment Strategies (RCISs), and Mitigation Credit Agreements (MCAs).



Source: Data downloaded from CDFW in 2023; adapted by Ascent in 2024.

Figure 2-3 Conservation Planning Programs within the Geographic Focus Area

RCAs and RCISs are intended to be ecologically based and may encompass a wide range of habitat types; however, an RCA is broad and is not required to develop an RCIS. MCAs can only be developed under an approved RCIS.

The RCIS program allows any public agency or federally recognized Tribe that is willing to be the lead or co-lead of an RCIS to propose an RCIS document that guides protection of a range of focal plant and wildlife species and habitat types within a specified boundary for regionwide, holistic conservation. An RCIS is a comprehensive guidance document, not a binding regulatory plan. An RCIS document includes goals, objectives, actions, and priorities to guide large-scale conservation within the RCIS area. The RCIS document is developed by the agency or federally recognized Tribe in collaboration with other local entities and interested parties. Once the whole document is drafted and is reviewed and approved by CDFW, the RCIS document becomes publicly available for implementation. Existing or potential conservation and mitigation projects that fall within the RCIS boundary may elect to implement one or more conservation actions.

Within an approved RCIS boundary, an individual or entity may develop an MCA in collaboration with CDFW. An MCA is a mitigation crediting mechanism by which ecological improvements resulting from the implementation of RCIS actions can create mitigation credits for a variety of targeted species, habitats, or other sensitive resources included in an RCIS document. MCA credits can be used to mitigate project impacts, and excess credits can be sold to other entities.

The following sections describe RCIS documents that have been approved within the geographic focus area. The boundaries of these RCIS areas are shown in Figure 2-3.

ANTELOPE VALLEY REGIONAL CONSERVATION INVESTMENT STRATEGY

The Antelope Valley RCIS, developed by the Desert and Mountain Conservation Authority, was approved by CDFW in January 2022 (ICF 2021). Approximately 10 percent of western Joshua tree's range in California is within the Antelope Valley RCIS. The RCIS document describes focal species for which conservation priorities, including permanent protection, enhancement, and habitat restoration, are identified. Western Joshua tree (presumed to be western Joshua tree based on location, but not specified) is identified in the Antelope Valley RCIS as a focal species of high conservation priority. In addition, Joshua tree woodland is identified as a special interest community elevated to the highest emphasis level because of local conservation concern and major threats to over 90 percent of their range, especially with respect to the potential effects of climate change. Joshua tree woodland is also considered a CDFW sensitive natural community (refer to "California Department of Fish and Wildlife" in Section 2.3.4 for additional information on sensitive natural communities).

The Antelope Valley RCIS identifies 43,738 acres of predicted habitat for western Joshua tree within the RCIS area (1 percent of western Joshua tree's range in California) and sets a conservation goal of protecting 23,901 acres of western Joshua tree stands (0.7 percent of western Joshua tree's range in California). Within the 23,901 acres identified for protection, the Antelope Valley RCIS identifies 19,052 acres for permanent protection and 4,849 acres for uplift from their current protection status. These areas represent 0.6 percent and 0.2 percent of western Joshua tree's range in California, respectively. In the context of the Antelope Valley RCIS, "uplift" means a benefit over the current protection status and can include actions such as (1) establishing a conservation easement; (2) providing secure, perpetual funding for management and monitoring of habitat, enforcement of applicable legal and permitting requirements (e.g., CESA, California Environmental Quality Act [CEQA]), and protecting habitat; or (3) implementing specific management actions to improve habitat conditions.

SAN BERNARDINO REGIONAL CONSERVATION INVESTMENT STRATEGY

The San Bernardino County RCIS, developed by the San Bernardino County Transportation Authority, was approved by CDFW in April 2024 (SBCOG 2023). Approximately 31 percent of western Joshua tree's range in California is within the San Bernardino County RCIS. The San Bernardino County RCIS identifies western Joshua tree as a focal species.

2.3.3 Federal Land Management

Approximately 63 percent of western Joshua tree's range in California is on federal land. There are currently no federal range-wide management efforts or recovery plans specifically for western Joshua tree. However, the species receives special protection and focused management by some federal agencies. Relevant management plans are discussed in the following sections. Many of these management plans were developed when western and eastern Joshua tree was considered a single species. Based on the currently known western Joshua tree's range, it is presumed that these plans refer to western Joshua tree where Joshua tree is mentioned, unless otherwise noted.

Source: National Park Service.

Because western Joshua tree's range within California extends into federal land, which is outside the jurisdiction of the State, the conservation approach for the species will be more

effective where state and federal agencies can coordinate to support and enhance conservation actions.

Written MOUs or other agreements executed by CDFW and federal agencies may promote the conservation of western Joshua tree by identifying protective measures not currently being implemented on federal land, as discussed further in Chapter 6, "Implementation." The following sections outline protective measures that are already incorporated in some federal agency management plans and are being implemented in select areas within western Joshua tree's range in California.

Lands managed by federal agencies (e.g., DOD, NPS, BLM, USFS) in the geographic focus area are shown on Figure 2-4. Wilderness areas managed by NPS, BLM, or USFS in the geographic focus area are shown on Figure 2-5. Natural resources in wilderness areas generally receive a high level of protection, including some active management for the benefit of natural resources.

US BUREAU OF LAND MANAGEMENT

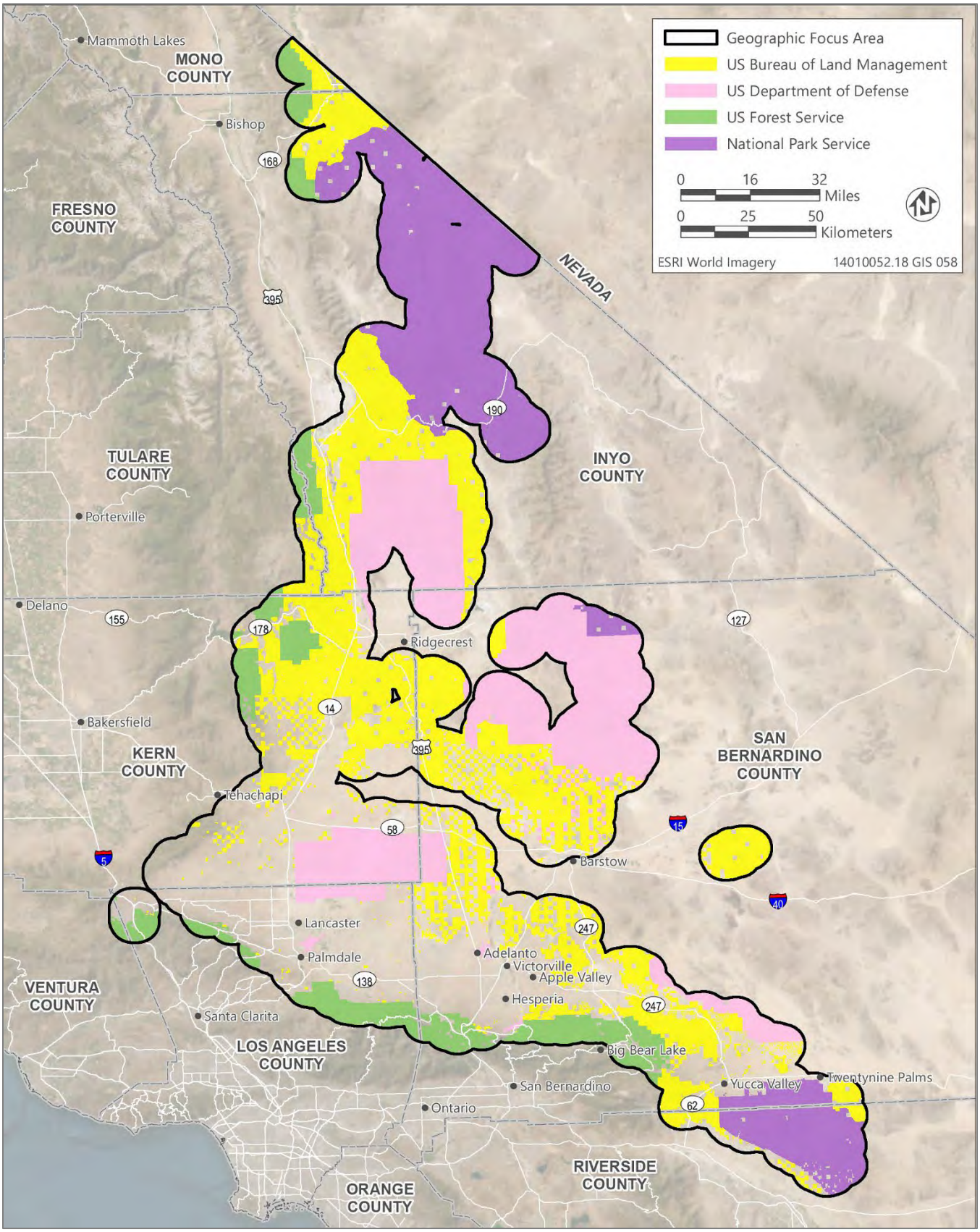
Approximately 3,703 square kilometers (1,429.9 square miles), or 28 percent, of western Joshua tree's range in California, is distributed within lands managed by BLM. BLM was established for the purpose of managing public lands for a variety of uses, such as energy development, livestock grazing, recreation, and timber harvesting while ensuring natural, cultural, and historic resources are maintained for present and future use. BLM lands within the geographic focus area are shown on Figure 2-6.

Wilderness Areas

Several wilderness areas in California managed by BLM support populations of western Joshua tree and provide the species with a high level of protection. These wilderness areas are shown on Figure 2-6 and described in Table 2-2.

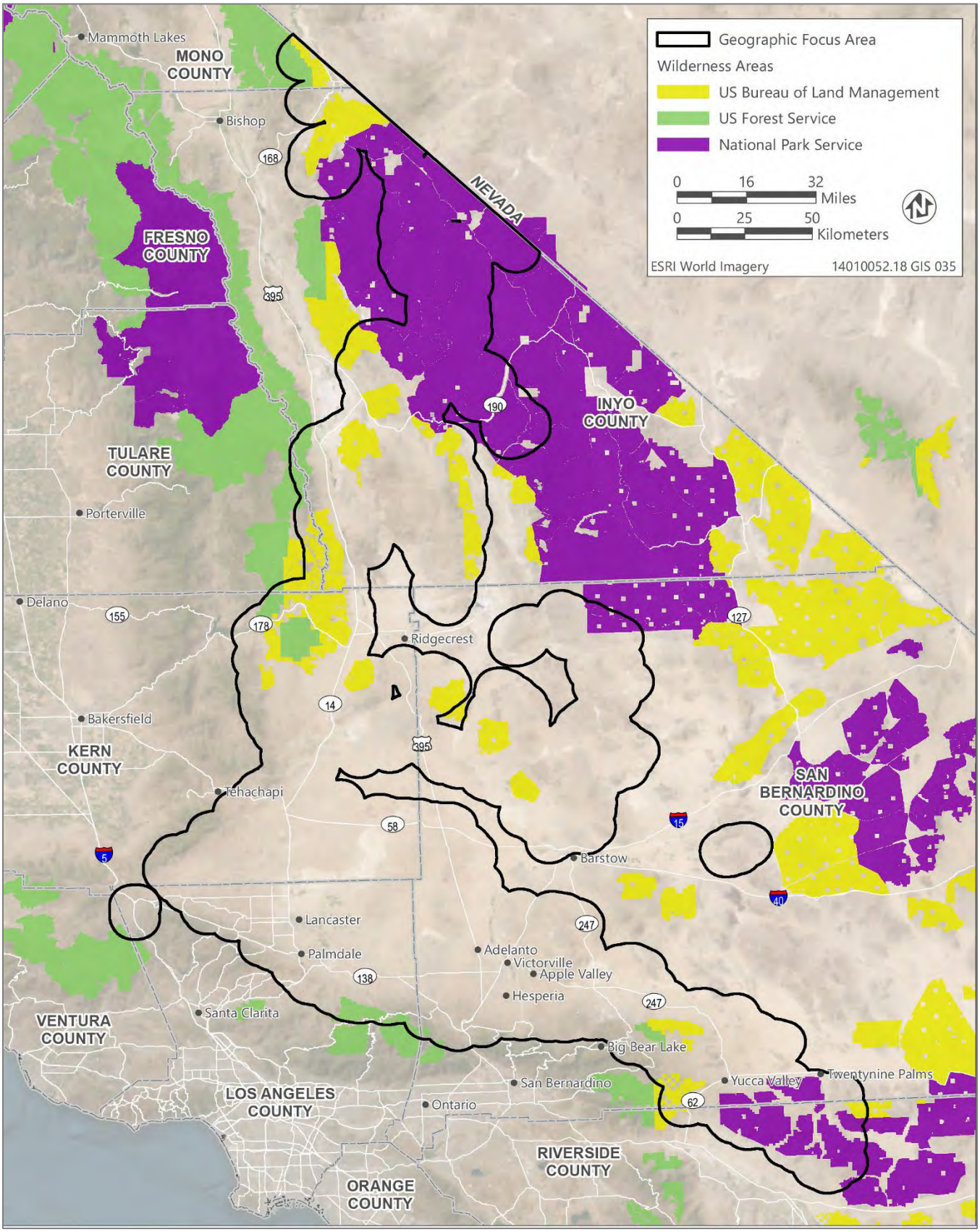
Non-Wilderness Areas

Outside of wilderness areas, populations of western Joshua tree on BLM lands may receive various levels of protection, but some lands supporting western Joshua tree may also be used for purposes other than conservation, such as renewable energy development. BLM has adopted various management plans within the range of western Joshua tree, as discussed in the following sections.



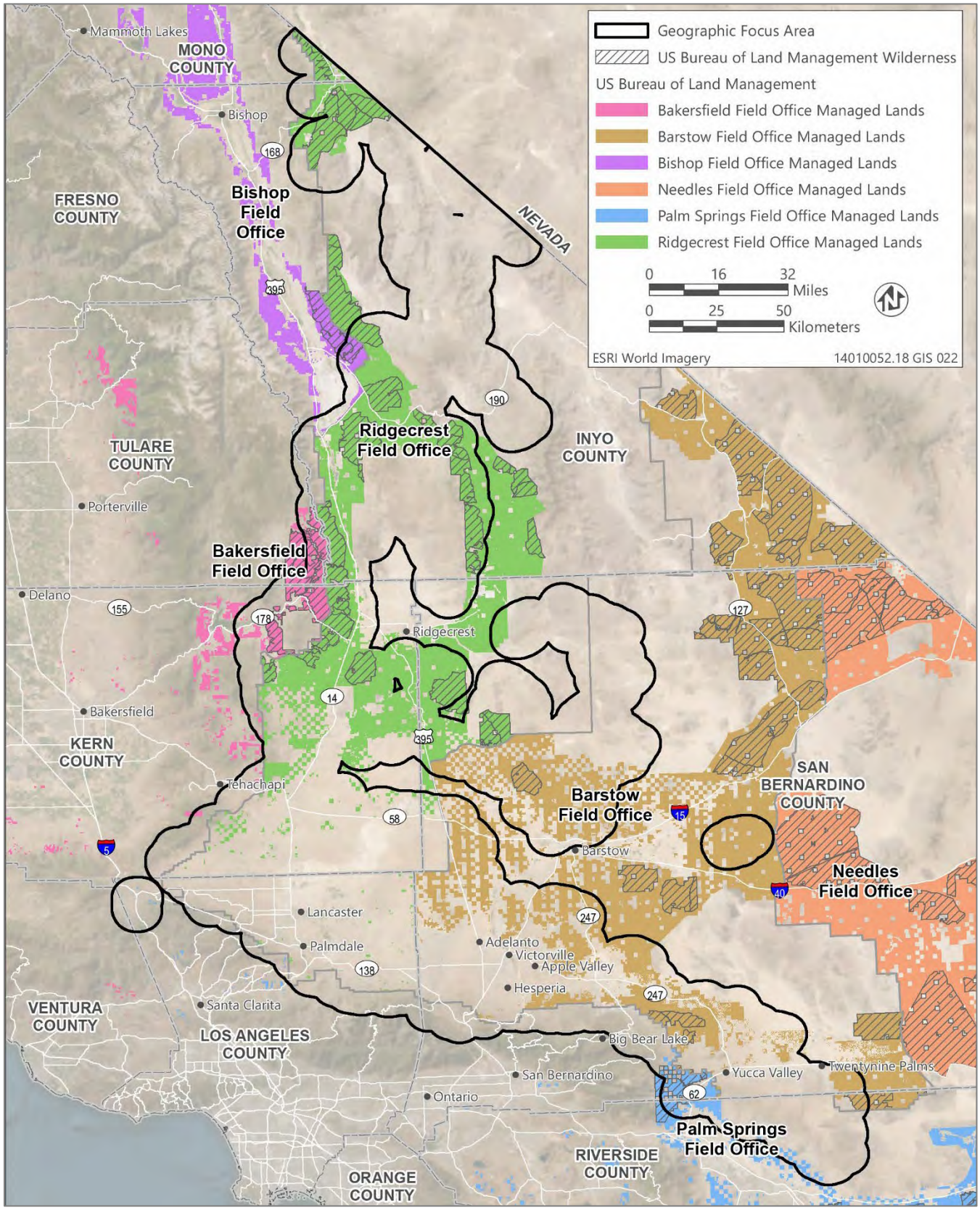
Source: Adapted by Ascent in 2024.

Figure 2-4 Federal Lands within the Geographic Focus Area



Source: Adapted by Ascent in 2024.

Figure 2-5 Federal Wilderness Areas within the Geographic Focus Area



Source: Data downloaded from BLM in 2024; adapted by Ascent in 2024.

Figure 2-6 Bureau of Land Management Lands and Wilderness Areas within the Geographic Focus Area

Table 2-2 US Bureau of Land Management Wilderness Areas in Western Joshua Tree Range in California

Wilderness Area	County	BLM Field Office	Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
Owens Peak Wilderness	Kern	Bakersfield and Ridgecrest	298.5 (115.3)	187.2 (72.3), 1.4	The wilderness area contains creosote bush scrub communities on the bajadas; scattered yuccas (*Yucca* spp.), western Joshua trees, cacti, flowering annuals, cottonwoods (*Populus* spp.), and oaks (*Quercus* spp.) in the canyons and valleys; and juniper and pinyon woodlands with sagebrush and foothill pines (*Pinus sabiniana*) on the upper elevations.
Coso Range Wilderness	Inyo	Ridgecrest	199.4 (77.0)	170.9 (66.0), 1.3	The wilderness area contains large stands of western Joshua trees mixed with low desert shrubs, annuals, cactuses, and creosote bushes (*Larrea* spp.).
Kiavah Wilderness	Kern	Bakersfield and Ridgecrest	357.3 (138.0)	129.9 (50.1), 1.0	The wilderness area is at a transition zone between the Sierra Nevada mountains and the Mojave Desert, with vegetation that includes creosote bush, western Joshua tree, burro bush (*Ambrosia salsola*), and shadscale (*Atriplex confertifolia*) growing near pinyon pine (*Pinus quadrifolia* or *Pinus monophylla*), juniper (*Juniperus* spp.), canyon oak (*Quercus chrysolepis*), and foothill pine.
Bighorn Mountain Wilderness[1]	San Bernardino	Barstow and Palm Springs	155.2 (59.9)	101.5 (39.2), 0.8 [2]	The wilderness area is a transition zone between the yucca- and western Joshua tree-covered desert floor and stands of Jeffrey pine (*Pinus jeffreyi*) in the higher elevations.

Wilderness Area	County	BLM Field Office	Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
Malpais Mesa Wilderness	Inyo	Ridgecrest	129.1 (49.8)	95.8 (37.0), 0.7	The wilderness area contains creosote, low desert shrubs, and grasses in the lower elevations; western Joshua trees at middle elevations on the eastern side; and pinyon pines and junipers at higher elevations.
Sacatar Trail Wilderness	Inyo	Bakersfield and Ridgecrest	210.0 (81.1)	91.7 (35.4), 0.7	The wilderness area contains western Joshua trees, creosote bush, and other desert shrubs in the lower elevations and scattered pinyon and juniper woodlands dotted with cactuses in the higher elevations.
Sylvania Mountains Wilderness	Inyo	Ridgecrest	75.6 (29.2)	74.3 (28.7), 0.6	This wilderness area contains sagebrush scrub in the eastern portions and pinyon pine and juniper at higher elevations. Western Joshua trees are widely distributed in the wilderness area.
Grass Valley Wilderness	San Bernardino	Ridgecrest and Barstow	122.2 (47.2)	69.4 (26.8), 0.5	The wilderness area contains a few western Joshua trees, but the vegetation is dominated by a creosote bush scrub community.
Piper Mountain Wilderness	Inyo	Bishop and Ridgecrest	293.7 (113.4)	55.7 (21.5), 0.4	The wilderness area contains one of the northernmost stands of western Joshua tree at the base of the Inyo Mountains. Sagebrush and pinyon-juniper woodlands are the most common vegetation communities, although conifers grow in some of the higher elevations.
Argus Range Wilderness	Inyo	Ridgecrest	266.0 (102.7)	49.3 (19.0), 0.4	This wilderness area contains creosote scrub communities on the lower slopes, occasional pinyon-juniper communities at higher elevations, and western Joshua tree forests.

Wilderness Area	County	BLM Field Office	Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
Bright Star Wilderness	Kern	Ridgecrest	38.5 (14.9)	24.4 (9.4), 0.2	The wilderness area contains stands of pinyon pine and juniper in the higher elevations, and the lower elevations contain shrubs, large granite outcropping, and western Joshua trees.
El Paso Mountains Wilderness	Kern	Ridgecrest	96.2 (37.1)	16.4 (6.3), 0.1	The wilderness area is dominated by creosote bushes, whereas western Joshua trees are found on the western side of Black Mountain.
Inyo Mountains Wilderness[1]	Inyo	Ridgecrest	506.2 (195.4)	14.9 (5.7), 0.1	The wilderness area is dominated by creosote, shadscale scrub, and sagebrush at lower elevations. Riparian habitat found in the canyons, pinyon-juniper woodlands are found on some slopes, and bristlecone pine (*Pinus longaeva*) and limber pine (*Pinus flexilis*) grow in the higher elevations. Western Joshua trees are found in the southeasternmost portion of the wilderness area.
Darwin Falls Wilderness	Inyo	Ridgecrest	33.1 (12.8)	11.4 (4.4), 0.1	The wilderness area is dominated by a creosote bush community, with western Joshua tree woodlands higher in the hills.
Golden Valley Wilderness	San Bernardino	Ridgecrest	152.9 (59.0)	6.4 (2.5), 0.1	The wilderness area contains flowering annuals and is dominated by creosote bush scrub community, but also contains western Joshua trees on the mountainsides.
Domeland Wilderness	Tulare, Kern	Bakersfield	526.4 (203.2)	2.5 (1.0), <0.1	The wilderness area contains mostly pinyon pine and sagebrush. Western Joshua trees are found in the southernmost portion of the wilderness area.

Wilderness Area	County	BLM Field Office	Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
White Mountains Wilderness[2]	Mono	Bishop and Ridgecrest	934.7 (360.9)	2.0 (0.8), <0.1	The wilderness area contains one of the largest and highest desert mountain ranges. The wilderness area is known for its high-elevation bristlecone pine forest, but western Joshua trees have been observed in the desert portions.
Black Mountain Wilderness	San Bernardino	Barstow	83.2 (32.1)	1.0 (0.4), <0.1	The wilderness area contains a mesa rising above an expanse of desolate, ancient lava flows. Western Joshua trees are present in the wilderness area.
San Gorgonio Wilderness[3]	San Bernardino, Riverside	Barstow and Palm Springs	390.9 (150.9)	0.1(<0.1), <0.1	This wilderness area is in a landscape that transitions between desert, coastal, and mountain environments, including different types of vegetation representative of each elevation. Western Joshua trees are present in the BLM-managed part of the wilderness area.

Notes: sq mi = square miles.

[1] BLM and USFS manage separate parts of this wilderness area; however, western Joshua trees occur only in the area managed by BLM. Therefore, the sizes of the wilderness area and western Joshua tree range in the wilderness area represent only the area of land managed by BLM.

[2] BLM and USFS manage separate parts of this wilderness area. The western Joshua tree range in the wilderness area represents only the area of land managed by BLM.

[3] BLM and USFS manage separate parts of this wilderness area.

Source: Esque et al. 2023; compiled by Ascent in 2024.

Source: Jesse Pluim, Bureau of Land Management.

California Desert Conservation Area Plan

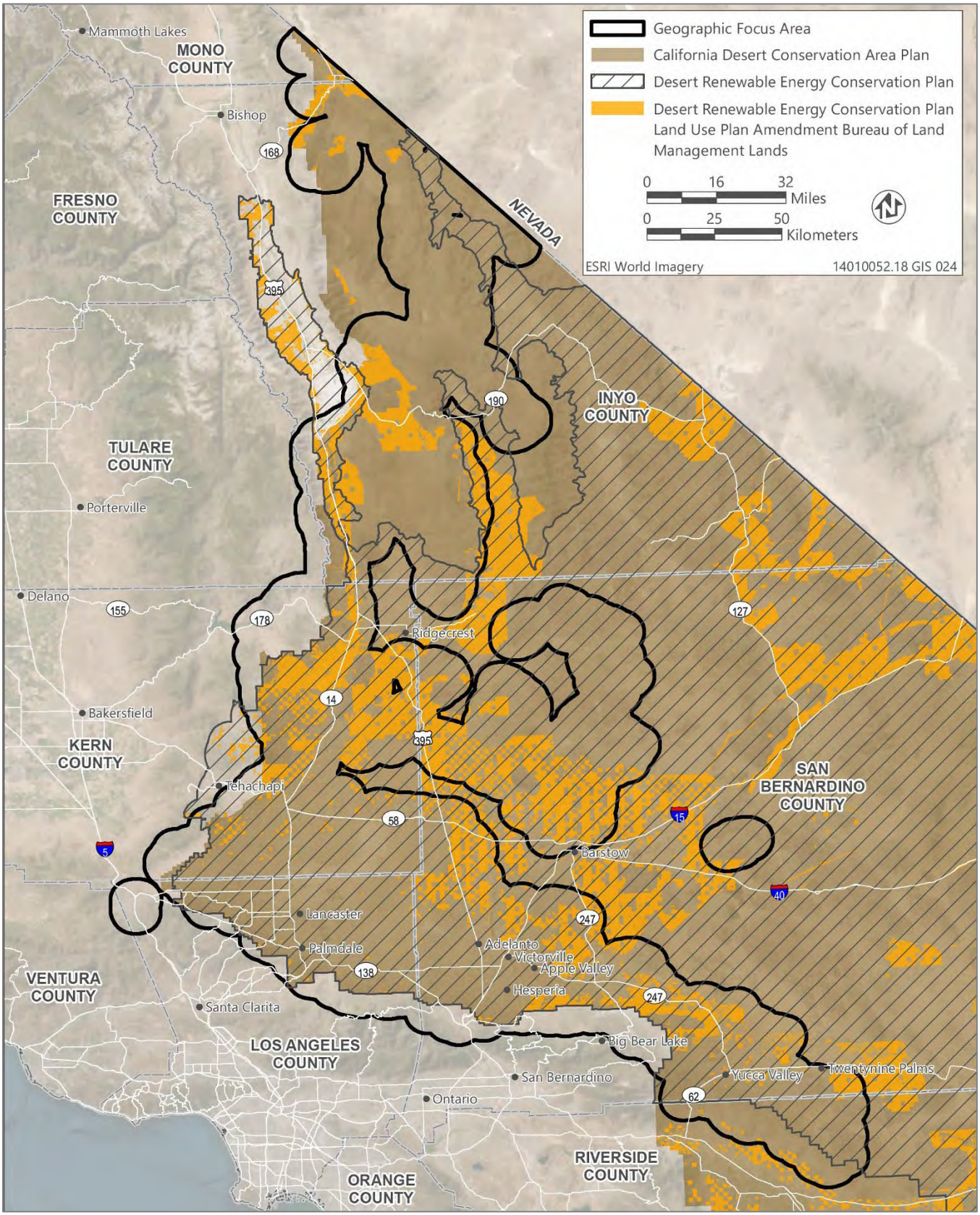
The Federal Land Policy and Management Act was enacted by Congress in 1976 to direct the management of public lands of the United States. Section 601 of the Federal Land Policy and Management Act established the California Desert Conservation Area (CDCA), which encompasses 25 million acres of resource-rich desert lands in Southern California. Twelve million acres within CDCA are public lands administered by BLM. Section 601 of the Federal Land Policy and Management Act directs BLM to prepare a comprehensive long-range plan for CDCA that establishes guidelines for the management of public lands. The CDCA Plan was completed in 1980 and amended in 1999.

The CDCA Plan does not identify specific protections for western Joshua tree, but includes a Vegetation Element that contains goals related to conserving listed species, preserving unusual plant assemblages, managing wetland and riparian areas, maintaining the continued existence and biological viability of vegetation resources in CDCA while providing for consumptive needs, providing guidance for the manipulation of plant habitats or vegetation, and encouraging the use of private lands for commercial production of valuable desert plants. The CDCA Plan identifies 55 acres of Joshua tree woodland in the Superior Valley of San Bernardino County as a management area with the goal to "protect, stabilize, and enhance values" (BLM 1999). DRECP, an amendment to the CDCA Plan, is discussed in the following section. The CDCA Plan boundary, as amended, is shown in Figure 2-7.

Desert Renewable Energy Conservation Plan

DRECP is a landscape-level plan that was developed to provide effective protection and conservation of desert ecosystems while allowing for the appropriate development of solar, wind, and geothermal energy projects and promoting outdoor recreation opportunities within CDCA. DRECP covers 22.5 million acres in seven California counties—Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and San Diego—including 10.8 million acres of public lands managed by BLM.

DRECP was developed by BLM, USFWS, CDFW, and the California Energy Commission, collectively known as the Renewable Energy Action Team. In addition to the Renewable Energy Action Team, the planning process involved the California State Lands Commission (CSLC), California Public Utilities Commission, California State Parks (CSP), NPS, and DOD, as well as cities, counties, Tribes, industry groups, utilities, and nongovernmental environmental organizations.



Source: Data downloaded from Data Basin in 2024; adapted by Ascent in 2024.

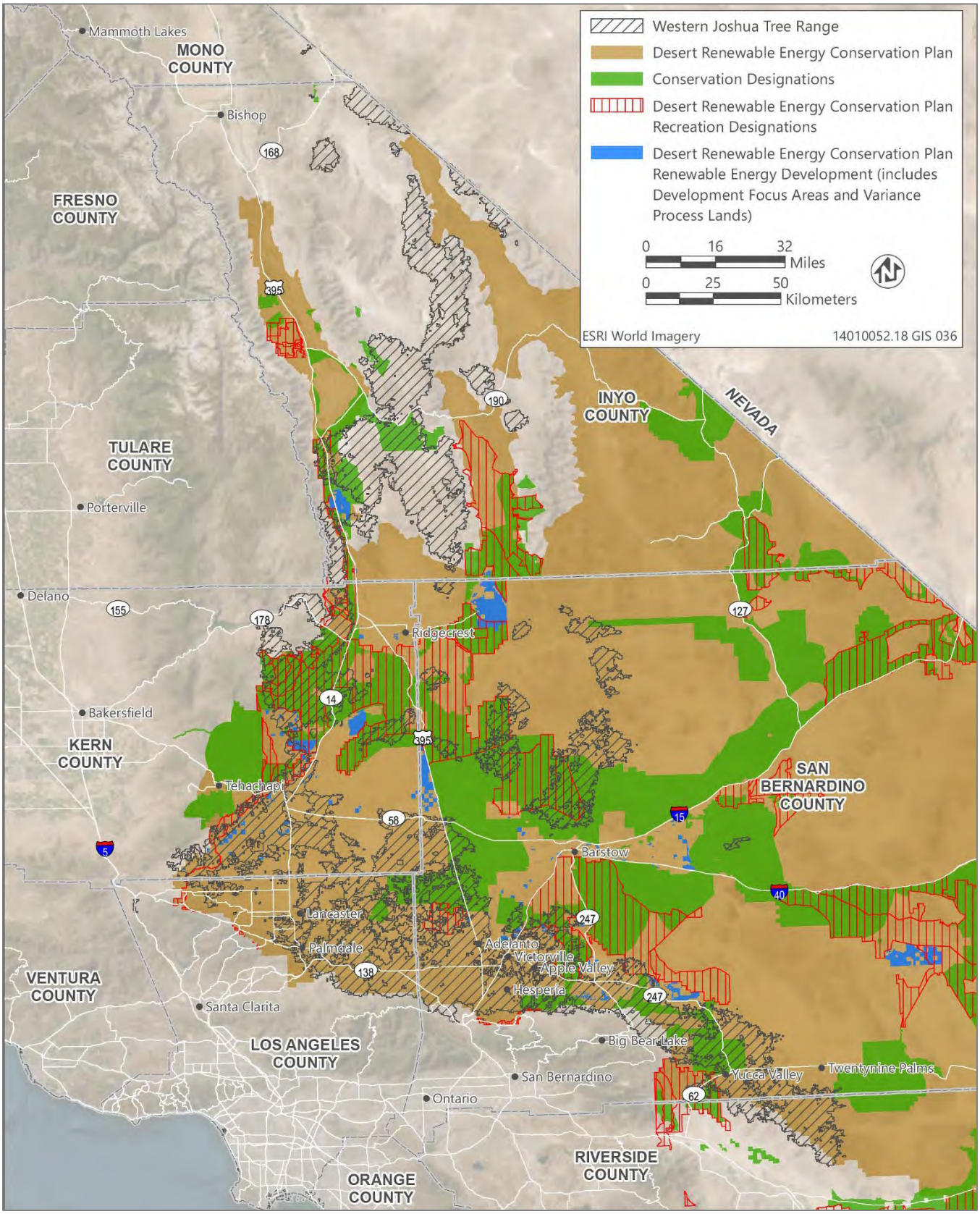
Figure 2-7 California Desert Conservation Area and Desert Renewable Energy Conservation Plan within the Geographic Focus Area

In September 2016, as part of DRECP, BLM adopted its Land Use Plan Amendment (LUPA) to the CDCA Plan, Bishop Resource Management Plan, and Bakersfield Resource Management Plan (BLM 2016). LUPA amends preexisting land designations, identifying 4.2 million new acres for conservation that are closed to renewable energy development on BLM-managed public lands and 3.5 million acres with recreation designations, which are generally closed to renewable energy development. The land designations under LUPA are shown in Figure 2-8. Under LUPA, approximately 24 percent of western Joshua tree's range in California is designated for conservation, 12 percent is designated for recreation, and 1 percent is designated for renewable energy development.

Approximately 32 square kilometers (12.2 square miles), or roughly one third of areas open for renewable energy development in DRECP, are within western Joshua tree's range and classified as ecologically core or ecologically intact (Randall et al. 2010; Parker et al. 2018). Areas for renewable energy development are referred to as Development Focus Areas and Variance Process Lands in DRECP. Development Focus Areas are areas with substantial energy generation potential, access to existing or planned transmission, and low resource conflicts. Variance Process Lands are areas where renewable energy development may be considered, but are subject to a variance process with specific permitting requirements. Ecologically core refers to lands with high landscape integrity that support conservation targets and are located in areas where protection is critical for the long-term conservation of the ecoregion's biological diversity (Randall et al. 2010). Ecologically intact lands have high landscape integrity or support conservation targets and require protection to continue to support ecological processes and provide connectivity (Randall et al. 2010).

To minimize impacts from development, LUPA includes the following objective that guides the protection of western Joshua tree on BLM-managed lands:

- **Objective 1.4:** Conserve unique landscape features, important landforms, and rare or unique vegetation types identified within the BLM Decision Area [i.e., BLM-managed surface lands and federal mineral estate lands within the DRECP planning area], including:
    - Desert riparian and wetland resources in the planning area, including riparian habitat (including microphyll woodlands), desert playas, and seeps/springs;
    - Areas of dense Joshua tree woodland;
    - Areas with unique geological activity and/or paleontological interest;
    - Rare vegetation alliances.



Source: Data downloaded from Data Basin in 2024; adapted by Ascent in 2024.

Figure 2-8 Land Use Designations under the Bureau of Land Management Land Use Plan Amendment to the Desert Renewable Energy Conservation Plan

LUPA also identifies conservation and management actions to protect biological resources. LUPA-BIO-1 requires a habitat assessment, which includes identification or delineation of Joshua trees and suitable habitat to inform siting and design considerations for all authorized activities on BLM-managed public lands. LUPA-BIO-SVF-1 requires habitat assessment of special vegetation features, which include Joshua tree woodland, for activity-specific National Environmental Policy Act analysis. LUPA-BIO-SVF-5 requires that impacts on Joshua tree woodlands be avoided to the maximum extent practicable (BLM 2016).

In 2016, BLM commissioned a report that analyzed the 6-year planning process leading to the release of the draft DRECP in 2014 (Bengston et al. 2016). The report describes the lessons learned and recommendations for future landscape-scale planning processes based on interviews with representatives of government agencies, Native American tribes, consultants, scientists, and other interested parties.

In support of the Conservation Plan, CDFW could enter into a written MOU or other agreement with BLM to minimize renewable energy development in areas that currently support ecologically core or intact habitat for western Joshua tree or in areas that could serve as potential climate refugia for the species on BLM-managed lands. As part of these agreements, CDFW could also provide input on mitigation measures or other conditions of permit approval to reduce impacts on western Joshua tree (e.g., guidelines for relocation, seed collection).

Wildland Fire Management Program

The BLM Wildland Fire Management Program is responsible for fire management, including wildland fire suppression and prescribed fire, for the protection of natural resources on public lands. Because these public lands are intermixed with land owned and managed by other federal, state, and local government entities, BLM collaborates with other fire management agencies and is a member of the National Wildfire Coordinating Group. BLM is working to preserve ecosystems that are not currently affected by invasive plants, while restoring ecological balance in other ecosystems where invasive plants are changing the landscape and increasing wildland fire risk (BLM n.d.). BLM also participates in the interagency Burned Area Emergency Response program to address post-wildland fire recovery. The Conservation Plan presents an opportunity for CDFW to collaborate on best management practices related to western Joshua tree and its habitat for fire crews and fire resource advisors in initial wildland fire response.

Covington Flats in Joshua Tree National Park under smoke from the Apple Fire.

Source: National Park Service.

US DEPARTMENT OF DEFENSE

Approximately 2,321 square kilometers (896.3 square miles), or 18 percent, of western Joshua tree's range in California is within lands managed by DOD. Military installations within the geographic focus area are shown on Figure 2-9.

DOD's mission does not specifically include management of lands for the benefit of natural resources, but the Sikes Act (16 U.S.C. § 670 et seq.) directs DOD to cooperate with USFWS and state fish and wildlife agencies to carry out a program for the conservation and rehabilitation of natural resources on military installations.

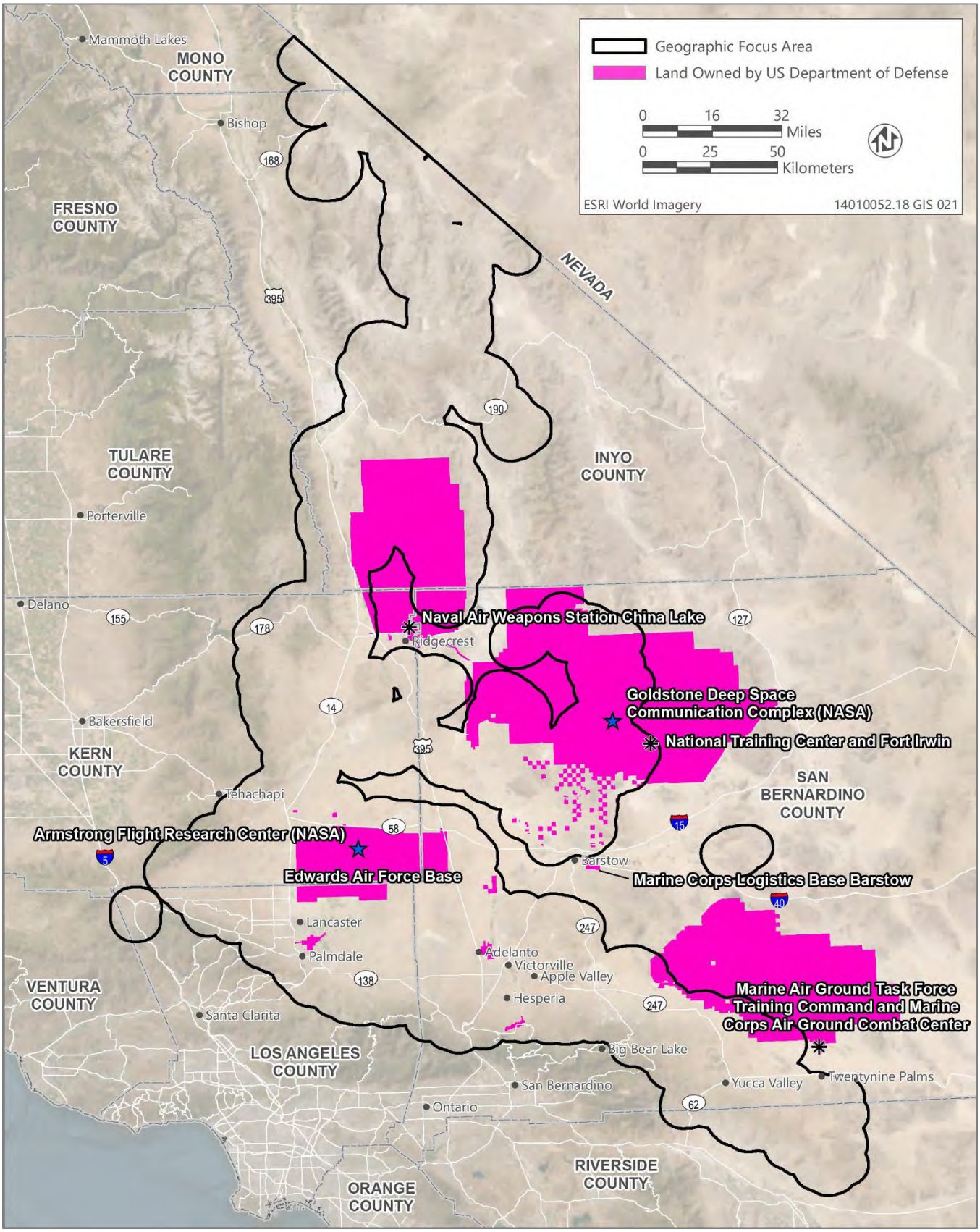
The Sikes Act requires DOD to develop and implement Integrated Natural Resources Management Plans (INRMPs) to guide the management of natural resources on military lands. INRMPs use an ecosystem-based approach and balance conservation and mission activities to ensure "no net loss" from testing, training, and operational activities (DOD 2023). INRMPs are valid for a period of 5 years and must be reviewed by USFWS, the relevant state agency, and the military installation.

INRMPs present an opportunity for CDFW to coordinate with military installations on management goals and actions that support the conservation of western Joshua tree on military lands. These plans could further serve as the foundation for a written MOU or other agreement between CDFW and DOD regarding the conservation of western Joshua tree. The INRMPs for the military installations within the geographic focus area that relate to the conservation of western Joshua tree are described in the following sections.

Mojave Desert Installations

Edwards Air Force Base

The US Air Force adopted a 2020-2025 INRMP for the Edwards Air Force Base to support natural resources management in accordance with the Sikes Act (US Air Force 2020). The INRMP identifies 52,719 acres of Joshua tree woodland within the Edwards Air Force Base. Overall, the US Air Force's primary management goals for desert woodlands are to "conserve these limited natural resources for [the benefit of] threatened and endangered species and other wildlife and to maintain the integrity of the desert ecosystem. For western Joshua trees specifically, the Environmental Management Directorate of the US Air Force encourages conserving the species wherever feasible. The INRMP references the Air Force Flight Test Center's 1994 *Edwards Air Force Base Revegetation Plan* (US Air Force 1994, cited in US Air Force 2020), which recommends planting Joshua trees to maintain the diversity of natural habitats on base. The US Air Force conducts western Joshua tree restoration efforts at the base in accordance with the recommendations in the *Edwards Air Force Base Revegetation Plan*.



Source: Adapted by Ascent in 2024.

Figure 2-9 US Department of Defense Lands within the Geographic Focus Area

The INRMP also states that the US Air Force implements avoidance and minimization measures to reduce individual fatalities of western Joshua tree and disturbance of its habitat (US Air Force 2020). Edwards Air Force Base previously identified all western Joshua trees over 3 meters (approximately 10 feet) in height using photogrammetry, light detection, and ranging data and has reported that populations on the base are stable to increasing (412 CEG/CEVA 2017, cited in US Air Force 2020).

Edwards Air Force Base is collaborating with the USFWS Joshua Tree Biological Working Group to develop standardized western Joshua tree monitoring procedures. Because of the substantial acreage of Joshua tree woodland on the base and the US Air Force's management goals for the species, a written MOU or other agreement between Edwards Air Force Base and CDFW could be beneficial to western Joshua tree conservation.

Western Joshua tree at Edwards Air Force Base. Source: US Geological Survey.

Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center

The INRMP for the Marine Air Ground Task Force Training Command and Marine Corps Air Ground Combat Center (Combat Center) located in Twentynine Palms provides a strategy for natural resource management on the installation (MAGTFTC MCAGCC 2024). The INRMP states that yucca woodlands (identified as "Joshua Trees and/or Mojave Yucca" in the INRMP) are located in the southwestern and northwestern portions of the Combat Center and cover 0.4 percent of the installation. The Combat Center has not established formal protections for western Joshua tree but incorporates measures to avoid and minimize impacts. These protections include inventorying all known western Joshua trees on the installation, maintaining a 1-kilometer (approximately 0.6-mile) no-train buffer at the base boundary that reduces potential for indirect impacts, and establishing restricted areas around portions of the population. During subsequent updates of the INRMP, CDFW has the opportunity to collaborate with the Combat Center on establishing formal protections for western Joshua tree and developing management goals and actions to support conservation of the species on the installation.

National Training Center and Fort Irwin

The INRMP for the National Training Center and Fort Irwin provides a strategy for natural resource management at the facilities. The INRMP notes that Joshua tree is a species of

special concern and has a limited distribution and density on the National Training Center and Fort Irwin. The INRMP states that if removal of Joshua trees is necessary, trees must be relocated to sites with the same orientation and similar characteristics as their original sites to reduce the risk of tree mortality (US Army 2006).

Naval Air Weapons Station China Lake

The INRMP for the Naval Air Weapons Station China Lake provides a strategy for natural resource management at the station. The INRMP for Naval Air Weapons Station China Lake does not list western Joshua tree as a sensitive species but discusses the sensitivity of the species to fire and mentions transplantation of western Joshua tree as a component of revegetation or landscaping (US Navy n.d.).

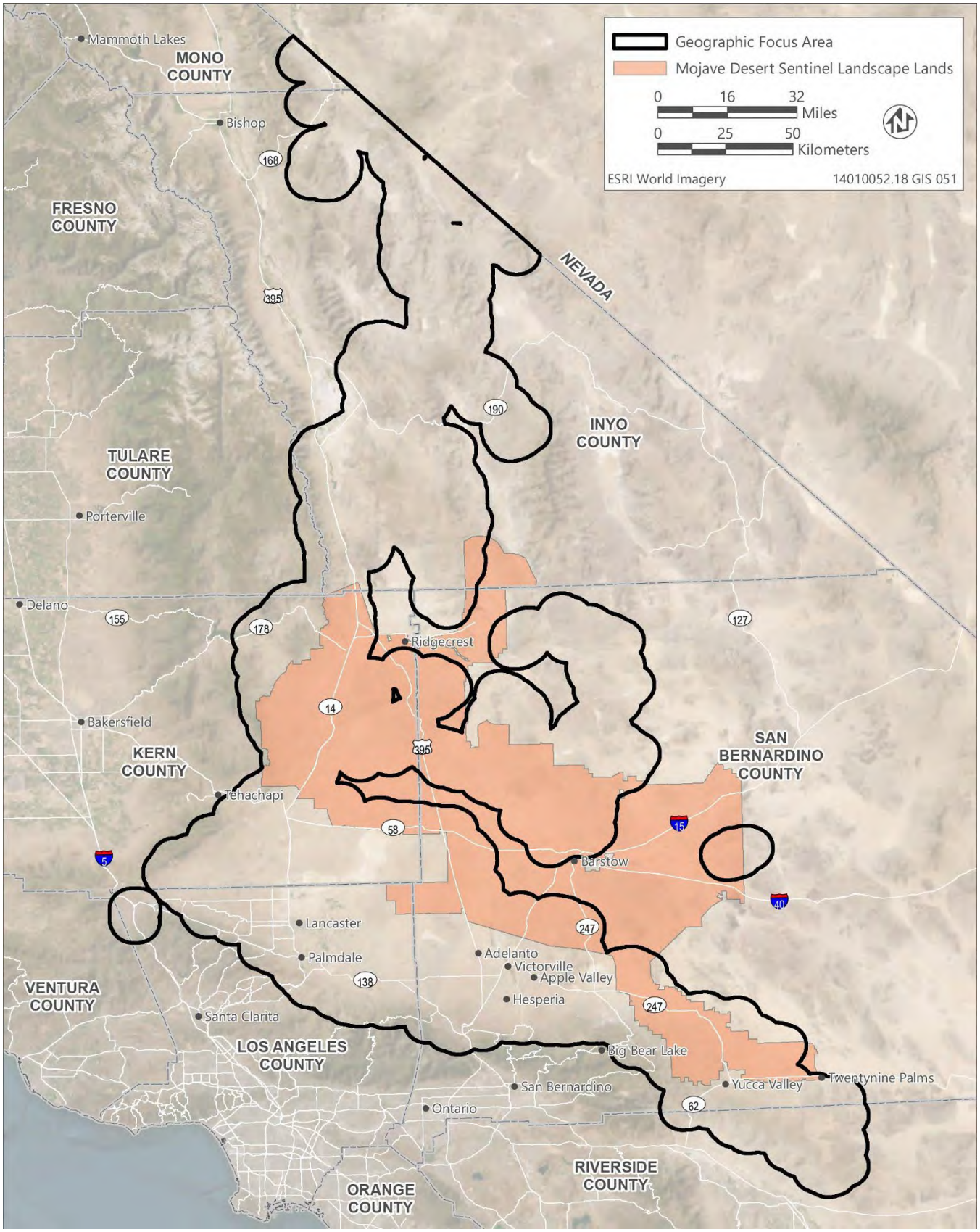
Department of Defense Wildland Fire Management Plans

DOD uses Wildland Fire Management Plans to guide the application of prescribed fire and the response to and recovery from wildland fire incidents on military installations. Each installation manages wildland fires according to its mission, location, community, and the natural resources, ecosystems, and species that are present. Wildland fire planning is integrated with installation INRMPs so that ecological processes, impacts, and benefits are evaluated (DOD 2022). Because wildland fires occur across jurisdictions, an interagency approach to wildland fire planning, prevention, response, and recovery is necessary. DOD is a member of the National Wildfire Coordinating Group, which includes other federal, tribal, state, and local partners.

Sentinel Landscapes Partnership

The Sentinel Landscapes Partnership is a coalition of federal agencies, state and local governments, and NGOs that work with private landowners to advance sustainable land management practices around military installations and ranges. The partnership was founded by the US Department of Agriculture, DOD, and the Department of the Interior. To fulfill the partnership's mission of conserving natural resources, the Sentinel Landscapes Partnership connects private landowners with voluntary state and federal assistance programs that provide funding for conservation easements, among other things.

The Mojave Desert Sentinel Landscape (MDSL) was designated on May 15, 2024 (Clark 2024), which will allow a coalition of state, federal, tribal, and local partners to address encroachment threats, resource concerns, and climate resilience priorities. The MDSL area is 3,539,077 acres, encompassing 2,074,754 acres of federal land (59 percent of the western Joshua tree range in California), 124,870 acres of state land (4 percent of the species' California range), and 1,337,821 acres of private land (38 percent of the species' California range). MDSL lands include the mountain foothills, sand washes, playas, and desert mountains of the Mojave Desert and Sierra Nevada (Figure 2-10).



Source: Data received from CDFW in 2024; adapted by Ascent in 2024.

Figure 2-10 Mojave Desert Sentinel Landscape Lands within the Geographic Focus Area

Western Joshua trees are found on all five DOD installations in the Mojave Desert, described in the previous section. In the MDSL proposal, western Joshua tree is identified as one of the more than 40 threatened, endangered, or sensitive species targeted for conservation. The proposal identifies the potential to work collaboratively with entities such as CDFW to support the following goals, which are relevant to the Conservation Plan:

- Facilitate connectivity to increase species and climate resilience.
- Provide community outreach in tandem with habitat improvements to increase the success of restoration and proactive conservation activities that support climate resiliency.
- Reduce and mitigate impacts from unauthorized off-highway vehicle (OHV) use, which compromises vegetation, soil integrity, and habitat.
- Reclaim and rehabilitate priority habitats by supporting protection, restoration, wildlife restoration, and rehabilitation of up to 50,000 acres of the MDSL.
- Develop sustainable seed propagation and climate resilient seed growing cooperatives.

The proposal also identifies the potential to leverage state funding programs to implement protection, restoration, and rehabilitation activities. CDFW has the opportunity to provide input on shared goals, establish regional priorities, and leverage funding for implementation of projects that support western Joshua tree conservation within MDSL lands.

National Aeronautics and Space Administration Facilities

The National Aeronautics and Space Administration (NASA) operates two facilities within the geographic focus area—the Armstrong Flight Research Center, which is located within Edwards Air Force Base, and the Goldstone Deep Space Communication Complex, which is associated with the US Army Fort Irwin National Training Center (Figure 2-9). Western Joshua trees are present at both facilities. NASA has not adopted specific management plans addressing conservation of the species; however, NASA strives to protect ESA-listed species and to limit adverse effects on state-specific and local species of concern in accordance with applicable federal and state laws and regulations. NASA also strives to be proactive in species management, helping to protect the ecological integrity of critical habitat and promote populations of endangered and threatened species (NASA 2024). For example, NASA installed a new antenna at the Gladstone Deep Space Communications Complex in 2020. As part of the project, NASA developed a mitigation plan that involved installing perimeter exclusion fences around some western Joshua trees and transplanting trees that could not be avoided (Wilder Ecological Consulting 2024). If CDFW enters into a written MOU or other agreement for management of western Joshua tree within Edwards Air Force Base and the US Army Fort Irwin National Training Center, NASA could also be a party to the agreement.

NATIONAL PARK SERVICE

Approximately 1,934 square kilometers (746.5 square miles), or 15 percent, of western Joshua tree's range in California, are distributed within lands managed by NPS. Joshua Tree National Park and Death Valley National Park, which are located within California and administered by NPS, have native populations of western Joshua tree (Figure 2-11). Mojave National Preserve, which is also administered by NPS, is outside the current range of western Joshua tree, but supports populations of eastern Joshua tree. The preserve is shown on Figure 2-11 for reference to discussions in Section 5.2, "Management Actions Necessary to Conserve Western Joshua Tree."

Natural resources on lands managed by NPS generally receive a high level of protection, including some active management, although some of these resources may be adversely affected by recreational use, development and maintenance of related infrastructure, wildland fire, and invasive species. As detailed in the following sections, NPS is implementing management practices to conserve western Joshua tree within Joshua Tree National Park, and the Agency began to implement management practices to conserve eastern Joshua tree within Mojave National Preserve following the 2020 Dome Fire.

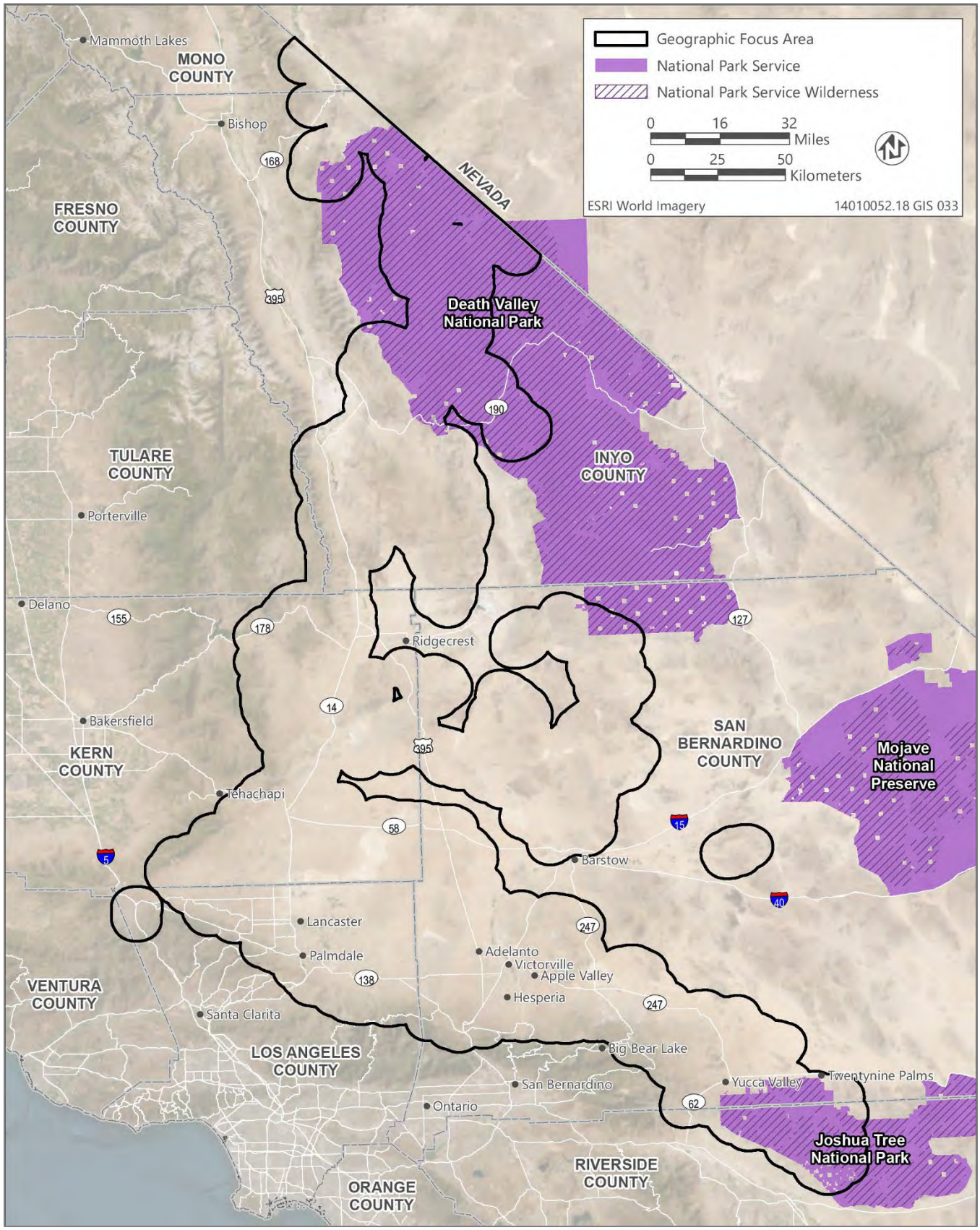
NPS's experience with Joshua tree conservation has fundamental influence on the Conservation Plan, particularly where it can inform CDFW protocols for the successful relocation of western Joshua trees. A summary of NPS's input on the Conservation Plan to date is provided in Chapter 6.

The Conservation Plan will provide an opportunity for CDFW and NPS to engage in cooperatively coordinated conservation actions. As discussed above, the Conservation Plan could support the development of a written MOU or other agreement and may also influence the development of new NPS management policies or updates to existing policies.

The following two systemwide and park-specific management plans and practices that are relevant to the conservation of western Joshua tree are discussed in the following sections.

National Park Service Management Policies 2006

NPS adopted *Management Policies 2006*, which serves as the primary guide for management of the National Park System. *Management Policies 2006* does not contain specific policies for western Joshua tree or other individual species. Rather, it sets forth general principles for the management of biological resources, including principles for the management and restoration of native plants and animals, management of threatened and endangered plants and animals, maintenance of altered plant communities, harvest of plants and animals by the public, and NPS actions that remove native plants and animals (NPS 2006).



Source: Data downloaded from NPS in 2024; adapted by Ascent in 2024.

Figure 2-11 National Park Service Lands within the Geographic Focus Area

National Park Service Fire Management

To fulfill its mission, NPS manages wildland fire to protect the public, park communities, and infrastructure; conserve natural and cultural resources; and maintain and restore natural ecosystems and processes. NPS also participates in the interagency Burned Area Emergency Response program to address post-wildland fire recovery. Because NPS manages wildland fire in consideration of natural resources and ecosystem processes, NPS fire management principles and strategic guidelines are expected to have a positive influence on conservation outcomes for western Joshua tree.

Director's Order #18 contains the basic principles and strategic guidelines governing the management of wildland fire by NPS. Under Director's Order #18, each national park with burnable vegetation must have an approved fire management plan. The current fire management plan for Joshua Tree National Park provides for full suppression of all fires, including those naturally caused, until more research is collected on fire behavior and fire effects in the park and across the Mojave Desert. Park biologists are monitoring the long-term consequences of fire in desert ecosystems, as well as the effectiveness of treatments designed to hasten ecosystem recovery, to inform future fire management policies (NPS 2024).

Wildland fire at Joshua Tree National Park.
Source: National Park Service.

Death Valley National Park has a policy to suppress wildland fires and implement all fire management actions using methods, equipment, and tactics that cause the least impact to natural and cultural resources. The park also has a policy to develop fire management strategies based on science including field observations of fire effects and post-burn monitoring of selected sites (NPS 2021b).

Joshua Tree National Park

Superintendent's Compendium

The Superintendent's Compendium is a compilation of designations, closures, permit requirements, and other restrictions made by the superintendent. The compendium applies to all people within the boundaries of federally owned or designated public use lands within Joshua Tree National Park. It specifically prohibits possessing, destroying, injuring, defacing, removing, digging, or disturbing plants, including climbing, sitting on, or standing on live

Joshua trees or using them as anchors for hammocks or slacklines (Code of Federal Regulations, tit. 35, § 2.1, subd. (a)(1)) (NPS 2022).

Foundation Document

Most units of the National Park System have a foundation document that provides basic guidance for planning and management decisions. Each foundation document contains significance statements, which express why a park's resources and values are important enough to merit designation as a unit of the National Park System. One of the significance statements for Joshua Tree National Park is that the park "preserves a world-renowned, undisturbed population of [western] Joshua trees…, an integral component of the Mojave Desert ecosystem." Accordingly, the Foundation Document for Joshua Tree National Park designates Joshua tree as a fundamental resource and value, warranting its primary consideration during park planning and management activities (NPS 2017a). Joshua Tree National Park is actively engaged in conservation efforts and restoration activities in support of this foundation statement (CDFW 2022).

Joshua Tree National Park General Management Plan

Public Law 95-625, enacted on November 10, 1978, requires NPS to prepare a general management plan to provide for the preservation and public enjoyment of each area of the National Park System (54 U.S.C. § 100502). In 1995, NPS adopted a new general management plan for the administration of Joshua Tree National Monument, which subsequently became a national park in 1994. The General Management Plan provides for the management, use, and development of Joshua Tree National Park. The General Management Plan primarily applies to the developed areas of the park (NPS 1995).

The General Management Plan identifies Joshua tree as a species of special concern because the species is a major part of the park experience. The General Management Plan acknowledges that Joshua trees are likely to be affected by construction of roads, parking areas, and buildings throughout the park. The General Management Plan states NPS will make special efforts to reduce impacts on Joshua trees, including by implementing design criteria to avoid large trees, planting new trees, and salvaging and replanting trees during construction (NPS 1995).

Backcountry and Wilderness Management Plan

On October 31, 1994, the California Desert Protection Act (Public Law 103-433) added 234,000 acres to the Joshua Tree National Monument and changed its status from national monument to national park (16 U.S.C. § 410, subd. aaa-22). This land remains largely undeveloped and primarily comprises backcountry and wilderness areas. As an amendment to the General Management Plan, Joshua Tree National Park adopted the Backcountry and Wilderness Management Plan to address the management of these lands. The purpose of the

Backcountry and Wilderness Management Plan is to minimize disturbance to resources, ensure their preservation, and offer the public a wide variety of recreational opportunities. The plan identifies the following nine actions that affect the quality of the human environment: designation of a trail system; designation of unpaved roads in lands added to the park in 1994; designation of management prescriptions for recreational climbing; designation of locations where roadside auto camping may or may not be permitted; analysis of major artificial water sources installed for wildlife; adoption of areas limited to day use only or closed to public access; establishment of group size limits for overnight stays; implementation of the Department of the Interior's Desert Tortoise Recovery Plan; and analysis of proposed additions to wilderness (NPS 2000).

Joshua tree is identified in the Backcountry and Wilderness Management Plan as a species of special interest to NPS. Although the Backcountry and Wilderness Management Plan does not identify specific protections for western Joshua tree, management actions contained in the plan were designed to minimize impacts to natural resources and avoid the removal of large plants, such as Joshua trees (NPS 2000).

Source: Dave Hursey, National Park Service.

Resource Stewardship Strategy Summary

An NPS Resource Stewardship Strategy Summary is a strategic plan intended to help park managers achieve and maintain desired resource conditions over time. The Resource Stewardship Strategy Summary for Joshua Tree National Park, released in January 2021, includes a summary of key issues, stressors, and threats affecting park resources, brief descriptions of the park's priority resources and their components, stewardship goals for priority resources, and stewardship activities determined to be high priorities for the next 3 to 5 years (NPS 2021a).

The Resource Stewardship Strategy Summary discusses the threat of climate change on the mortality of Joshua trees and the elimination of suitable habitat for the species. The document identifies a long-term goal of sustaining Joshua tree populations within their potential range under climate change. Short-term goals of the document include controlling wildland fires and removing invasive plant species within Johusa tree climate change refugia, directing visitor activity to areas outside of climate change refugia to minimize trampling of young trees, and restoring degraded refugia for Joshua trees, especially in burned areas. High-priority stewardship activities are also identified in support of these goals. The document also identifies a long-term goal to better understand the trends in Joshua tree distribution, resilience to environmental change, and the effects of other stressors on Joshua trees (NPS 2021a).

Death Valley National Park

Foundation Document

The Foundation Document for Death Valley National Park provides basic guidance for planning and management decisions within the park. The park's endemic species (i.e., a species whose geographic range or distribution is confined to a single given area) and biodiversity are identified in the Foundation Document as fundamental resources and values for which NPS intends to focus planning and management efforts. The Foundation Document does not identify specific protections for western Joshua tree but outlines several opportunities to address threats to the park's endemic species and biodiversity that may aid in the conservation of the species. These opportunities include controlling visitation to critical habitat areas, conducting additional research to guide management decisions, collaborating to ensure adequate resource protection, engaging in cooperative management with the Timbisha Shoshone Tribe to refine resource management activities, and managing fire regimes (NPS 2017b).

Death Valley National Park General Management Plan

The General Management Plan for Death Valley National Park provides an overall management strategy for the park over a 10 to 15-year period. The General Management Plan does not specifically discuss western Joshua tree, but it includes management objectives to perpetuate plant and animal life for their essential roles in the natural ecosystem and to perpetuate rare and endangered plants and animals and species endemic to Death Valley National Park. The General Management Plan states that NPS will seek to manipulate natural landscapes and plants only when necessary to achieve approved management objectives (NPS 2021b).

Backcountry and Wilderness Management Plan

NPS does not identify western Joshua tree as a species of special interest in the Backcountry and Wilderness Management Plan for Death Valley National Park, but it includes goals that may aid in the conservation of the species. These goals include: preserving natural resources; minimizing conflicts between users and sensitive resources; refraining from the deliberate manipulation or management of wilderness resources except as necessary; promoting the natural quality of wilderness character through the thoughtful restoration and/or maintenance of natural processes and features; preserving ecological values of wilderness; and preserving the intangible aspects of wilderness, including ongoing traditional cultural uses by the Timbisha Shoshone Tribe (NPS 2012).

Mojave National Preserve

As noted above, Mojave National Preserve is outside the current range of western Joshua tree but supports a large population of eastern Joshua tree. In September 2020, the Dome Fire burned over 43,000 acres in Mojave National Preserve, including over an estimated one million

eastern Joshua trees (Smith et al. 2023). The perimeter of the Dome Fire overlaps a modelled eastern Joshua tree climate refugium where favorable conditions are expected to persist during future warming (Smith et al. 2023).

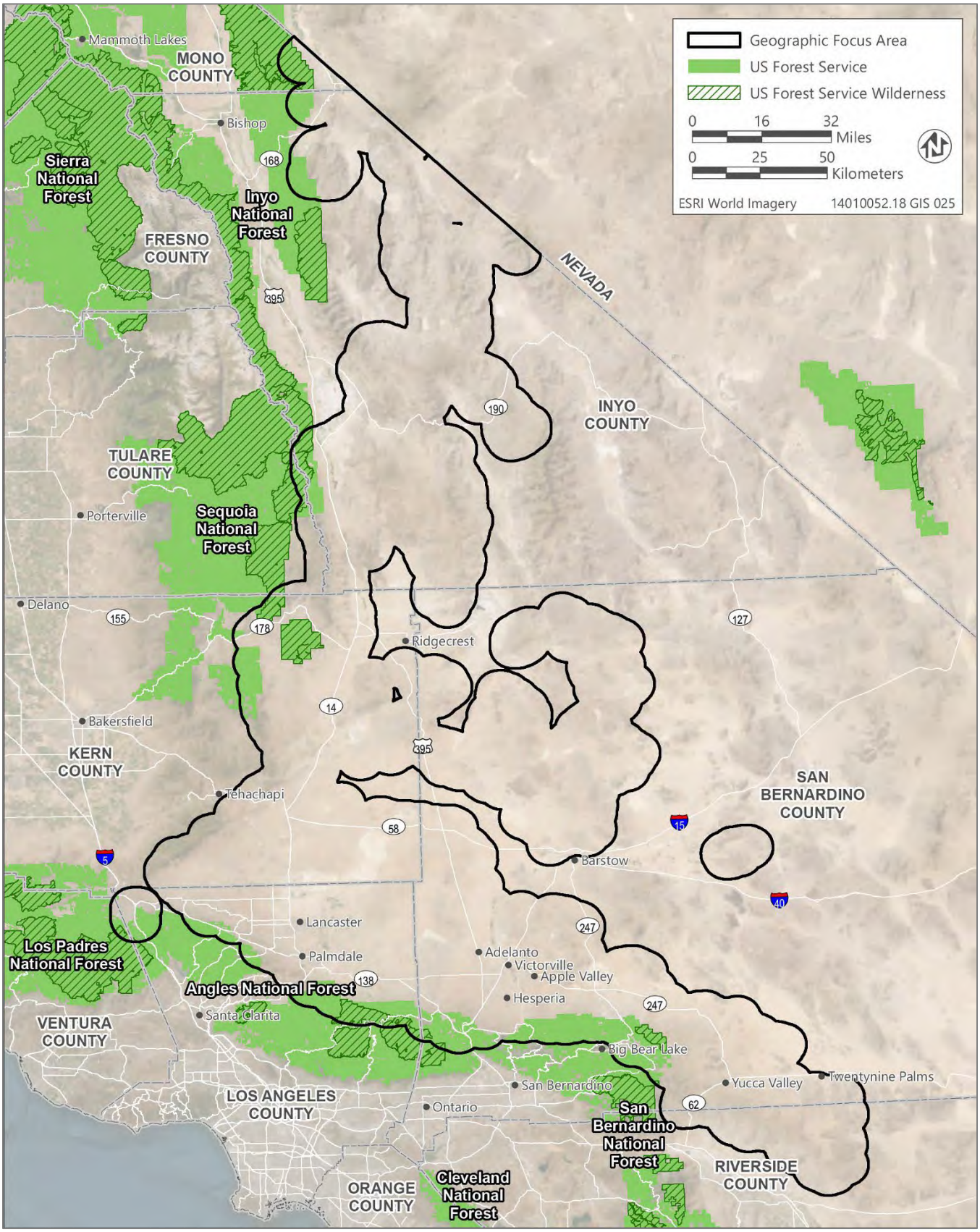
Eastern Joshua trees burned in the Dome Fire in Mojave National Preserve.

Source: Drew Kaiser, California Department of Fish and Wildlife.

In response to past grazing impacts and the loss of eastern Joshua trees in the Dome Fire and the species' poor seed dispersal characteristics, Mojave National Preserve staff prepared the Dome Fire Restoration Plan in May 2021 (NPS 2021c). The plan outlines restoration, monitoring, management, and maintenance strategies to restore eastern Joshua tree within the predicted climate refugium. These activities include planting and watering trees and applying herbicide to control invasive annual grasses. As part of the Dome Fire Restoration Plan, Mojave National Preserve staff are collecting data on survival rates associated with various treatments, including the use of cages to exclude herbivores and planting under shrubs to simulate nurse plants. Although the monitoring data from this restoration project apply to eastern Joshua tree, the resulting data can provide important information related to postfire recovery and survivability and successful restoration strategies for western Joshua tree.

US FOREST SERVICE

Approximately 245 square kilometers (94.6 square miles), or 2 percent, of western Joshua tree's range in California, is distributed within lands managed by USFS. USFS manages several national forests and wilderness areas within the geographic focus area, which are shown on Figure 2-12. The national forests and wilderness areas in western Joshua tree's range in California are described in Table 2-3.



Source: Data downloaded from USFS in 2023; adapted by Ascent in 2024.

Figure 2-12 US Forest Service Lands within the Geographic Focus Area

Table 2-3 US Forest Service Lands in Western Joshua Tree Range in California

National Forest or Wilderness Area	County	National Forest or Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
San Bernardino National Forest	San Bernardino	3,284.3 (1,268.1)	127.1 (49.1), 1.0	The National Forest contains mixed conifer forests and oak woodlands, pinyon juniper stands, and chaparral and semidesert areas, which include western Joshua trees.
Bighorn Mountain Wilderness Area[1]	San Bernardino	155.2 (59.9)	44.2 (17.1), 0.3 [2]	The wilderness area is a transition zone between the western Joshua tree and other yucca–covered desert floor and stands of Jeffrey pine in the higher elevations.
Kiavah Wilderness Area	Kern	357.3 (138.0)	28.8 (11.1), 0.2	The wilderness area is at a transition zone between the Sierra Nevada mountain range and the Mojave Desert, with vegetation that includes creosote bush, western Joshua tree, burro bush, and shadscale growing near pinyon pine, juniper, canyon oak, and foothill pine.
Sequoia National Forest	Tulare, Kern, Fresno	4,451.5 (1,718.7)	1.9 (0.7), <0.1	The National Forest contains mixed forests of ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), sugar pine (*Pinus lambertiana*), and scattered groves of giant sequoia (*Sequoiadendron giganteum*) in the low- to mid-montane elevations. Jeffrey pines are scattered on dry granitic slopes, and pure stands of red fir forest and lodgepole pine forest are found in the upper montane zone. Western Joshua trees are found in the southernmost and easternmost portions of the National Forest.
Angeles National Forest	Los Angeles, San Bernardino, Ventura	2,630.5 (1,015.6)	1.3 (0.5), <0.1	The National Forest is predominately covered with dense chaparral, which changes to slopes covered in pine (*Pinus* spp.) and fir (*Abies* spp.) in the higher elevations. Western Joshua trees are present at lower elevations.
Inyo National Forest	Inyo, Mono, Tulare, Fresno, Madera	8,093.7 (3,125.0)	1.3 (0.5), <0.1	The National Forest contains arid shrublands, conifer forests, and mountain meadows. Western Joshua trees are present in the desert scrub on the lower slopes of the eastern Sierra Nevada Mountains in the southern part of the National Forest.
White Mountains Wilderness[1]	Mono	934.7 (360.9)	0.8 (0.3), <0.1 [2]	The wilderness area contains one of the largest and highest desert mountain ranges. The wilderness area is known for its high-elevation bristlecone pine forest, but western Joshua trees have been observed in the desert portions.

National Forest or Wilderness Area	County	National Forest or Wilderness Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
San Gorgonio Wilderness[1]	San Bernardino, Riverside	390.9 (150.9)	0.1 (<0.1), <0.1	This wilderness area is in a landscape that transitions between desert, coastal, and mountain environments, including different types of vegetation representative of each elevation. Western Joshua trees are present in the USFS-managed part of the wilderness area.

Notes: sq mi = square miles.

[1] This wilderness area is managed jointly by BLM and USFS.

[2] The western Joshua tree range in the wilderness area represents only the area of land managed by USFS.

Source: Esque et al. 2023; compiled by Ascent in 2024.

US Forest Service Land Management Plans

The land management plans for the Angeles and San Bernardino National Forests, which specifically reference western Joshua tree, are described in the following sections.

Angeles National Forest Land Management Plan

The Angeles National Forest Land Management Plan describes USFS's strategic direction for managing the land and resources within the Angeles National Forest over the next 10 to 15 years. As identified in the Angeles National Forest Land Management Plan, the Mojave Front Country within the Angeles National Forest contains western Joshua trees at lower elevations. The Angeles National Forest Land Management Plan states that one of the desired conditions for this area is to maintain a natural-appearing landscape, which includes preserving distinct desert views of Joshua trees. The Land Management Plan does not include specific protections for western Joshua tree but includes vegetation management standards and other design criteria required under the Code of Federal Regulations title 36, part 219 that may aid in the protection of the species (USFS 2005a).

San Bernardino National Forest Land Management Plan

The San Bernardino National Forest Land Management Plan describes USFS's strategic direction for managing the land and resources within the San Bernardino National Forest over the next 10 to 15 years. Within the San Bernardino National Forest, western Joshua trees are found in the high desert landscape in the eastern portion of the Big Bear backcountry, at lower elevations within the Desert Rim and the Mojave Front Country, and in the Bighorn Mountain Wilderness.

The San Bernardino National Forest Land Management Plan states that one of the desired conditions for these areas is to preserve valued landscape attributes, such as Joshua tree stands. Within the Mojave Front Country, another desired condition is to manage Joshua tree woodlands to provide fire protection for adjacent urban communities, compatible dispersed recreation use, high quality wildlife habitat, and protection for plant communities from type conversion by frequent burning. The San Bernardino National Forest Land Management Plan does not include specific protections for western Joshua tree but includes vegetation management standards and other design criteria required under Code of Federal Regulations title 36, part 219 that may aid in the protection of the species (USFS 2005b).

US Forest Service Fire Management

USFS manages wildland fire on National Forest System lands and also partners with Tribes and federal, state, and local governments as part of the National Wildfire Coordinating Group. USFS suppresses fires that threaten people and communities but also uses prescribed fire to benefit natural resources and prevent the buildup of flammable vegetation. USFS also participates in the interagency Burned Area Emergency Response program and implements rehabilitation and restoration activities to repair natural resources damaged by wildland fires. These activities include planting trees, reestablishing native species, restoring habitats, and removing invasive plants.

Source: Bob Wick, Bureau of Land Management.

NATURAL RESOURCES CONSERVATION SERVICE

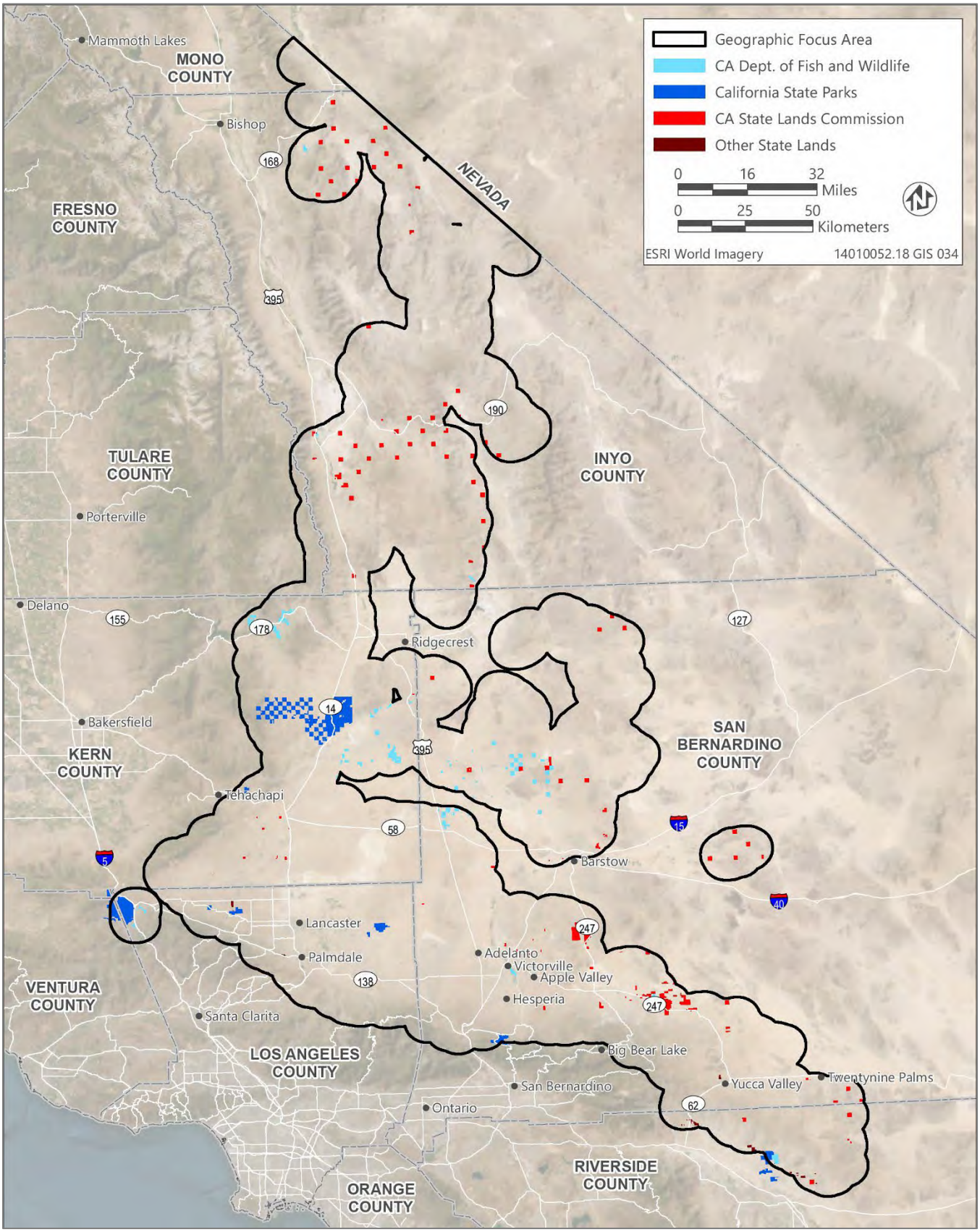
Approximately 0.3 square kilometer (74.1 acres), or less than 0.1 percent, of western Joshua tree's range in California, is distributed within lands managed by the Natural Resources Conservation Service (NRCS). This land is part of a conservation easement established under the Wetland Reserve Easements program, which was established to help private and tribal landowners protect, restore, and enhance wetlands that have been previously degraded due to agricultural uses. NRCS has the right to develop and implement a Wetland Reserve Plan of Operations for land enrolled in wetland reserve easements. These plans detail practices to help restore, protect, and enhance wetland functions and values.

2.3.4 State of California Land Management

State agencies manage approximately 2 percent of land within western Joshua tree's range in California. State Lands within the geographic focus area, including lands managed by CDFW, CSP, and CSLC, are shown on Figure 2-13. Lands identified as "Other State Lands" on Figure 2-13 consist of lands owned by the California Department of Water Resources, University of California, California Wildlife Conservation Board, Coachella Valley Conservation Commission, Coachella Valley Mountains Conservancy, and Desert and Mountain Conservation Authority. Natural resources on state-managed lands generally receive a high level of protection, including some active management and research for the benefit of natural resources (CDFW 2022).

CALIFORNIA STATE PARKS

CSP manages the California State Park System. The State Park System is divided into 21 districts. The Central Valley, Great Basin, Inland Empire, and Sierra Districts overlap with the geographic focus area. Lands owned by CSP within the geographic focus area are shown on Figure 2-13, and the distribution of western Joshua tree's range in California within State Parks is listed in Table 2-4. Approximately 149 square kilometers (57.4 square miles), which is about 1 percent of western Joshua tree's range in California, overlaps with the California State Park System.



Source: Data downloaded from CSP, CDFW, California Protected Areas Database, and CAL FIRE in 2024; adapted by Ascent in 2024.

Figure 2-13 State Lands within the Geographic Focus Area

Table 2-4 California State Parks in Western Joshua Tree Range in California

Park	District	County	Park Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
Onyx Ranch State Vehicular Recreation Area	Great Basin	Kern	105.2 (40.6)	82.1 (31.7), 0.6	The setting consists of rugged Mojave Desert terrain. Recreational opportunities include trails for OHV use and campgrounds. This recreation area has the largest contiguous stands of western Joshua trees in the California State Parks System.
Red Rock Canyon State Park	Great Basin	Kern	109.3 (42.2)	50.7 (19.6), 0.4	The setting consists of a desert landscape with cliffs, buttes, and rock formations. Recreation opportunities include developed campsites, day use areas, hiking and equestrian trails, and primitive roads for OHV recreation. Western Joshua trees are currently present at the park.
Saddleback Butte State Park	Great Basin	Los Angeles	12.0 (4.6)	11.7 (4.5), 0.1	The setting consists of a granite mountaintop surrounded by high desert landscape, including native Joshua tree woodlands. Recreation opportunities include day-use picnic areas, campground facilities, and equestrian trails. Western Joshua trees are currently present at the park.
Arthur B. Ripley Desert Woodland State Park	Great Basin	Los Angeles	2.3 (0.9)	2.3 (0.9), <0.1	The setting consists of a Joshua tree and juniper woodland stand. Recreation opportunities include picnic areas and hiking trails. Western Joshua trees are currently present at the park.
Antelope Valley Indian Museum State Historic Park	Great Basin	Los Angeles	0.6 (0.2)	1.6 (0.6), <0.1	The setting consists of desert parkland on the south side of Piute Butte in the Mojave Desert and sits against a backdrop of western Joshua trees and towering rock formations. Western Joshua trees are currently present at the park.
Hungry Valley State Vehicular Recreation Area	Great Basin	Los Angeles	76.9 (29.7)	0.3 (0.1), <0.1	The setting consists of hills and valleys, grassland, coastal sage scrub, and oak woodland. Recreational opportunities include trails for OHV use and campgrounds. Western Joshua trees are currently present at the recreation area.

Notes: OHV = off-highway vehicle; sq mi = square miles.

Source: Esque et al. 2023; compiled by Ascent in 2024.

California State Parks Department Operations Manual

The "Natural Resources" chapter of the CSP Department Operations Manual (CSP 2004) contains many policies that can apply to management of western Joshua trees. The following are examples of two high-level, general policies; however, more detailed guidance can be found in the "Plant Management" section, DOM 0310-0310.9.

- **DOM 0310.1.1: Plant Management Policy.** It is the policy of the Department to acquire, preserve, and interpret outstanding examples of native California species; and to acquire, perpetuate, and interpret natural plant communities, associations, natural processes (e.g., succession), and examples of rare, endangered, endemic, or otherwise sensitive native California plants. This will be done in concert with other agencies and organizations.
- **DOM 0313.2.1: Wildfire Management.** The Department's goal is to prevent all unplanned human-caused fires on its lands. Given that some unplanned fires will occur, both lightning-caused and human-caused, it becomes the Department's responsibility to protect human life, and to minimize damage to park facilities and resources from wildfires and from all suppression activities.

State Park Units Classified as State Parks

The following sections discuss units classified as State Parks that have management goals and policies relevant to western Joshua tree.

Arthur B. Ripley Desert Woodland State Park

In 1995, CSP established the 566-acre Arthur B. Ripley Desert Woodland State Park (Ripley State Park) in Los Angeles County. Although CSP has not adopted a general plan for this park, the agency has undertaken management efforts to protect Joshua tree and juniper woodland, which have nearly disappeared in the Antelope Valley due to factors including farming, housing, and green energy development. The purpose statement of the park is "to preserve and protect an impressive area of Joshua Tree—juniper woodlands and its associated ecosystem, a landscape which was once abundant in the Antelope Valley" (CSP n.d.).

Western Joshua trees in Arthur B. Ripley Desert Woodland State Park. Source: California State Parks.

In August 2020, the Lake Fire burned 55 acres, primarily comprised of western Joshua tree habitat, in the southern extent of Ripley State Park. Beginning in March 2021, CSP implemented a habitat restoration project to address regeneration of western Joshua tree. In a June 2022 status report, CSP reported that Ripley State Park is steadily recovering from the fire. The report describes restoration methods, identifies the survival rate of sprouts, and recommends management actions to track the growth rate of the trees (CSP 2022). These findings and recommendations may be used to inform management actions in the Conservation Plan related to restoration. CSP is also seeking funding

to remove fuels and invasive species and conduct research on the effects of wildland fire on regrowth of western Joshua tree in the park.

Red Rock Canyon State Park

Red Rock Canyon State Park was first established on 3,015 acres in Kern County. Since 1982, the park has grown to about 27,000 acres through subsequent land acquisitions and agreements. The Red Rock Canyon State Park General Plan was approved in January 1982 and most recently updated in 2023. The General Plan identifies 301 acres of Joshua tree woodland and other small stands within the park, noting that Joshua tree woodland is a sensitive natural community of high resource value and in need of protection.

The General Plan also identifies western Joshua tree as a sensitive botanical resource, noting that the park is near the western edge of the species' range in California where the population was modeled as unsustainable (Cole et al. 2011; CSP 2023).

One of the General Plan's stated goals is to restore native plant communities, including by:

- Developing science-based vegetation management objectives for habitat restoration and enhancement.
- Developing management plans in consultation with Tribes to avoid or minimize human impacts on native plant communities.
- Partnering with neighboring landowners to restore and preserve desert plant communities on a landscape scale.

Another goal of the General Plan (CSP 2023) is to protect and conserve sensitive plant species, including by:

- Implementing protection methods (e.g., habitat preservation, seed banking, restoration/enhancement, and visitor education).
- Developing and implementing protocols for locating and monitoring sensitive plant populations.
- Monitoring known populations of sensitive species over time.
- Developing sensitive species management plans.
- Planning and implementing conservation actions in collaboration with other agencies.
- Avoiding or minimizing human activities that disrupt natural ecological systems.
- Implementing management activities that improve ecological systems, such as controlling invasive species and restoring habitat.

Saddleback Butte State Park

Saddleback Butte State Park encompasses 2,955 acres in Los Angeles County. Although CSP has not adopted a general plan for this park, the park was originally named Joshua Trees State Park and was established for the purpose of protecting Joshua tree woodlands.

The purpose statement of the park is "to make available for day use an unspoiled area of desert terrain and to preserve a representative stand of [western] Joshua Trees and associated desert flora typical of this portion of the Mojave Desert" (CSP n.d.).

State Park Units Classified as State Vehicular Recreation Areas

The following sections describe management plans relevant to western Joshua tree conservation that apply to State Vehicular Recreation Areas (SVRAs).

Wildlife Habitat Protection Plans

Public Resources Code section 5090.32, subdivision (g) requires the Off-Highway Vehicle Division of CSP to prepare Wildlife Habitat Protection Plans (WHPPs) for lands in SVRAs within the State Parks System. Each SVRA has an existing WHPP that was developed in the 1990s and updated in 2010. Many of these plans are currently being updated in accordance with changes to the Public Resources Code. After completion of these updates, WHPPs will be updated every 5 years at a minimum. Some of the updated WHPPs were approved between 2022 and 2024, while other WHPPs are still in development or pending public review and approval. In accordance with the Public Resources Code, each WHPP must include objectives for updated WHPPs to identify rare or endangered plant and animal species and their supporting habitat for sensitive area consideration; incorporate objectives that target the protection, conservation, and improvement of natural resources within SVRAs; and develop and incorporate annual monitoring programs to assess whether WHPP objectives are being met. The types of management actions that may influence western Joshua tree conservation include actions to conserve and restore soils, prevent authorized trail development in areas with existing natural communities, and restore habitat. During subsequent updates of WHPPs, CDFW will have the opportunity to collaborate with CSP on management actions to be implemented at Hungry Valley and Onyx Ranch SVRAs in support of western Joshua tree conservation.

Soil Conservation Plans

Each SVRA is required to develop a soil conservation plan that must be reviewed every 5 years and updated as needed. Soil conservation plans must demonstrate how an SVRA complies with CSP's 2020 Soil Conservation Standard by implementing an adaptive management framework that consists of performing assessments of OHV roads, trails, and facilities, implementing maintenance actions, and monitoring the outcome of the actions taken. Under the 2020 Soil Conservation Standard, SVRAs must manage OHV facilities for sustainable long-

term use, meaning soil loss must not exceed restorability (CSP 2020). During subsequent updates of soil conservation plans, CDFW will have the opportunity to collaborate with CSP on soil management actions to be implemented at Hungry Valley and Onyx Ranch SVRAs in support of western Joshua tree conservation.

Hungry Valley State Vehicular Recreation Area

Hungry Valley SVRA encompasses 19,000 acres in Los Angeles County. Providing opportunities for OHV recreation is a top priority of Hungry Valley SVRA, but the General Plan, which is currently being updated, also recognizes the recreation area's natural resources. The General Plan does not specifically discuss western Joshua tree but includes policies to protect rare, endangered, and threatened plants. CSP is currently developing a soil conservation plan for Hungry Valley SVRA, which includes measures to minimize and repair soil erosion in the recreation area. CSP is also implementing a wildlife habitat protection plan for Hungry Valley SVRA, which allows motorized vehicle use in a manner that balances natural resource protection. The plan identifies western Joshua tree as a candidate for listing under CESA and identifies Joshua tree woodland as habitat for other wildlife species in the recreation area (CSP 2024).

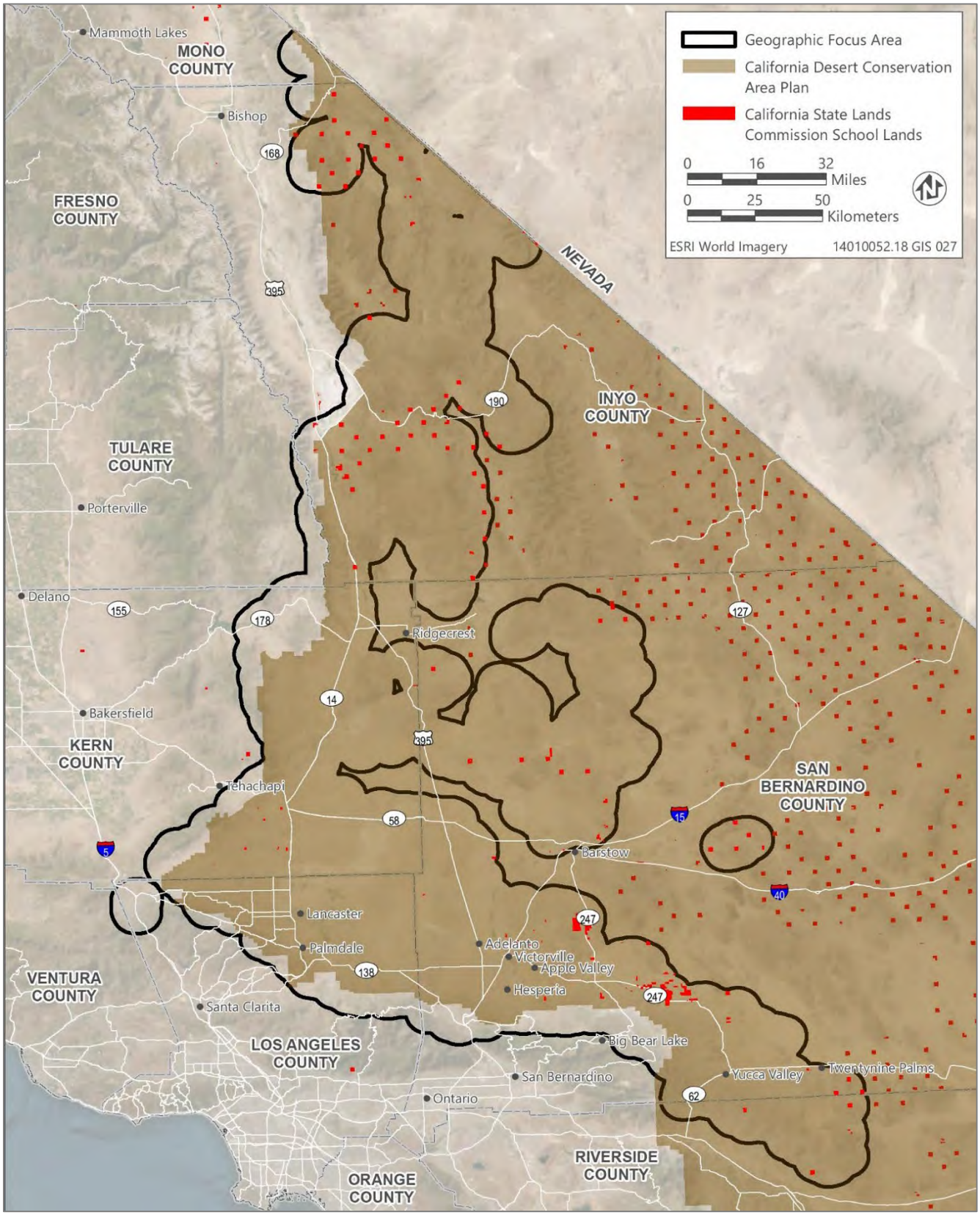
Onyx Ranch State Vehicular Recreation Area

Onyx Ranch SVRA encompasses over 26,000 acres in eastern Kern County. A general plan has not yet been adopted for this SVRA. CSP is currently developing a soil conservation plan and a wildlife habitat protection plan for Onyx Ranch SVRA.

CALIFORNIA STATE LANDS COMMISSION

School Lands in the California Desert Conservation Area

The California State Lands Commission (CSLC) has primary responsibility for the surface management of school lands in California. This includes the identification, location, and evaluation of the State's interest in these lands and their leasing and management. School lands are what remains of the nearly 5.5 million acres granted to California by Congress in 1853 to benefit public education (Ch. 145, 10 Stat. 244). Currently, CSLC manages approximately 468,000 acres of school lands held in fee ownership by the State, with many of these lands located in the California desert. The Commission also manages the surface and mineral ownership of hundreds of thousands of acres of school lands (CSLC 2012, 2024). School lands make up approximately 87 square kilometers (33.6 square miles), or roughly 0.7 percent, of western Joshua tree's range in California. School lands within the geographic focus area are shown in Figure 2-14.



Source: Data downloaded from CSLC in 2024; adapted by Ascent in 2024.

Figure 2-14 California State Lands Commission School Lands within the Geographic Focus Area

As discussed above, DRECP was developed by the agencies in the Renewable Energy Action Team to provide effective protection and conservation of desert ecosystems while allowing for the appropriate development of renewable energy projects and promoting outdoor recreation opportunities within CDCA (refer to the "Desert Renewable Energy Conservation Plan" section above).

CSLC is the largest state agency landowner in DRECP, managing approximately 1.5 percent of the DRECP planning area. These lands form a patchwork of small parcels found throughout the DRECP planning area, mostly in San Bernardino County and Eastern Riverside County (BLM 2015).

On October 16, 2008, CSLC adopted the Resolution by the California State Lands Commission Supporting the Environmentally Responsible Development of School Lands Under the Commission's Jurisdiction for Renewable Energy Related Projects. In this resolution, CSLC resolved that lands within its jurisdiction may be developed only with assurances that California's unique and sensitive environments will be protected. A written MOU, executed in May 2012 between CSLC and the Department of the Interior, acting through BLM, describes the terms and procedures for land exchanges between these agencies to consolidate school lands into larger parcels suitable for commercial-scale renewable energy projects (CSLC 2008, 2012; BLM 2015).

CSLC may issue leases or permits on State Lands under its jurisdiction, including School Lands, for various types of projects (e.g., utility, highway, grazing, mineral extraction). CSLC generally serves as the lead agency for conducting environmental review under CEQA for the issuance of leases and permits on school lands. As part of the CEQA process, CSLC is required to evaluate the impacts of issuing a lease or permit on special-status species, including western Joshua tree, and to adopt mitigation measures to reduce potentially significant impacts, where feasible. For example, CSLC recently issued a general lease for a new solar energy facility in Kern County. The project was anticipated to affect lands that possess significant environmental values due, in part, to their unique display of Joshua trees. CSLC required preparation of a Joshua Tree Preservation Plan, exclusionary fencing of the western Joshua tree woodland, and annual monitoring of the species (CSLC 2023).

CSLC may also issue leases on State Lands for conservation purposes. CSLC has previously approved long-term leases (i.e., 10–20 years) to CSP and CDFW for conservation. In support of the Conservation Plan, CSLC may award additional long-term leases to CDFW to conserve land that currently supports western Joshua tree or that could serve as potential climate refugia for the species.

California State Lands Commission Significant Lands Inventory

Western Joshua trees at sunset.
Source: National Park Service.

As directed by Public Resources Code section 6370, CSLC published the *Inventory of Unconveyed State School Lands & Tide & Submerged Lands Possessing Significant Environmental* Values, also referred to as the "Significant Lands Inventory" (CSLC 1975). The report identifies lands possessing significant environmental values and the criteria by which those determinations were made, along with any recommended actions necessary for permanent protection of such identified lands. Whether land is necessary for the continued existence of a rare or endangered plant is one of several criteria for identifying lands that possess significant environmental values. Parcels that possess significant environmental values are then classified into the following categories:

- Class A: Restricted Use. Areas where public use should be minimized to preserve the integrity of the natural environment as a whole.
- Class B: Limited Use. Areas in which one or more closely related dominant, significant environmental values is present. Limited use compatible with and non-consumptive of such values may be permitted.
- Class C: Multiple Use. Areas currently in multiple use which are less susceptible to environmental degradation than are Classes A and B, but nevertheless do possess significant environmental values.

CSLC adopted regulations to assure the protection of the significant environmental values of identified lands (Cal. Code Regs., tit. 2, § 2951 et seq.). The regulations state that CSLC will not allow sale, lease, or other use of significant environmental land without (a) finding that adequate provisions have been made for the permanent protection of the significantly environmental characteristics or (b) finding that granting of the application will have no significant effect upon environmental characteristics.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Sensitive Natural Communities

CDFW maintains a list of natural communities throughout California, which are assigned a state rank based on their rarity. Sensitive natural communities refer to natural communities with rarity ranks of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable). Joshua tree woodland (*Yucca brevifolia* Woodland Alliance) is identified as a CDFW sensitive natural community. The State rank for Joshua tree woodland is S3 (vulnerable) due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from California (CDFW 2023).

CEQA is the primary mechanism through which sensitive natural communities receive protection. CEQA requires public agencies to evaluate impacts to sensitive natural communities from projects they review, and to adopt measures to mitigate significant impacts. The Native Plant Protection Act, CESA, and ESA may also afford protections to natural communities that support rare species or are defined by the dominance or presence of such species by prohibiting unauthorized take of those species. In addition, sensitive natural communities may be protected by local regional plans, regulations, or ordinances (CDFW 2024).

State Wildlife Action Plan

In 2005, Congress mandated that each state must develop a State Wildlife Action Plan (SWAP) every 10 years. SWAPs are designed to identify species of greatest conservation need. California's SWAP examines the health of wildlife and prescribes actions to conserve wildlife and vital habitats before they become rarer and more costly to protect. The plan also promotes wildlife conservation while furthering responsible development and addressing the needs of a growing human population. Although the focus of the SWAP is on wildlife conservation, the plan acknowledges that Joshua tree is an endemic species adapted to specialized desert habitats. Joshua trees are a focal habitat type associated with conservation targets in the desert region.

The SWAP includes conservation strategies for wildlife species that would also benefit western Joshua tree, including strategies to advocate, increase political awareness, and acquire funding for conservation of desert habitat; develop HCPs, NCCPs, and management plans to minimize impacts of development; and conserve lands through land acquisitions, easements, and leases (CDFW 2015). CDFW is currently preparing a 2025 update.

California Department of Fish and Wildlife Lands Program

CDFW manages more than 1.1 million acres of land spanning more than 700 properties statewide. These lands comprise ecological reserves, wildlife areas, undesignated lands, public access areas, fish hatcheries, and miscellaneous lands. Of these, approximately 700,000 acres are owned in fee title, and approximately 483,000 acres are administered through written MOUs, leases, easements, or management agreements under the CDFW Lands Program (CNRA 2023). The CDFW Lands Program's mission is to ensure that California's lands are managed and maintained to provide optimal benefits for fish, wildlife, and plants by:

- Developing uniform, statewide policies and planning guidance relative to the acquisition, protection, restoration, enhancement, and management of lands.
- Providing statewide policy and programmatic coordination with conservation groups and local, state, and federal resource agencies to conserve privately owned lands.
- Developing uniform guidelines and regulations for public use and land management plans that focus on the needs of fish, wildlife, and plants.
- Providing budgetary and technical assistance to regional land managers.
- Fostering public use, knowledge, and enjoyment of lands.

CDFW lands within the geographic focus area are shown on Figure 2-13. Approximately 34 square kilometers (13.1 square miles), or 0.3 percent, of western Joshua tree's range in California is distributed within CDFW lands. The ecological reserves within western Joshua tree's range in California, which together comprise approximately 28 square kilometers (10.8 square miles), or 0.2 percent, are listed in Table 2-5. CDFW has not adopted land management plans for these ecological reserves. Approximately 5 square kilometers (1.9 square miles), or less than 0.1 percent, of CDFW land within western Joshua tree's range in California are held under conservation easements. Other CDFW lands within western Joshua tree's range in California include a mitigation property, a regional park, a fish hatchery, and public river access. Combined, these areas make up less than 0.4 square kilometer (98.8 acres), or less than 0.1 percent, of western Joshua tree's range in California.

Table 2-5 Ecological Reserves in Western Joshua Tree Range in California

Ecological Reserve	County	Ecological Reserve Area in Square Kilometers (sq mi)	Range in Square Kilometers (sq mi), Percent of Range (%)	Description
West Mojave Ecological Reserve	San Bernardino	72.8 (28.1)	18.8 (7.3), 0.1	This reserve was acquired for the purpose of preserving a representative portion of the West Mojave Desert, protecting desert tortoise (*Gopherus agassizii*) and Mojave ground squirrel (*Xerospermophilus mohavensis*) habitat, and protecting it from the damaging influences of OHV use and sheep grazing. The dominant vegetation in the reserve is white bur-sage (*Ambrosia dumosa*). Creosote bush is also abundant but not as evenly distributed.
Canebrake Ecological Reserve	Kern	29.1 (11.2)	5.0 (1.9), <0.1	The Reserve contains valley foothill riparian, valley foothill hardwood-conifer/blue oak-foothill pine, sagebrush, western Joshua tree, riverine, lacustrine, fresh emergent wetland, wet meadow, pasture, and cropland.
Fremont Valley Ecological Reserve	Kern	16.6 (6.4)	4.2 (1.6), <0.1	The Reserve was acquired for the purpose of protecting desert tortoise habitat. The reserve consists of typical northwest Mojave Desert terrain, and the natural vegetation community is primarily creosote bush scrub.
King Clone Ecological Reserve	San Bernardino	2.0 (0.8)	0.5 (0.2), <0.1	This reserve was acquired for the purpose of protecting ancient creosote rings in the Mojave Desert. The Reserve consists of a predominantly flat, level area with creosote bush scrub.

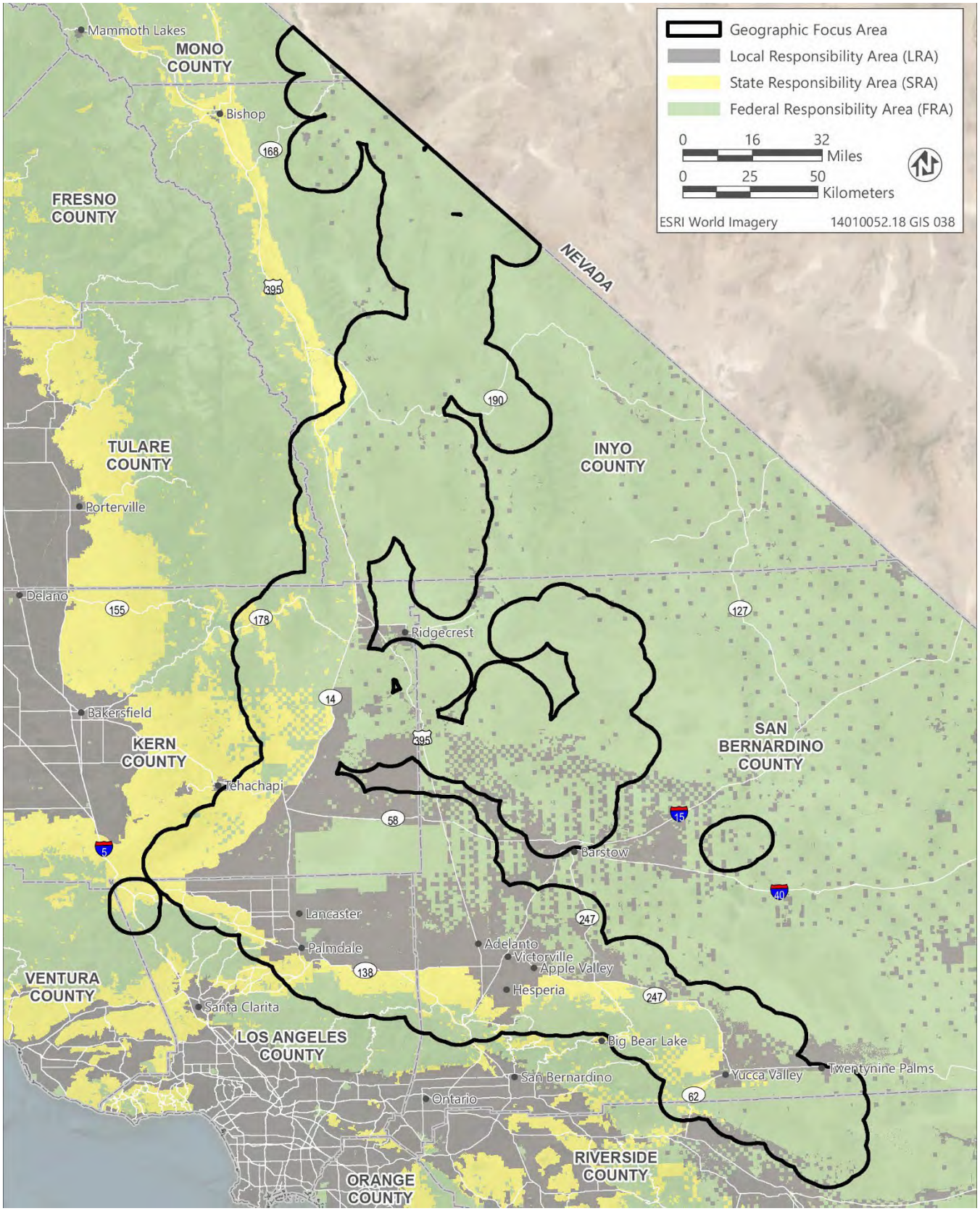
Notes: OHV = off-highway vehicle; sq mi = square miles.

Source: Esque et al. 2023; compiled by Ascent in 2024.

CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

The California Department of Forestry and Fire Protection (CAL FIRE) is responsible for wildland fire prevention, risk reduction, and response on behalf of the State across lands not covered by local fire districts or by federal agencies (i.e., the State Responsibility Area) and in certain local jurisdictions through intergovernmental contracts. The CAL FIRE State Responsibility Area is shown in Figure 2-15.

Approximately 14 percent of the western Joshua tree range in California is within the State Responsibility Area. In the State Responsibility Area, CAL FIRE's fire suppression objective is to provide aggressive initial attack on all wildland fire to minimize resource loss.



Source: Adapted by Ascent in 2024.

Figure 2-15 Federal, State, and Local Responsibility Areas for Fire Response within the Geographic Focus Area

CAL FIRE also supports and encourages fuel treatment before an incident occurs to reduce wildland fire risk, including the use of prescribed fire as a management tool on forest and rangelands, as well as for wildlife habitat improvement, watershed protection, reforestation, and range and livestock management. Further discussion regarding fire protection, natural resource management, and fire prevention methods within western Joshua tree's range in California and climate refugia, including fire suppression and fuel treatments, is found in Sections 5.2.2, "Land Conservation and Management," and 5.2.4, "Research to Inform Long-Term Conservation."

CALIFORNIA WILDLIFE CONSERVATION BOARD

The California Desert Conservation Act (Fish & G. Code, § 1450 et seq.) became effective on January 1, 2022, and established a California Desert Conservation Program under the administration of the Wildlife Conservation Board. The purpose and goal of the California Desert Conservation Program include the following:

- Protect, preserve, and restore the natural, cultural, and physical resources of the "portions of the Mojave and Colorado Deserts region," as defined in Fish and Game Code section 1452, subdivision (f), in California through the acquisition, restoration, and management of lands.
- Promote the protection and restoration of the biological diversity of the region.
- Provide for resilience in the region to climate change.
- Protect and improve air quality and water resources within the region.
- Undertake efforts to enhance public use and enjoyment of lands owned by the public.

Federal and state agencies, local public agencies, tribes, and NGOs with tax exempt status under United States Code title 26, section 501, subdivision (c)(3) are eligible to apply for grant funding under the program for acquisition, restoration, and management projects (Fish & G. Code, §§ 1452, subd. (d) & 1456, subd. (c)). Although the California Desert Conservation Program does not specifically target the conservation of any individual species, the program could contribute to the conservation or restoration of western Joshua tree habitat in California (WCB n.d.).

2.4 TRIBAL CO-MANAGEMENT

This section describes laws and policies that provide for CDFW communication, consultation, and co-management with Tribes. WJTCA provides requirements regarding western Joshua tree co-management with Tribes in Fish and Game Code section 1927.6, subdivisions (a) and (b), listed below.

- CDFW shall develop and implement a western Joshua tree conservation plan in collaboration with the Commission, governmental agencies, Tribes, and the public (Fish & G. Code, § 1927.6, subd. (a)).
- When developing the conservation plan, CDFW shall consult with Tribes, include co-management principles in the plan, provide for the relocation of western Joshua trees to tribal lands upon a request from a Tribe, and ensure Traditional Ecological Knowledge is incorporated into the plan (Fish & G. Code, § 1927.6, subd. (b)).
- This section shall not preclude CDFW from entering into memorandum of understanding with Tribes to provide for the taking and possession of western Joshua trees for tribal cultural purposes, or as otherwise required by applicable law (Fish & G. Code, § 1927.2, subd. (h); see Section 6.4, "Tribal Co-Management").

Tribal lands referenced in Fish and Game Code section 1927.6, subdivision (b) above include all of the following: (1) lands meeting the definition of "Indian country" in United States Code, title 18, section 1151 held in trust by the United States for the benefit of either Tribes (rancherias/reservations) or tribal members (individual allotments usually within rancherias/reservations); (2) fee lands held by Tribes (land purchased and owned by a Tribe typically outside of rancherias/reservations); or (3) fee lands held by tribal-led NGOs (e.g., NALC) or NGOs formed by non-federally recognized Tribes to act on a Tribe's behalf as an entity to hold land.

Source: Ryan Hall.

2.4.1 State Tribal Communication and Consultation Policy

State agencies and Tribes engage in consultation regarding policies, processes, programs, and projects that have the potential to affect tribal interests. Executive Order (EO) B-10-11, issued by Governor Edmond G. Brown, Jr., on September 19, 2011, states that it is the policy of the administration that every state agency and department subject to executive control shall encourage communication and consultation with Tribes. EO B-10-11 reaffirms the right for Tribes to exercise sovereign authority over their members and territory, recognizes that the State and Tribes are better able to adopt and implement mutually beneficial policies when they cooperate and engage in meaningful consultation, and identifies the State's commitment to strengthening and sustaining effective government-to-government relationships between the State and the Tribes. EO B-10-11 also created the Office of the Tribal Advisor, which, among other things, is directed to facilitate communication and consultations

between Tribes and state agencies. Pursuant to EO B-10-11, California Natural Resources Agency (CNRA), CDFW, and the Commission developed the following policies:

- CNRA adopted its Tribal Consultation Policy on November 20, 2012 (CNRA 2012). The Tribal Consultation Policy directs CNRA departments to conduct outreach to Tribes and designate a tribal liaison to serve as the central point of contact for Tribes. CNRA is currently updating its Tribal Consultation Policy to reflect additional consultation requirements established by news laws and executive orders that have been enacted subsequent to 2012. This updated Tribal Consultation Policy will become the new framework for all CNRA departments, which may develop supplemental policies specific to their authorities.
- CDFW adopted its Tribal Communication and Consultation Policy on October 2, 2014. The Policy establishes guiding principles and directs CDFW to appoint a tribal liaison. CDFW is committed to consulting with Tribes about issues surrounding California's fish, wildlife, and plant resources, assessing the potential effects of CDFW activities on tribal interests, and providing Tribes with meaningful opportunities to participate in decision-making processes that have the potential to affect tribal interests.
- The Commission adopted its Tribal Consultation Policy on June 10, 2015, to effectively work with Tribes to sustainably manage natural resources of mutual interest. Several years of an iterative and collaborative processes to develop a shared vision between tribal entities and the Commission resulted in the following vision statement and definition of co-management (Commission 2017, 2020):
    - "The vision of Tribes, the California Fish and Game Commission, and the California Department of Fish and Wildlife is to engage in a collaborative effort between sovereigns to jointly achieve and implement mutually agreed upon and compatible governance and management objectives to ensure the health and sustainable use of fish and wildlife."
    - Co-management is defined as "a collaborative effort established through an agreement in which two or more sovereigns mutually negotiate, define, and allocate amongst themselves the sharing of management functions and responsibilities for a given territory, area or set of natural resources."

EO N-15-19, issued by Governor Gavin Newsom on June 18, 2019, acknowledges and apologizes on behalf of the State for the prejudicial policies and maltreatment of Tribes and commends California Native Americans for stewarding and protecting lands within California. This EO also reaffirms and incorporates by reference the principles of government-to-government engagement established by EO B-10-11.

EO N-82-20, signed by Governor Gavin Newsom on October 7, 2020, creates a California Biodiversity Collaborative and sets a goal of conserving at least 30 percent of the State's land and coastal waters by 2030 to combat the biodiversity and climate crises. This EO acknowledges that California Native Americans have stewarded and managed the lands within California and that addressing the biodiversity and climate crises requires partnerships and collaboration with Tribes.

Young western Joshua tree.
Source: National Park Service.

Section 1.3.2, "California Native American Tribes," and Appendix C, "Tribal Input Summary Memo," of the Conservation Plan include a summary of CDFW's tribal outreach and consultation efforts to-date during development of this Conservation Plan.

2.4.2 Statement of Administration Policy: Native American Ancestral Lands

In September 2020, Governor Newsom issued a Statement of Administration Policy stating that it is the policy of the administration to "seek opportunities to support California Native American tribes' co-management of and access to natural lands that are within a California Native American tribe's ancestral land and under the ownership or control of the State of California." The purposes of this policy are to partner with Tribes to facilitate tribal access to, use of, and co-management of state-owned or state-controlled natural lands and to work cooperatively with Tribes that are interested in acquiring natural lands in excess of state needs in order to:

- Support tribal self-determination and self-government.
- Facilitate the access of Tribes to sacred sites and cultural resources.

- Improve the ability of Tribes to engage in traditional and sustenance gathering, hunting, and fishing.
- Partner with Tribes on land management and stewardship utilizing Traditional Ecological Knowledge.
- Reduce fractionation of tribal lands.
- Provide opportunities for education, community development, economic diversification, and investment in public health, investment in information technology and infrastructure, renewable energy, water conservation, and cultural preservation or awareness.

Examples of actions that could be taken in accordance with this policy are:

- Entering into a written MOU or other written agreements, or adopting policies and practices to allow for access to or co-management of natural lands under the ownership or control of the State with Tribes with ancestral lands located in such areas.
- Coordinating with local governments to zone natural land in excess of state needs in a way conducive to tribal access and use.
- Granting funding to assist Tribes with procurement, protection, or management of natural lands located within their ancestral territories, subject to available resources.
- When natural lands under the ownership or control of the State are in excess of state needs, working cooperatively within existing statutory and regulatory frameworks with Tribes that have ancestral territory within those lands and are interested in acquiring them, including by prioritizing tribal purchase or transfer of land.

2.4.3 Assembly Bill 1284: Tribal Co-Governance and Co-Management

Enacted in September 2024, Assembly Bill 1284 allows for the co-governance and co-management of tribal ancestral lands and waters in California. The bill encourages the CNRA and its departments, conservancies, and commissions to enter into co-governance and co-management agreements with federally recognized Tribes. In addition, the bill authorizes the California Natural Resources Secretary or a delegate to enter into agreements with federally recognized Tribes for the purposes of shared responsibility, decision-making, and collaboration in resource management and conservation within a Tribe's ancestral lands and waters, and requires the Secretary or a delegate to be the signatory for the State for these agreements. The bill also authorizes the Secretary or a delegate, within 90 days of a federally recognized Tribe's request, to begin government-to-government negotiations on co-governance and co-management agreements with the Tribe.

2.4.4 Senate Bill 310: Cultural Burning

Enacted in September 2024, Senate Bill 310 authorizes the California Natural Resources Secretary, in consultation with its departments, commissions, boards, conservancies, and other entities, to enter into written agreements with federally recognized Tribes in support of tribal sovereignty with respect to cultural burning in their ancestral territories. In deference to tribal sovereignty, the Secretary may agree in a written agreement that compliance with specified state permitting or regulatory requirements is not required for cultural burning. The bill also authorizes local air districts to enter into written agreements with federally recognized Tribes in support of tribal sovereignty with respect to cultural burning in their ancestral territories.

2.4.5 Tribal Stewardship Strategy Toolkit

The CNRA is developing a Tribal Stewardship Strategy Toolkit that will provide policies and resources to advance shared goals of Tribes and the State for improved tribal access and co-management of public places and natural resources and the return of ancestral lands to tribal ownership. Example projects already undertaken by departments within CNRA include entering into memorandums of understanding to open state lands for tribal ceremonies, gathering, and use; returning land to Tribes; and providing funds to Tribes to support their wildland fire resilience and forestry management priorities (CNRA 2024).

2.4.6 The Advisory Council on Historic Preservation

The Advisory Council on Historic Preservation has adopted a policy statement on indigenous knowledge and historic preservation, which was requested to be included in the Conservation Plan by tribal members who contributed to the Conservation Plan (FIICPI, pers. comm., 2024). The Advisory Council on Historic Preservation provides foundational commitments that are important for guiding development of co-management principles with Native Americans who inhabit land in the United States (ACHP 2024). CDFW developed initial foundational commitments based on recommendations from tribal members in Action TCM 1, which are described in Section 5.2.3, "Tribal Co-Management," and in Appendix G, "Foundational Commitments by CDFW for Developing Western Joshua Tree Conservation Plan Co-Management Principles with California Native American Tribes."

2.4.7 Joshua Tree National Park Co-Management Agreement

In November 2022, the Twenty-Nine Palms Band of Mission Indians entered into a co-management agreement with Joshua Tree National Park that allows for continued cooperation between the two entities and outlines a path toward shared stewardship of park resources. Through this agreement, the Twenty-Nine Palms Band of Mission Indians and Joshua

Tree National Park identified critical areas for collaboration, which include trail development, emergency mutual aid, joint planning on educational and interpretive activities, and other programs (NPS 2023). This co-management agreement can serve as an example for future co-management agreements between CDFW and Tribes.

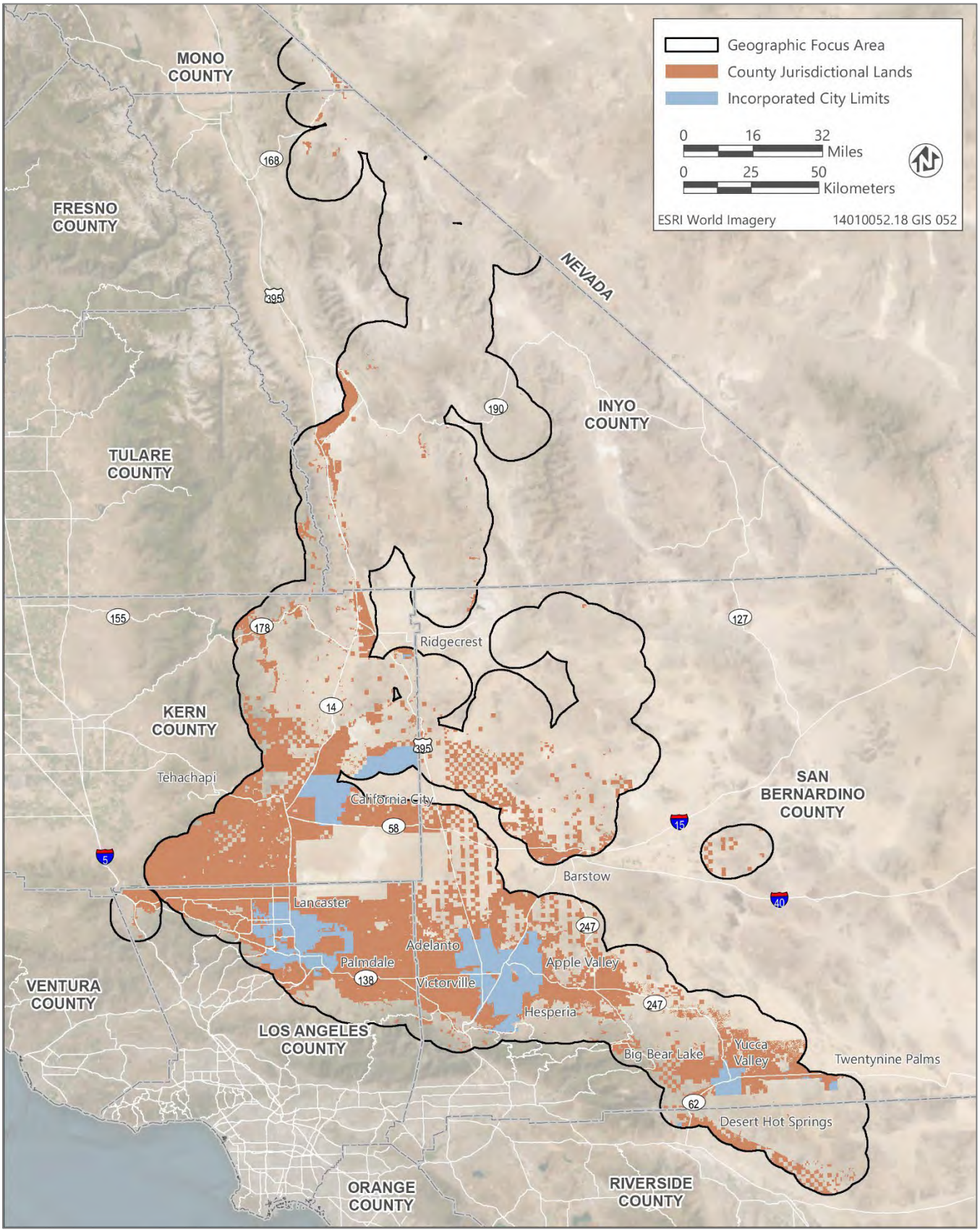
2.5 LOCAL GOVERNMENT

2.5.1 County and City Plans, Policies, and Ordinances

Approximately 37.84 percent of western Joshua tree's range in California is within areas of land use control and authority of local agencies (i.e., county and city jurisdictions). Table 2-6 lists the counties and cities that have western Joshua trees in their jurisdiction and identifies the area and percentage of the species' range in California within each jurisdiction. For each county listed, the area and percentage of western Joshua tree's range in California is limited to unincorporated areas within the county and excludes federal and state lands. The counties and cities within the geographic focus area are shown on Figure 2-16. Figure 2-16 does not include federal and state lands, which are included in Figure 2-4 in Section 2.3.3 and Figure 2-13 in Section 2.3.4.

Yuccas in front of a western Joshua tree.

Source: National Park Service.



Source: Data received from CDFW in 2024; adapted by Ascent in 2024.

Figure 2-16 County and City Jurisdictional Land within the Geographic Focus Area

Table 2-6 City and County Jurisdictions in Western Joshua Tree Range in California

Jurisdiction	Range in Square Kilometers (sq mi)	Percent of Range (%)
San Bernardino County	1,741 (672.2)	13
Kern County	1,011 (390.3)	8
Los Angeles County	989 (381.9)	8
City of Hesperia	144 (55.6)	1.1
City of Adelanto	120 (46.3)	0.9
City of Victorville	119 (45.9)	0.9
City of Palmdale	117 (45.2)	0.9
Town of Apple Valley	98 (37.8)	0.7
Inyo County	53 (20.5)	0.4
Town of Yucca Valley	93 (35.9)	0.7
City of California City	70 (27.0)	0.5
City of Lancaster	56 (21.6)	0.4
Riverside County	4 (1.5)	<0.1
Mono County	<1 (<0.4)	<0.1

Notes: sq mi = square miles.

Source: Esque et al. 2023; compiled by Ascent in 2024.

Article XI of the California Constitution sets forth the powers of local governments. Local agencies govern land use planning within their jurisdictions, including by adopting ordinances, zoning regulations, and general plans. Although state laws and regulations protecting biological resources preempt those of local governments, local agencies can adopt ordinances, regulations, and policies that describe how the agency will implement state requirements, support the State's objectives, and reinforce the State's priorities at the local level. Local agencies have the ability to adopt more stringent ordinances and regulations, provided that they do not conflict with state laws. Local agencies also have the ability to make changes to their ordinances, regulations, and policies in response to changing conditions and regulatory environments.

Many counties and cities within western Joshua tree's range in California have adopted policies in their general plans that align with state and federal laws governing the protection of biological resources. Such policies include designating Joshua tree woodland as a sensitive natural community, designating sensitive areas where development must be carefully planned or where development is discouraged or prohibited, coordinating with land management agencies to protect biological resources, protecting special-status species, acquiring mitigation lands and preserving those lands as open space, and educating the public about natural resources. Many general plans also include policies that provide a framework for the local agency to coordinate with CDFW to implement the requirements of CESA at the local level.

Many counties and cities within western Joshua tree's range in California have also adopted ordinances that regulate tree maintenance and removal, with some ordinances providing specific requirements applicable to western Joshua tree. As applied to western Joshua tree, some of these local ordinances are currently preempted by WJTCA and CESA, given the protections afforded by these statutes, and will continue to be preempted if the species is listed under CESA. However, WJTCA allows local agencies to adopt measures that provide additional protections beyond those required under the act (Fish & G. Code, § 1927.11).

WJTCA allows CDFW to enter into an agreement with any county or city to delegate the ability to authorize, by permit, the taking of a western Joshua tree associated with developing single-family residences, multifamily residences, accessory structures, and public works projects, provided certain conditions are met (Fish & G. Code, § 1927.3). Fish and Game Code section 1927.3, subdivision (c)(3) specifies limits on the number of individual western Joshua trees that a project may take pursuant to a permit issued under a county or city's delegated authority, depending on the project type, and requires CDFW's concurrence that certain projects have avoided and minimized the take of western Joshua trees to the maximum extent practicable. To receive this limited delegation of authority, a county or city must adopt an ordinance requiring the satisfaction of all requirements in Fish and Game Code section 1927.3 as a condition of approval for any take permit issued under such authority (Fish & G. Code, § 1927.3, subd. (c)(1)). In addition, counties and cities are responsible for ensuring that permittees satisfy those requirements (Fish & G. Code, § 1927.3, subd. (c)(2)). Fish and Game Code section 1927.3, subdivision (c)(4) also directs counties and cities to collect fees for permits issued and to remit the fees to CDFW.

CDFW may also enter into an agreement with any county or city to delegate the ability to authorize, by permit, the removal or trimming of dead western Joshua trees or the trimming of live western Joshua trees that pose a risk to structures or public health and safety, provided certain conditions are met (Fish & G. Code, § 1927.4, subd. (b)). To receive this limited delegation of authority, counties and cities must ensure the requirements of Fish and Game Code section 1927.4, subdivision (a) are met and must comply with specific reporting requirements (Fish & G. Code, § 1927.4, subd. (b)).

The Conservation Plan can also provide a framework for CDFW to enter into a written MOU or other agreement with counties and cities to designate protected areas for western Joshua tree. For example, Inyo County designates large contiguous areas in the County known for containing sensitive natural communities or supporting special-status species as environmental resource areas. Policy BIO-1.4 in the *Inyo County General Plan* (Inyo County 2001) discourages development in environmental resource areas unless adverse effects to sensitive resources can be mitigated to a less-than-significant level. The *Inyo County General Plan* recognizes Joshua tree woodland as sensitive natural community that occurs within the County. Similarly, Los

Angeles County officially designates areas with irreplaceable biological resources as significant ecological areas. Although western Joshua tree receives protection under the County's significant ecological areas ordinance, this ordinance is currently preempted by WJTCA. There is potential for CDFW to work with Inyo and Los Angeles Counties to designate western Joshua tree habitat, including climate refugia, as environmental resource areas and significant ecological areas, respectively. In addition, there is potential for CDFW to work with other counties and cities to designate western Joshua tree habitat, including climate refugia, within their respective jurisdictions. A written MOU or other agreement could also include programs to protect western Joshua tree, such as "adopt-a-tree" programs by which the public can participate in restoration and stewardship activities (Section 5.3.5, "Education and Awareness").

Approximately 25 percent of the western Joshua tree range in California is within the Local Responsibility Area for fire response (Figure 2-15). County and city fire departments and local fire districts have primary responsibility for preventing and suppressing fires in the Local Responsibility Area. Local fire departments generally serve developed areas and are primarily concerned with protecting the communities they serve. However, there are opportunities for CDFW to collaborate with local fire departments on fire management strategies that benefit western Joshua tree on private land.

2.5.2 Utilities and Special Districts

Approximately 0.2 percent of the western Joshua tree's range in California is within lands owned by the public utilities and special districts described below.

- Mountains Recreation and Conservation Authority is an open space district dedicated to the acquisition, preservation, and protection of open space wildlife habitat, and urban, mountain, and river parkland that is easily accessible to the public.
- Apple Valley Recreation and Park District provides recreation in the Town of Apple Valley.
- Hesperia Recreation and Park District provides parks and recreation facilities to the residents of the City of Hesperia and portions of the unincorporated areas of Oak Hills, Summit Valley, and Phelan.
- Antelope Valley Union High School District provides public education in the cities of Palmdale and Lancaster.

A long-lived western Joshua tree.
Source: National Park Service.

- Joshua Tree Park and Recreation District provides recreation for the residents of the unincorporated areas of Joshua Tree and neighboring communities of the Morongo Basin.
- Lancaster Cemetery District operates a cemetery that serves residents of the Antelope Valley.
- Littlerock Creek Irrigation District is a public water utility that provides water for agricultural use for the surrounding areas of Littlerock.
- Morongo Valley Community Services District is a community service district for parks, street lights, and fire protection in Morongo Valley.
- Palmdale Water District is a public water utility that provides water within the City of Palmdale's planning area.
- Phelan Piñon Hills Community Services District provides water, parks and recreation, solid waste, and street lighting services in the desert foothills of the eastern San Gabriel Mountains in unincorporated San Bernardino County.
- Los Angeles Department of Water and Power is a municipal utility that provides water and electricity within the City of Los Angeles and several adjacent cities and communities in southwestern Los Angeles County.

Public agencies and publicly or investor-owned utilities were previously exempt from obtaining permits under the California Desert Native Plants Act for removal of western Joshua tree when acting in obligation to provide public service (Cal. Food & Agri. Code, § 80117). However, these utilities and special districts are now required to seek take authorization for removal of western Joshua tree under either CESA or WJTCA while western Joshua tree is a candidate species under CESA.

2.6 NONGOVERNMENTAL ORGANIZATIONS

Approximately 0.8 percent of the western Joshua tree's range in California is within lands owned or held in easements by the NGOs, which are described below.

- The Wilderness Land Trust is an NGO whose mission is to acquire and transfer private lands to public ownership to complete designated and proposed wilderness areas or directly protect wilderness values.
- The Transition Habitat Conservancy is a land trust whose mission is to protect transition zones and wildlife corridor ecosystems and their scenic, agricultural, and cultural resource values in the West Mojave Desert.
- The Wildlands Conservancy is an NGO whose mission is to preserve lands and provide programs for public recreation.

- The National Audubon Society is an NGO whose mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats.
- The Mojave Desert Land Trust is an NGO that acquires and permanently protects ecologically significant land throughout the California desert, with a focus on parcels within national parks and preserves, wilderness areas, areas of critical environmental concern, and wildlife corridors.
- The Boys and Girls Club of America is an NGO that provides programs and services for young people, including after-school programs, summer camps, sports and recreation programs, academic enrichment programs, and character development programs.
- The Sequoia Riverlands Trust is an NGO that conserves natural and agricultural lands of the Southern Sierra Nevada and San Joaquin Valley.
- The Tejon Ranch Conservancy is an NGO that works to preserve, enhance, and restore the native biodiversity and ecosystem values of the Tejon Ranch and Tehachapi Range.
- The Wildlife Heritage Foundation is a statewide, nongovernmental land trust that is currently preserving over 100,000 acres of ecologically significant land and water resources.
- The Native American Land Conservancy is an NGO that acquires, preserves, and protects off-reservation sacred sites in California's ancestral territories. Western Joshua trees are present on Coyote Hole and the Bob Rabbit wildlife corridor, which are owned and managed by the Native American Land Conservancy.

These NGOs offer important planning influences because they were established primarily to protect land or provide recreation opportunities and conservation activities. The Conservation Plan presents an opportunity for CDFW to work with these nongovernmental conservancies and trusts to acquire land for conservation or implement additional protective measures on existing conservation lands for the benefit of western Joshua tree. Such measures could potentially also be applied to conservation easements on lands NGOs manage as easement holders.

3 TRADITIONAL VALUES AND USES OF WESTERN JOSHUA TREE BY CALIFORNIA NATIVE AMERICAN TRIBES

This chapter provides an overview of California Native American tribes' (Tribes) traditional uses of Joshua trees (i.e., western Joshua tree and/or eastern Joshua tree [*Yucca jaegeriana*]), as well as traditional values and collective experience and knowledge, known as Traditional Ecological Knowledge (TEK), related to Joshua trees. TEK has been defined in many different ways as part of federal or state policy making, often based on consultation with Native American tribes. USFWS describes TEK as "evolving knowledge acquired by Native and local peoples over hundreds or thousands of years through direct contact with the environment. . . TEK is an accumulating body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (human and non-human) with one another and with the environment. TEK encompasses the world view of Native people which includes ecology, spirituality, human and animal relationships, and more" (Rinkevich et al. 2011). TEK is collectively shared and transmitted and can take several forms, including stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds (Secretariat of the Convention of Biological Diversity 2021). TEK may embody aspects of spirituality, ceremonies, health, vitality, human and wildlife relationships, ecology, and more. It also guides habitat and plant management that complements non-native scientific understanding of agriculture, fisheries, health, horticulture, forestry, cultural identity, and

> *"TEK is an accumulating body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (human and non-human) with one another and with the environment."*
> *-Rinkevich et al. 2011*

more (Rinkevich et al. 2011). While the origin of TEK is from previous generations, its application now is a part of contemporary landscape management science.

The sources used to inform the chapter include information gathered from tribal engagement and consultation with individual California Native American tribes during the preparation of the Conservation Plan, as described in Section 1.3.2, "California Native American Tribes." Information referenced in this chapter that was received from a Tribe has been approved by the providing Tribe for public disclosure. Additional sources used to inform the chapter include available secondary materials related to California Native American tribes and their uses of Joshua tree. The secondary materials that help inform this chapter are not exhaustive sources in the published literature, and they may not necessarily provide a complete representation of California Native American tribes and their use of Joshua tree. Only published literature, references, and materials that are currently and publicly available were consulted as secondary sources. Tribal names and ethnographic/linguistic Native American groups are denoted as they were used in each article and may not coincide with, or be representative of, modern Tribe names. If a Tribe or Tribes present new information or alternative representations of the information they would like included in this chapter, CDFW will work to incorporate the information into future updates of the Conservation Plan.

Source: Native American Land Conservancy.

Most published literature about California Native American tribes' use of Joshua tree does not distinguish between eastern Joshua tree and western Joshua tree because the taxonomic distinction of the two species occurred only recently. For purposes of this chapter, the general term "Joshua tree" is therefore used. In addition, the more generalized "yucca" naming convention is found mostly in early historical and anthropological references, where discussion of "yucca" included Joshua tree, as well as a broader group of shrub-like yucca plant species, such as banana yucca (*Yucca baccata*), chaparral yucca (*Hesperoyucca whipplei*, which was previously *Yucca whipplei*), and Mojave yucca (*Yucca schidigera*). Thus, this chapter uses the term "yucca" or "yucca species" when information is not known to be specific to Joshua tree.

As stated in Section 1.3.2, the collaborative engagement process with California Native American tribes is ongoing and will evolve over time. The information in this chapter will be updated with additional tribal consultation and input shared and approved by Tribes in future

versions of the Conservation Plan. California Native American tribes that requested to review a preliminary draft of the Conservation Plan prior to CDFW submittal to the Commission were provided the opportunity. Tribes may provide comments on that preliminary draft and may also provide comments on the publicly released draft Conservation Plan through the review process outlined on the Commission's website. Tribal input will continue to be welcomed at any time by CDFW during Conservation Plan implementation (which is called for in Management Action TCM 1, "Establish Co-Management Principles" in Section 5.2.3, "Tribal Co-Management"), and for incorporation into future Conservation Plan updates.

3.1 CALIFORNIA NATIVE AMERICAN TRIBES COLLABORATING ON THE CONSERVATION PLAN

CDFW notified and invited input from 170 federally and non-federally recognized tribal contacts and representatives during preparation of the draft Conservation Plan. The following Tribes have met with or provided information to CDFW or Native American Land Conservancy (NALC), some of which is incorporated into the Conservation Plan. As additional California Native American tribes provide contributions to the Conservation Plan, they will be added to the following list in future Conservation Plan updates.

- Agua Caliente Band of Cahuilla Indians (ACBCI)
- Agua Caliente Tribe of Cupeño Indians (ACTCI)
- Cahuilla Band of Indians (Chahuilla)
- Fernandeño Tataviam Band of Mission Indians (FTBMI)
- Fort Independence Indian Community of Paiute Indians (FIICPI)
- Fort Yuma Quechan Indian Tribe (FYQIT)
- Kern Valley Indian Community (KVIC)
- Kwaaymii Laguna Band of Indians
- Lone Pine Paiute-Shoshone Tribe (LPPSR)
- San Manuel Band of Mission Indians (SMBMI)
- Tübatulabals of Kern Valley (Tübatulabals)
- Tule River Indian Tribe

3.2 TRIBAL VALUES RELATED TO, AND USES OF, JOSHUA TREE

This section is based on information contributed by California Native American tribes in meetings held during the development of the Conservation Plan and published literature. Descriptions of values and uses provided by secondary materials are sometimes referenced in the past tense because they originate from previously documented sources that interpret or describe Native American values and uses. Tribes have verified and approved the use of secondary material cited in this section during meetings with CDFW and NALC for the Conservation Plan, and additional source material may be identified by Tribes in the future.

Joshua tree is called many names by California Native American tribes that have interacted with the plant (Collins et al. 2022). Yucca species, such as Joshua tree, have been documented for their use in traditional materials and for culinary and medical purposes in the Mojave Desert and throughout the rest of Joshua tree's range in California (Collins et al. 2022). In addition, silhouette images of Joshua trees carry cultural significance in some traditional stories (FTBMI, pers. comm., 2024), have significant historical value as part of the traditional cultural landscape, and serve as witnesses to the pre-colonial contact age (FIICPI, pers. comm., 2024).

An ethnobotanical study by Stoffle et al. (1990) analyzed holistic conservation theory and plant-specific interviews with representatives from Western Shoshone, Southern Paiute, and Owens Valley Paiute Tribes from the Mojave Desert and Great Basin to develop a ranking system of cultural significance of various plants. Importance given to plants was based on the number of plant elements used by Tribes. Due to the various tribal uses of Joshua tree for its seeds, flowers, roots, and fibers, Joshua tree ranked high in overall cultural importance across the represented Tribes in the study within Joshua tree's range in California (Stoffle et al. 1990). Similarly, Tribes in Los Angeles and in the southeastern desert region identified Joshua tree woodlands in southern California as culturally important, where Joshua trees were used for basketry material, culinary purposes, and artistic applications, such as dye for baskets, ceremonial purposes, and tattoo ink (Fortier 2008, 26).

3.2.1 Culinary and Medicinal Uses

Yucca species have been and continue to be an important food source since the earliest traditional cultures of the Southwest. Fruits of Mojave yucca, Joshua tree, and chaparral yucca were gathered for food among the Tribes of southern California, northwestern Arizona, and southern Nevada, (Bell and Castetter 1941, 22 and 63). Although the fruit of Mojave yucca (reported with the older name *Yucca mohavensis* by Bell and Castetter [1941]) could be eaten dry, most people preferred it cooked after drying and made into a drink (Bell and Castetter 1941, 18). Particularly important to the Chemehuevi, Cahuilla, and Serrano culturally affiliated Tribes' diets, "various species of yucca fruits, mescal, and seeds were collected by the women of the Tribe" (Stickel et al. 1980, 98; Braun and Gates 2013, 63 and 71). Basket lids were sealed with greasewood (*Adenostoma fasiculata*) gum for storage of seeds, which allowed them to be kept indefinitely (Braun and Gates 2013, 63). Food stores were frequently cached in caves or rock crevices; these "caches were important for the Chemehuevi when they maintained a more nomadic existence because they allowed the Chemehuevi the freedom to venture to other areas without having to be concerned with their food supply when they returned" (Braun and Gates 2013, 63). Processed edible parts of Joshua tree would be kept for long periods in storage areas (FTBMI, pers. comm., 2024).

Many parts of yucca and agave plants are used for culinary purposes, such as the yucca plant's flower buds, fruits, roots, bulbs, seeds, and stems (Bean and Saubel 1972; Eckhardt and Hatley 1982; Stoffel et al. 2022). The plants are a year-round staple, producing several types of traditional foods for Native Americans of the Mojave Desert, Great Basin, and Colorado Plateau (Stoffle et al. 2022, 23). Collecting parts of the yucca plant is purposefully timed to obtain nutritional value and optimize the quality of yucca material while contributing to the long-term productivity of the plant (Anderson 2005, 265). For example, Anderson reports that "the young flower stalks of [chaparral yucca]… and basal portions of the plants, with leaves removed," were harvested in late spring and "eaten after being roasted in a pit oven with hot stones" (Anderson 2005, 268).

California Native American tribes have noted that the preparation of Joshua tree to be consumed is a major social event (Stoffle et al. 2022, 24). The Fernandeño Tataviam Band of Mission Indians shared that yucca provided the most reliable and plentiful source of energy available to their ancestors; the root and stalk would be cooked slowly prior to being consumed (FTBMI, pers. comm., 2024). The seeds contributed important nutritional value, being especially high in fiber, oil, and sugar (Webber 1953). Seeds were finely ground and either eaten raw or cooked in the form of mush by Tribes in Southern California (Palmer 1878, 647). Immature seed pods were also used as food in early spring and were boiled down or cooked in roasting pits (Louderback et al. 2013). The seed pods of yucca and agave species have been observed in roasting pits dating back at least 4,000 years throughout the Southwest (Price et al. 2009, 18; Louderback et al. 2013, 285). Many sources state that gathering the flowers of Joshua tree and blossoms of other yucca species occurs in early spring (Bean and Saubel 1972; Stickel et al. 1980, 89; Eckhardt and Hatley 1982, 37; Tübatulabals, pers. comm., 2024). Joshua tree flowers and blossoms are eaten fresh or pickled (Tübatulabals, pers. comm., 2024). Flower buds that are cooked are similar in flavor to artichokes (Anderson 2005, 245). Fortier (2008) wrote that sugar from the flowers of Joshua tree has been used as an addition to the ground seeds of four-wing saltbush (*Atriplex canescens*) to create a pinole (roasted corn or maize) drink. In addition, yucca moth larvae, which develop within the fruits of yucca plants, are considered to be a special culinary treat (Stoffle et al. 2022, 23).

Published literature provides limited insight into the medicinal properties and uses of yucca species; however, medicinal TEK is an area of cultural tradition that is strongly associated with oral storytelling and generational knowledge transfer through hands-on education from elders to youth. Information regarding the uses of yucca species for healing purposes will be incorporated into the Conservation Plan in the future, to the extent available. Secondary sources noted that the root of the Joshua tree, "especially the red part," has a medicinal effect similar to greasewood as an antiviral and anti-inflammatory (Stickel et al. 1980, 223). Garcia and Adams Jr. (2009) note that chaparral yucca was used as a medication for skin irritations among the Kumeyaay Tribe.

3.2.2 Material Uses

Dried Joshua tree leaves with woven baskets in background. Source: Native American Land Conservancy.

Material uses of Joshua tree and other yucca species have been and continue to be essential for many functions of the California Native American tribes that inhabit and trade within or near Joshua tree habitat. Yucca species have been documented as being used for pole binding, cordage for building structures, carrying straps, and soap (Barrows 1900, 36–37, 47; Braun and Gates 2013, 135), with the leaves in particular being used for binding and cordage (Hedges 1967, 47-48; Wilken 2012, 136), and dried trunks being used to make sandals (Wilken 2012, 136-137). Yucca cord is often two-strand and twisted in a right spiral, with the fur strips being twisted about the cord base in a left-to-right spiral (Bell and Castetter 1941, 43). Seasonal variation in environmental conditions influence what parts of the Joshua tree might be better suited for gathering according to the type of textiles created from the plant (Anderson 2005, 130). Native Americans of the Mojave Desert pounded leaves of Joshua trees and other yucca and agave plants to expose fibers, which after drying were made into cordage (Stoffle et al. 2022, 23). The spines were used as needles for sewing, tattooing, and separating fibers when making baskets, and as awls when a handle was added (Stoffle et al. 2022, 23). Joshua tree fibers form a natural, elastic textile (Bean and Saubel 1972) used for rope, basket making, sandals, hairbrushes, paint brushes, bowstrings, and netting (Churchill et al. 1879; Barrows 1900, 47; Bean and Saubel 1972). Younger Joshua trees have more elastic fibers than older trees and were preferred for some material construction (Diguet and Poisson 1896).

The roots of Joshua tree are harvested for dyes and basket weaving purposes (FYQIT, pers. comm., 2024; Tübatulabals, pers. comm., 2024). The long roots were frequently used by Southern California desert Tribes, including the Kawaiisu, Kitanemuk, Owens Valley Paiute, Tübatulabals of Kern Valley, and Timbisha Shoshone (formerly known as the Panamint Shoshone) for making coiled baskets and utensils (Coville 1892, 358; Voegelin 1938, 30; Bell and Castetter 1941, 35; Zigmond 1978, 201; McDaniel et al. 2012, xvi, 2-8 through 2-9; Anderson 2018). The Joshua tree roots were removed selectively and collected in batches to allow rest periods for the plants and to not deplete the Joshua trees in a localized area (Anderson 2005, 191). The Tübatulabals of Kern Valley advise that roots should not be dug up in sections longer than 18 inches (Tübatulabals, pers. comm., 2024). The red color of the root of Joshua trees is what makes them desirable for basket weaving and creating patterns, such as lightning bolts for the Kitanemuk

basket makers (Anderson 2005, 43). The roots have been documented to create black, brown, light yellow, and red dyes, depending on the season they are harvested (Steward 1933, 271; Voegelin 1938, 30; Murphey 1959). The Paiute preferred roots of yucca from plants above 4,000 feet in elevation because the roots had better color than those from lower elevations (Anderson 2005, 53). Among the Kawaiisu and Tübatulabal, the roots were used in making coiled baskets and basket caps, and the fibers were used for making sandals (Voegelin 1938, 30; Zigmond 1978, 201; McDaniel et al. 2012, xvi, 2-8 through 2-9). Parts of the Joshua tree could also be used to make grass skirts and shoes (FYQIT, pers. comm., 2024). The Kawaiisu additionally used Joshua tree when making twined and burden baskets (Zigmond 1981, 201).

Woven baskets with intricate patterns are made with Joshua tree leaves and roots. A bundle of roots on the right side is the source of the dark colors to make the patterns in the baskets. Source: Native American Land Conservancy.

3.3 TRADITIONAL ECOLOGICAL KNOWLEDGE FOR CONSERVATION

Reestablishing and healing severed relationships with the earth through activities, such as gathering, crafting, and using products from nature, are important cornerstones to continue to keep California Native American relations with nature alive, rich, and sustainable (Anderson 2005, 338). TEK is a direct connection between Native Americans and the environment that is important for conservation of nature. Spiritual connections and belief systems guide Native American landscape management throughout California, and consultation now affords the ability for Tribes to articulate aspects of TEK that include spiritual elements that may be new to private landowners, local, state, and federal agencies (FIICPI, pers. comm., 2024). As such, it is critical that landowners and agencies take time to consider these new aspects of environmental protection and incorporate them into their plans, policies, and guidance (FIICPI, pers. comm., 2024). Native Americans continue to have highly participatory relationships with nature, which may be intertwined within their Creation Story. Payahuunadü, the Land of Flowing Water, is considered a living church and the Chuk-ke-shuv-ve-wé́-tah's (Oak Creek or Fort Independence Indian Reservation's) Creation Story includes ancestral lands, and their caring for, that extend beyond the artificial boundaries of their reservation (FIICPI, pers. comm., 2024). Practicing TEK, which is an ongoing cumulative body of knowledge, practices, and beliefs passed on through generations by Native Americans, is one way to heal these severed relationships with the earth and to achieve the Conservation Plan's vision for western Joshua tree.

As described in published literature and current tribal input, Joshua tree remains highly valued for its cultural significance. Landscape-level management was the driving force behind the continued livelihood of most Native Americans in Southwestern California, including in the Mojave Desert and Joshua tree woodland habitat (Anderson 2005, 160–165; Stoffel et al. 2022, 23). Tribes hold landscape-level management that extends beyond the boundaries of reservations and holistic views of culture and biology as key to managing a species (Stoffle et al. 2022; FIICPI, pers. comm., 2024; KVIC, pers. comm., 2024). The Tübatulabals of Kern Valley have highlighted the importance of protecting other native species in Joshua tree's range in California to properly care for the ecosystem (Tübatulabals, pers. comm., 2024). Fort Independence Indian Community of Paiute Indians stress the importance of engaging with all Tribes that have Joshua trees as part of their traditional cultural landscape to better understand how to manage and treat the trees in their cultural ways (FIICPI, pers. comm., 2024). Tribes are working with CDFW to identify actions that benefit multiple ecologically related species. For example, yucca moth and yucca have a mutualistic, ecological relationship and are dependent on each other for reproduction and long-term survival (see Section 4.2, "Wildlife Values and Ecological Function of Western Joshua Trees," for more details).

Native American landscape-level management bolsters plant and wildlife populations through actions that encourage the growth of culturally important plant species, which includes Joshua tree and yucca species (Zigmond 1981; Anderson 2005, 191 and 338). Harvesting the tender, immature flower stalks of yucca species before flowering may have stimulated vegetative reproduction through a hormonal change in the plants, forcing them to produce "pups"—small plants attached to the parent plant, which would create additional plants in a desirable area (Anderson 2005, 130 and 269). Pruning and cutting plants are strategically done to enhance plant growth as well (Anderson 2005, 2018). Native Americans have known and understand that among desert plants, propagation is dependent on microhabitats and nurse plants to shelter seedlings, which affect the generation and distribution of Joshua tree plant communities (Brittingham and Walker 2000; Tübatulabals, pers. comm., 2024).

Tribal members help dig a hole for a demonstration of a Joshua tree transplanting.

Source: Native American Land Conservancy.

There are limited areas of Joshua tree woodlands, and tribal representatives have remarked on the importance of these areas for ethnobotanical resources (Stoffle et al. 2022, 24). Joshua trees provide key habitat for other wildlife and plant species important to California Native American tribes (Stoffle et al. 2022, 23). In a series of interviews with consulting tribal representatives, one representative noted that wildlife live in the Joshua tree woodland; therefore, any disturbance could lead to the destruction of the habitat, and thus, many wildlife would die or leave the valley (Stoffle et al. 2022, 24).

Native Americans have skillfully gathered plants over long periods in different habitats without depleting plant populations to the point of extinction (Anderson et al. 1997, 33). The Fort Independence Indian Community of Paiute Indians indicate they wouldn't take western Joshua tree unless it was critical and beneficial for our people overall (FIICPI, pers. comm., 2024). A representative from the Tribe further explained that living in excess is a threat to the land and specifically the western Joshua tree species and does not align with the Tribe's values to take only what is needed from the land (FIICPI, pers. comm., 2024). According to *Tending the Wild* author, M. Kat Anderson, "Removing key elements from nature means the possibility of ecological degradation. . . . Removing elements from natural systems with thoughtfulness and respect, one [begins to] address the complex interplay between resource production and the conservation of biological diversity. Judiciously harvesting, crafting, and using products from nature continue to be the three cornerstones that keep Indian relationships with nature alive, rich, and sustainable." (Anderson 2005, 338).

Source: Native American Land Conservancy.

Regular Native American application of low-intensity, periodic fire across landscapes in California to manage vegetative communities and stimulate desirable plant growth is well-documented (Blackburn and Anderson 1993; Keeley 2002; Stewart 2002; Vale 2002; Anderson 2018; Roos et al. 2021; Schelenz 2022). The Kern Valley Indian Community and the Agua Caliente Tribe of Cupeño Indians addressed the topic of burning for management of Joshua trees. Both Tribes noted that there was not a tradition of cultural burning for the management of Joshua trees or the Joshua tree woodland community because there had traditionally not been a reason to burn it (ACTCI, pers. comm., 2024; KVIC, pers. comm., 2024). However, both noted that the environment has changed and believe that burning to reduce fuel loads containing invasive species, and therefore reducing fire intensity, is presently needed. The Kern Valley Indian Community has firsthand experience with Joshua trees and wildland fire and note that in their community, where a fire burned in 2016, Joshua trees were killed and no regrowth from the crowns was observed in areas on the flats where the fire burned more intensely. However, the Kern Valley Indian Community observed Joshua trees have been regrowing from the roots on slopes where the fire did not burn as intensely (KVIC, pers. comm., 2024). The Agua Caliente Tribe of Cupeño Indians' Tribal Chair indicated there may be potential for Joshua tree germination in an environment with fire ash and biochar (ACTCI, pers. comm., 2024).

Although California Native American tribes have noted that cultural burning is used less often in the desert than in other plant communities, there are still documented uses of periodic fire being employed by Native Americans in Southern California. For example, among the Kumeyaay of Southern California, yucca and agave seeds were planted immediately before burning a slope, and germination was induced by the heat of fire (Stoffle et al. 2022, 23). These stimulated plants did not provide immediate materials and would take several years to mature to usable size, providing evidence of long-range plant husbandry planning by the Tribes (Stoffle et al. 2022, 23).

Many southwestern plant species are transplanted across the desert by Native Americans to areas of importance to increase the availability for traditional purposes (Anderson 2005, 143 and 160–165; Stoffle et al. 2022, 23). The density observed in Joshua tree woodlands suggests that Joshua trees were stimulated to grow in the desert, especially near culturally important sites (Stoffle et al. 1989, 98; Stoffle et al. 2022, 23). There are documented accounts of Native Americans saving the seeds of agave, yucca, and desert fan palms and planting them in specific locations within the Mojave Desert, demonstrating the integral nature of plant cultivation in Native American cultural systems (Stoffle et al. 1989, 129 and 138; Anderson 2005, 161; Stoffle et al. 2022, 23).

Joshua tree being watered after it has been transplanted by tribal members.

Source: Native American Land Conservancy.

Native Americans skillfully gather plants over long periods in different habitats to manage the health of ecosystems while alternatively ensuring key cultural use species are readily available. This requires knowledge of each species' life characteristics (Anderson et al. 1997, 33). Joshua tree is abundantly present and has a wide habitat range in the desert Southwest because of this skillful knowledge and practice. The sustainability of Native American practices allows natural vegetation and human inhabitation of the landscape to coexist. Integration of California Native American tribes' traditional cultural uses and TEK for landscape-level health is crucial for land management strategies pertaining to conservation of western Joshua tree.

This page is intentionally left blank.

4 SUMMARY OF RESOURCE CONDITIONS

The starting point for assessing western Joshua tree conservation needs and developing management actions is understanding the existing range and distribution, habitat requirements, ecology, population trends, and key stressors and threats to the species. Detailed information on resource conditions related to western Joshua tree is available in CDFW's March 2022 status review of western Joshua tree (CDFW 2022). This chapter summarizes the resource conditions of western Joshua tree from the status review and additional information and analysis not available when the status review was finalized. Information from a summary of western Joshua tree resource conditions prepared by USFWS (2023) is also included.

4.1 WESTERN JOSHUA TREE BIOLOGY AND ECOLOGY

4.1.1 Range and Distribution

"It's the Joshua tree's struggle that gives it its beauty."
— Jeannette Walls, The Glass Castle

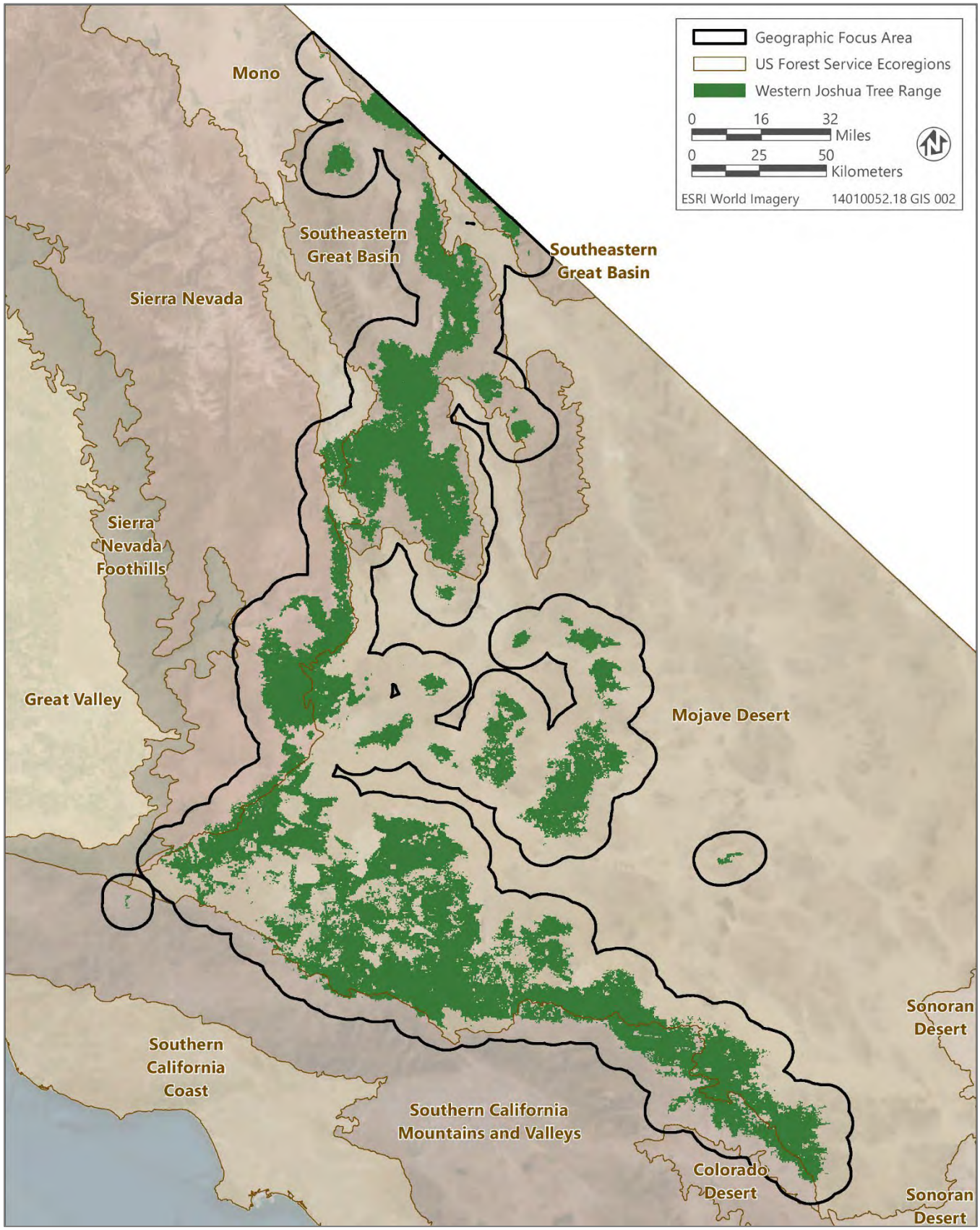
The western Joshua tree range and distribution in California are described in this section in reference to the ecoregions where they occur. Ecoregions are delineated based on biotic factors (i.e., living parts of an ecosystem) and environmental factors that determine the structure and function of ecosystems. Environmental factors include climate, physiography, water, soils, air, hydrology, and natural communities (ECOMAP 1993).

Western Joshua tree is present in discontinuous populations, mainly within the western Mojave Desert and extending north and east into the southwestern Great Basin across various ecoregions. The southern portion of the range extends south into the Southern California Mountains and Valleys ecoregion (Figure 4-1). The western portion of the range extends into the Sierra Nevada ecoregion and into a limited portion of the Sierra Nevada Foothills

ecoregion. Western Joshua tree is often noted to be abundant in ecological and sometimes elevational transition zones along the border of the Mojave Desert ecoregion. The southern extent of the species is east of Indio Hills, California, near Rockhouse Canyon and north of Fargo Canyon, and the western extent is an isolated population in Los Angeles County at the junction of Orwin Way Road and Quail Canyon Motocross Road near Caswell (Esque et al. 2023). The northern and eastern extents of the range are located just south of Tonopah, Nevada (Esque et al. 2023), and Tikaboo Valley, Nevada (Rowlands 1978; Smith et al. 2021), respectively, which are not represented in Figure 4-1 because only the California portion of the range is shown. The northern extent of the species in California is likely in the southeastern corner of Mono County, between Wildhorse Creek and Furnace Creek, which are north of Deep Springs, California, and south of Dyer, Nevada (Esque et al. 2023).

The Conservation Plan addresses the known portion of the western Joshua tree range in California within Riverside, San Bernardino, Los Angeles, Kern, Inyo, and Mono counties, and the small portions of the geographic focus area in Tulare and Ventura counties (Figure 4-1). Substantial stands of western Joshua tree have been reported at elevations ranging from approximately 750 to 2,100 meters (2,460 to 6,890 feet) above sea level (Rowlands 1978). The data used for the mapping developed by Esque et al. (2023) (Figure 4-1) show western Joshua tree present at approximately 585 meters (1,919 feet) up to approximately 2,675 meters (8,776 feet). The range of western Joshua tree in California has been estimated to encompass a total area of approximately 13,088 square kilometers (5,053 square miles) across six ecoregions (Table 4-1) (Esque et al. 2023).

Western Joshua tree has a sprawling, diffuse pattern of distribution, particularly compared to eastern Joshua tree (*Yucca jaegeriana*) (Figure 1-1 in Chapter 1, "Introduction") (Esque et al. 2023). High densities of western Joshua tree are present along the southern end of the species' range, separated by large gaps where the species is absent, particularly in the southwestern portion of the range. These conspicuous gaps in the species' distribution are likely a result of urban development, fire, and other cumulative disturbances (Esque et al. 2023). In California, most of the western Joshua tree range is within the Mojave Desert ecoregion and the Southeastern Great Basin ecoregion (Table 4-1; Figure 4-1). Most high elevation portions of the western Joshua tree range in California are in the Southeastern Great Basin ecoregion. Some high elevation portions of the species range in California are also in the Sierra Nevada and Southern California Mountains and Valleys ecoregions.



Sources: Esque et al. 2023; USFS 2024; adapted by Ascent in 2024.

Figure 4-1 California Ecoregions and Range of Western Joshua Tree in California

Table 4-1 Western Joshua Tree Range in California by Ecoregion and Elevation

Ecoregion	Elevation Class[1]	Area in Square Kilometers (sq mi)	Percent of Range
Mojave Desert	low elevation	6,024.3 (2,326.0)	46.0
	middle-low elevation	1,809.2 (698.5)	13.8
	middle-high elevation	1.8 (0.7)	<0.1
	Mojave Desert total	**7,835.2 (3,025.2)**	**59.9**
Southeastern Great Basin	low elevation	10.4 (4.0)	0.1
	middle-low elevation	1,265.8 (488.7)	9.7
	middle-high elevation	1,712.5 (661.2)	13.1
	high elevation	209.6 (80.9)	1.6
	Southeastern Great Basin total	**3,198.4 (1,234.9)**	**24.4**
Sierra Nevada	low elevation	164.1 (63.4)	1.3
	middle-low elevation	826.1 (319.0)	6.3
	middle-high elevation	153.4 (59.2)	1.2
	high elevation	0.3 (0.1)	<0.1
	Sierra Nevada total	**1,143.9 (441.7)**	**8.7**
Southern California Mountains and Valleys	low elevation	85.3 (32.9)	0.7
	middle-low elevation	581.0 (224.3)	4.4
	middle-high elevation	232.1 (89.6)	1.8
	high elevation	7.3 (2.8)	0.1
	Southern California Mountains and Valleys total	**905.8 (349.7)**	**6.9**
Mono	middle-high elevation	2.8 (1.1)	<0.1
	Mono total	**2.8 (1.1)**	**<0.1**
Sierra Nevada Foothills	middle-low elevation	0.7 (0.3)	<0.1
	Sierra Nevada Foothills total	**0.7 (0.3)**	**<0.1**
Total		**13,086.8**	**100.0**

Notes: m = meters; sq mi = square miles.

[1] The elevational range of western Joshua tree was divided into four equal range classes: low elevation: 585–1,105.9 meters (1,919–3,628 feet); middle-low elevation: 1,106–1,625.9 meters (3,629–5,334 feet); middle-high elevation: 1,626–2,145.9 meters (5,335–7,040 feet); high elevation: 2,146–2,675.9 meters (7,041–8,780 feet).

Source: Esque et al. 2023; USFS 2024; compiled by Ascent in 2024.

GENETIC VARIATION

Genetic variation within a species can allow it to adapt to environmental change. Adaptive genetic variation directly affects a species' ability to respond to environmental factors, such as heat stress and drought, highlighting the importance of conserving adaptive genetic

variation within species ecotypes (i.e., subgroups of a species that are genetically distinct), compared to conserving overall genetic variation within the species (Smith et al. 2023). A substantial amount of scientific attention has been directed toward understanding the coevolution of western Joshua tree, eastern Joshua tree, and their obligate pollinating moths. Much of this attention is focused on a small area in Tikaboo Valley, Nevada, where the two species of Joshua tree co-occur and hybridization has been observed. Western Joshua tree and eastern Joshua tree have a moderate degree of genetic differentiation and diverged approximately 100,000 to 200,000 years ago, which is considered a relatively recent divergence (Smith et al. 2021). The work by Smith et al. (2021) supports the conclusion that Joshua trees fall into two distinct groups that correspond with western Joshua tree and eastern Joshua tree. Smith et al. (2021) indicate there is genetic diversity among populations of western Joshua tree, particularly among populations in the southern and western extent of its range, possibly driven by adaptations to different climates. The study identified three genetically distinct groups of western Joshua tree across five populations that were sampled within the range in California, which are all located in the Mojave Desert ecoregion, although two populations that are in genetically distinct groups are less than 2 miles from the Southern California Mountains and Valleys ecoregion. Smith et al. (2023) suggested these genetically distinct populations may respond differently to climate change, in which case, identifying and protecting populations that are better adapted to future climate conditions could potentially improve conservation of the species. Further genetic analysis of western Joshua tree is currently in review and will be incorporated into the Conservation Plan in a future update.

4.1.2 Habitat Requirements

Western Joshua trees live in a variety of environments in a wide range of elevations, landforms, soil types, and vegetation communities. Recent research conducted by Esque et al. (2023), which addressed the entire range of western Joshua tree, showed that climatic variables are typically more accurate predictors of western Joshua tree presence than topography and vegetation; however, topography and vegetation may still be important factors for western Joshua tree survival.

CLIMATE

Western Joshua trees rely on precipitation events to augment soil moisture as a water source. Unlike mature Joshua trees, juvenile Joshua trees and seedlings do not have access to deep groundwater and are unable to store much water in their tissues. Duration of droughts and high precipitation periods are likely important factors in determining where western Joshua tree can successfully reproduce and survive. Where western Joshua trees are found, precipitation is received as rain and less frequently as snow, with most precipitation occurring between

October and April (Hereford et al. 2004). Annual precipitation for western Joshua tree is largely restricted to the winter months because of the species' western position in the Mojave precipitation gradient (Esque et al. 2023). Precipitation across the Mojave Desert region is highly variable from year to year and oscillates between wetter and drier conditions within multiyear and multidecade timescales. The soil moisture requirements of western Joshua tree likely vary depending on factors including life history stage, soil texture, ambient temperatures, local topography, elevation, and the presence and cover of other plants.

Source: Jeb Bjerke, California Department of Fish and Wildlife.

Recent species distribution modeling efforts by Esque et al. (2023) have revealed the environmental factors with the greatest influence on predicting western Joshua tree presence: mean annual temperature (defined as the average of the monthly temperature averages for the climatic normal period 1980–2010), temperature seasonality (standard deviation [i.e., measure of variation in data] of the monthly mean temperatures), precipitation seasonality (variation in monthly precipitation totals for the normal period 1980–2010), and summer precipitation (average total precipitation received from May through October, based on the climatic normal period 1980–2010). Other predictive factors for western Joshua tree presence, in order of importance, are annual heat/moisture index (mean annual temperature divided by mean annual precipitation), winter minimum temperature (average minimum temperature from December through February based on the climatic normal period 1980–2010),

precipitation ratio (ratio of summer to winter precipitation), and mean annual precipitation (average annual precipitation during the climatic normal period 1980–2010).

TOPOGRAPHY AND SOILS

Western Joshua trees are found on a variety of landforms in the Mojave Desert and Great Basin ecoregions, including gentle alluvial fans, bajadas, flats, ridges, mesas, and gentle to moderate slopes, often near the bases of mountains (Huning and Petersen 1973; Thomas et al. 2004; Gucker 2006), although at higher elevations, the species can also be found on steep slopes at lower densities (Esque, pers. comm., 2022, cited in USFWS 2023). The greatest densities of Joshua trees may be found on well-drained sandy to gravelly alluvial fans. Where western Joshua tree is less common, it is likely restricted to areas with sufficient groundwater, such as large sand dunes or groundwater drainages (Charlton and Rundel 2017).

Because water availability limits western Joshua tree survival and reproduction, the soil's water-retention capacity is likely important for the species. Western Joshua trees have been reportedly found more frequently on soils with bimodal textures (i.e., various sized soil particles) with both coarse sands and fine silts that facilitate soil moisture retention (Huning and Petersen 1973; Sawyer et al. 2009). Soil moisture is an important factor for western Joshua tree soil habitat. When not present in sufficient quantities, it can be a limiting factor to western Joshua tree distribution. Joshua tree habitat generally contains old alluvial rocks of igneous rather than sedimentary origin and soils that are coarse sands, very fine silts, gravel, or sandy loams (Rowlands 1978; Sawyer et al. 2009). Western Joshua tree appears unable to grow well in places with insufficient soil moisture available, such as in areas where soils have a high clay content or high volumes of coarse particles (Huning and Petersen 1973; Borchert 2022), or where the depth to bedrock is less than 1 meter (3.3 feet) (Huning and Petersen 1973). Western Joshua tree could grow in areas that collect water due to topography, subsurface bedrock, and soil structure that may otherwise be too hot or too dry, and such areas could provide important refugia for the species in the future. Therefore, water availability in soil is an important abiotic factor (i.e., nonliving part of an ecosystem) for western Joshua tree survival.

In addition, soil biotic factors play a role in intact western Joshua tree habitat, which typically has biological soil crusts (i.e., biocrusts) (Belnap et al. 2001). Biocrusts are soil surface layers that include bacteria, cyanobacteria, algae, mosses, liverworts, fungi, or lichens and can be major components of undisturbed desert ecosystems (Belnap et al. 2001). Biocrusts add diversity to the ecological system, limit soil erosion, increase accumulation of soil organic matter and nutrients, and can either positively or negatively interact with vascular plants (Bowker 2007; Abella et al. 2023).

VEGETATION

Western Joshua tree can occur as the characteristic species of a distinct vegetation community (i.e., a repeated pattern of plants across a landscape), or as an associate species within other tree, shrub, or herbaceously dominated vegetation communities. As described in *A Manual of California Vegetation* (Sawyer et al. 2009), which is California's standard vegetation classification system, Joshua trees are the characteristic species in the Joshua tree woodland alliance, which is defined as a stand of vegetation with greater than or equal to 1 percent cover of Joshua trees evenly distributed across the landscape, with less than 1 percent absolute cover of juniper (*Juniperus* spp.) or pine (*Pinus* spp.) trees. The understory in a Joshua tree woodland is often dominated by shrubs or grasses, and the overstory is dominated by Joshua trees and sometimes other tree species. Joshua tree can also be found in other vegetation communities where it constitutes less than 1 percent of the total overstory cover, including California juniper woodland, foothill pine woodland, and blackbrush scrub alliances.

Source: Anna Cirimele, National Park Service.

To describe the whole western Joshua tree range, a broader classification system of California Wildlife Habitat Relationships System is used in this chapter (CDFW 2024). This classification system maps terrestrial wildlife habitat based on vegetation characteristics, and can be cross-walked with the vegetation communities described in *A Manual of California Vegetation*. The habitats defined in the California Wildlife Habitat Relationships classification system that are within the range of western Joshua tree in California are desert scrub, which covers over half of the western Joshua tree range in California; Joshua tree, which is synonymous with *A Manual of California Vegetation's* Joshua tree woodland alliance; alkali desert scrub; and sagebrush (Table 4-2). Western Joshua tree nurse plants (described in Section 4.1.3) include the dominant plants (i.e., the plants for which the species alliance is named) in creosote bush scrub alliance and blackbrush shrub alliance and the co-dominant species singleleaf pinyon pine (*Pinus monophylla*) of singleleaf pinyon–Utah juniper woodlands alliance. These vegetation alliances are classified within the California Wildlife Habitat Relationships system as desert scrub habitat, sagebrush habitat, and pinyon-juniper habitat, respectively, which are all dominant habitats within the western Joshua tree range in California (Table 4-2). Areas where Joshua tree woodland is mapped likely contain some of the densest stands of Joshua trees. Although the western Joshua tree range in California is mostly within scrub and Joshua tree habitat, western Joshua tree can occur within a variety of vegetation and natural communities; therefore, at the range-wide scale, western Joshua tree does not appear to be associated with a specific vegetation community, which aligns with findings by Esque et al. (2023) conducted at a similar scale. However, topography and vegetation may still be important factors for understanding the full habitat needs of western Joshua tree and planning for its conservation.

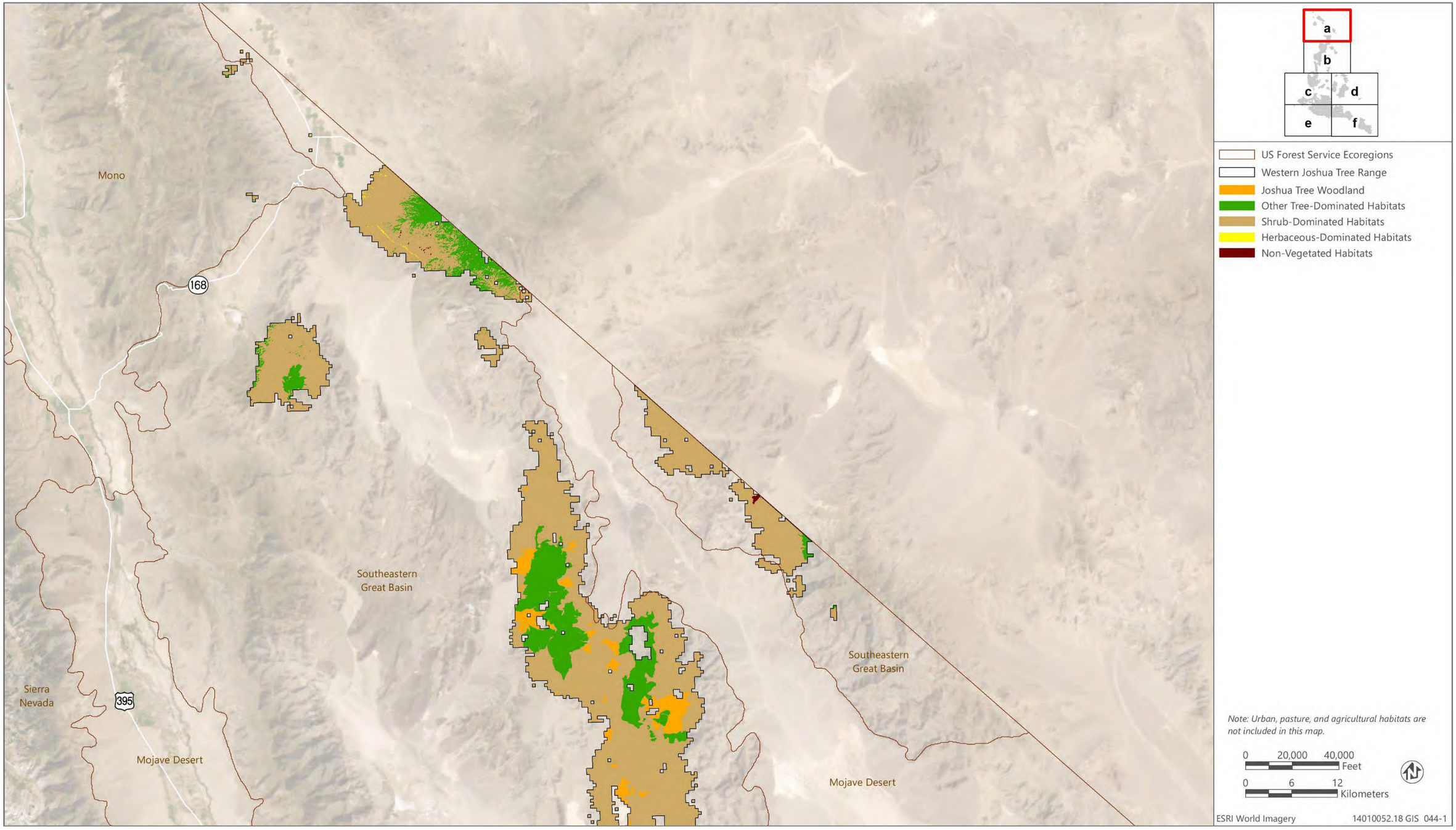
Vegetation within and just outside the western Joshua tree range in California has been mapped at a broad scale in Figures 4-2a through 4-2f.

Table 4-2 Land Cover within the Western Joshua Tree Range in California

Land Cover	Type of Land Cover	Area in Square Kilometers (sq mi)	Percent of Range
Desert scrub	Shrub dominated	7,085.7 (2,735.8)	54.1
Joshua tree	Tree dominated	1,314.5 (507.5)	10.0
Alkali desert scrub	Shrub dominated	1,100.0 (424.7)	8.4
Sagebrush	Shrub dominated	844.5 (326.1)	6.5
Pinyon-juniper	Tree dominated	669.1 (258.3)	5.1
Juniper	Tree dominated	467.7 (180.6)	3.6
Mixed chaparral	Shrub dominated	253.5 (97.9)	1.9
Annual grassland	Herb dominated	245.3 (94.7)	1.9
Barren	Non-vegetated	111.3 (43.0)	0.9
Desert wash	Shrub dominated	109.0 (42.1)	0.8
Desert succulent shrub	Shrub dominated	48.7 (18.8)	0.4
Montane chaparral	Shrub dominated	32.5 (12.5)	0.2
Low sage	Shrub dominated	18.9 (7.3)	0.1
Montane hardwood–conifer	Tree dominated	17.0 (6.6)	0.1
Bitterbrush	Shrub dominated	15.6 (6.0)	0.1
Lake	Aquatic	11.3 (4.4)	0.1
Desert riparian	Tree dominated	7.0 (2.7)	0.1
Montane riparian	Tree dominated	5.2 (2.0)	<0.1
Montane hardwood	Tree dominated	3.9 (1.5)	<0.1
Lodgepole pine	Tree dominated	2.1 (0.8)	<0.1
Riverine	Aquatic	2.1 (0.8)	<0.1
Blue oak–foothill pine	Tree dominated	1.0 (0.4)	<0.1
Valley foothill riparian	Tree dominated	0.8 (0.3)	<0.1
Fresh emergent wetland	Aquatic	0.7 (0.3)	<0.1
Saline emergent wetland	Aquatic	0.7 (0.3)	<0.1

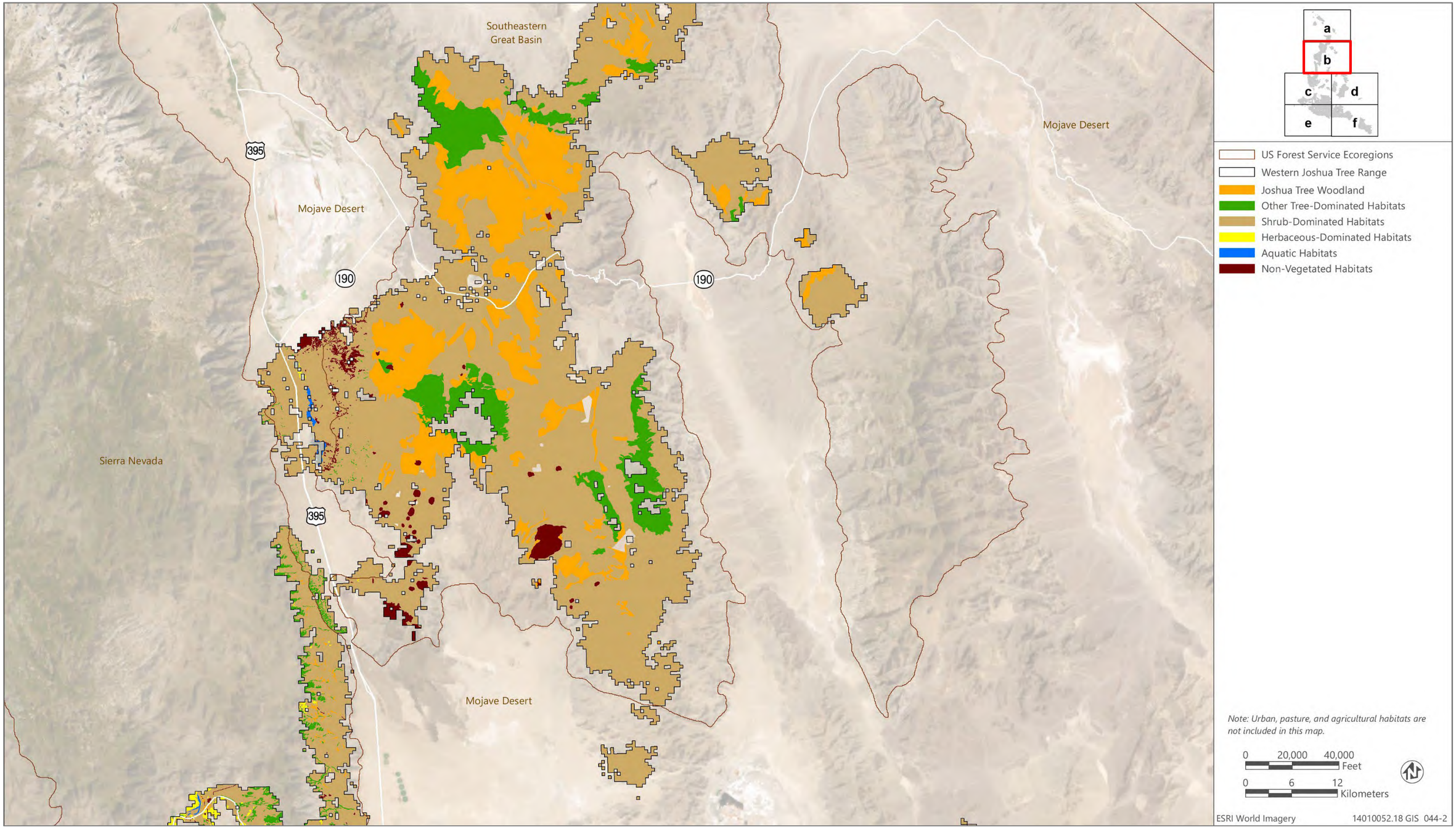
Note: Land cover types of eastside pine, wet meadow, perennial grassland, Jeffrey pine, valley oak woodland, sierran mixed conifer, blue oak woodland, coastal scrub, chamise-redshank chaparral, and ponderosa pine each represent less than 0.005 percent of the western Joshua tree range and were excluded from this table; sq mi = square miles; vegetation data is from CAL FIRE's Fire and Resource Assessment Program (FRAP), which is classified using the California Wildlife Habitat Relationship system. Converted land cover uses are presented separately in this chapter, below.

Sources: Esque et al. 2023; CAL FIRE 2024a; compiled by Ascent in 2024.



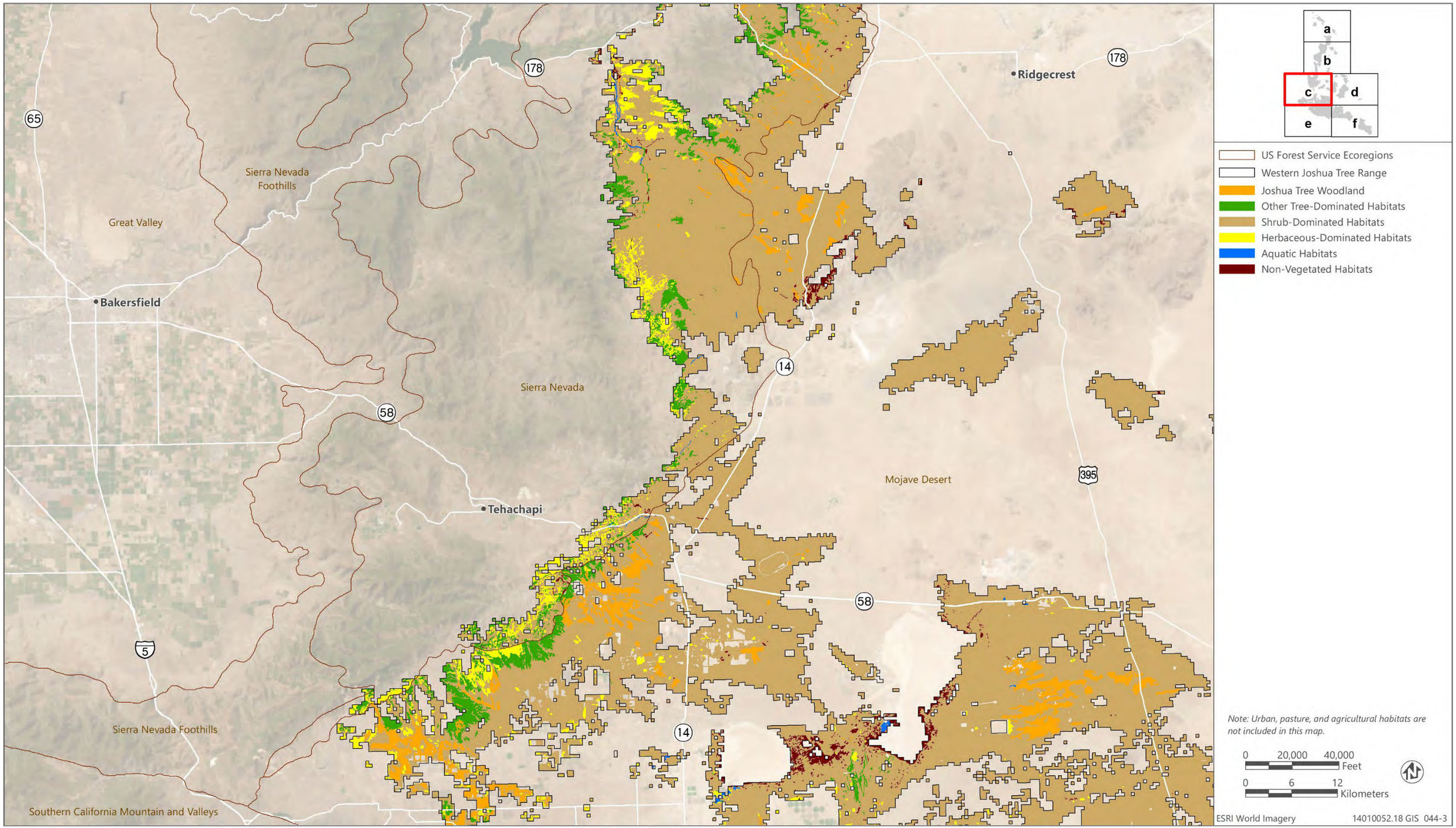
Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2a Land Cover within the Western Joshua Tree Range in California



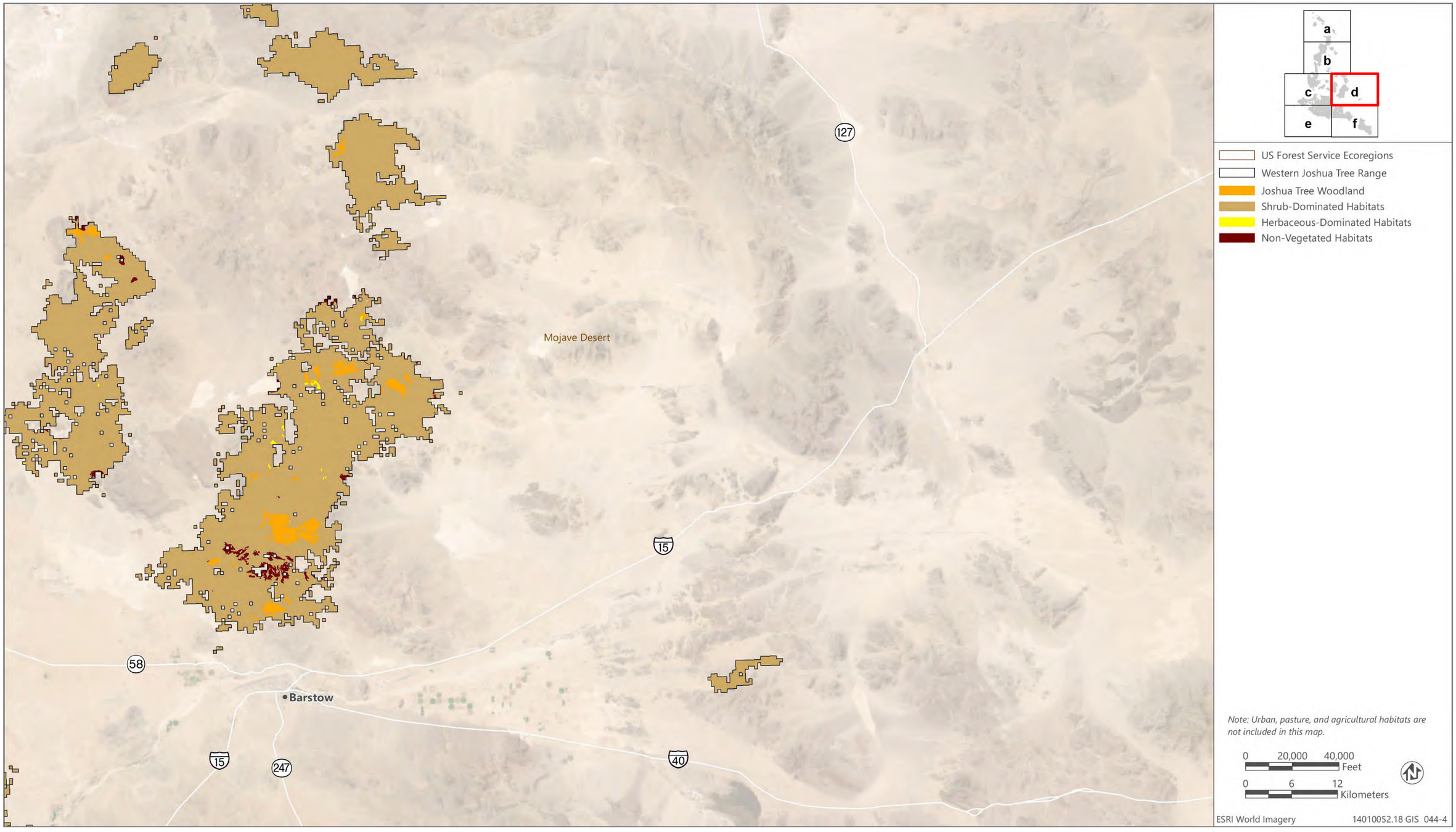
Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2b Land Cover within the Western Joshua Tree Range in California



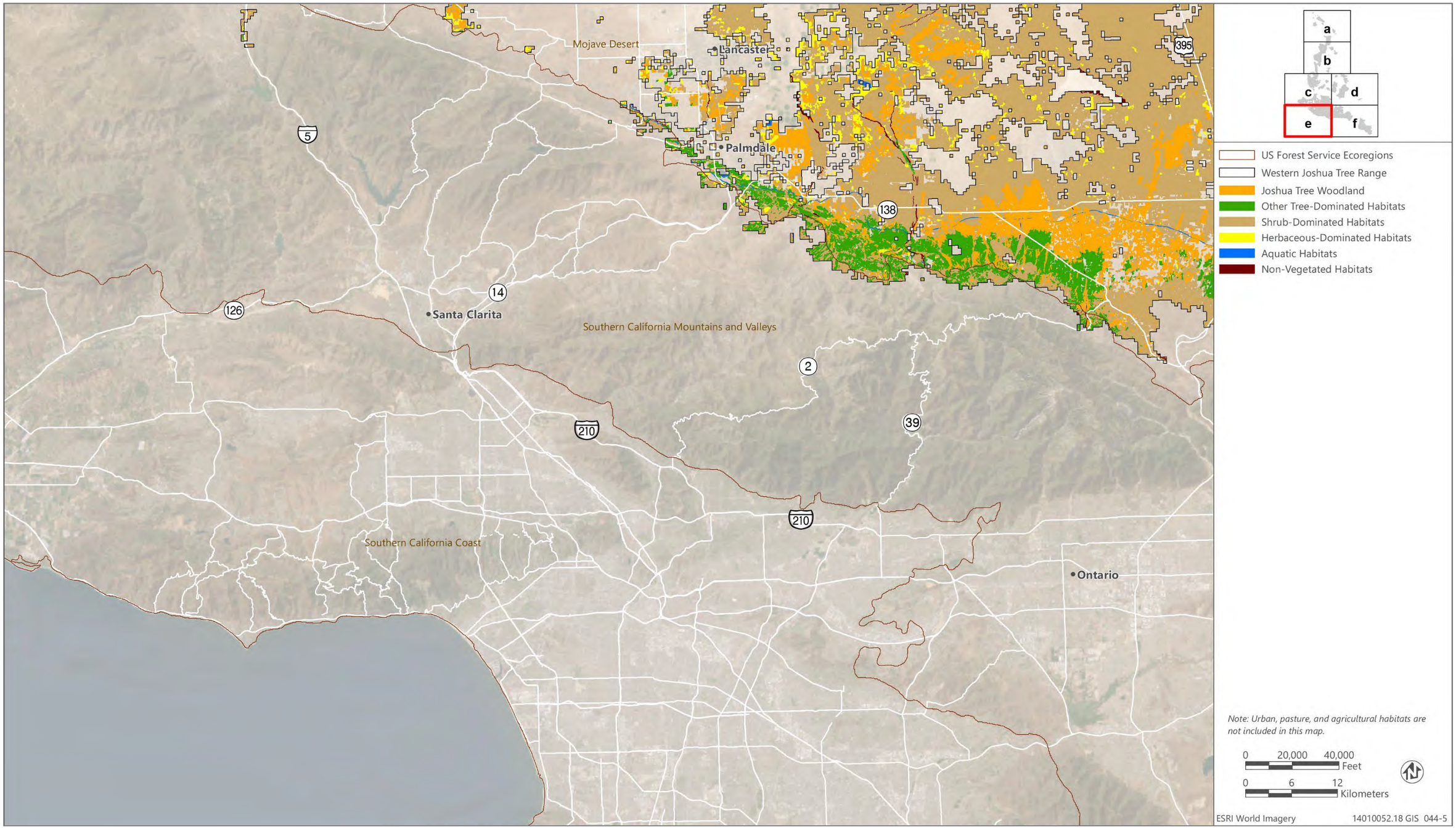
Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2c Land Cover within the Western Joshua Tree Range in California



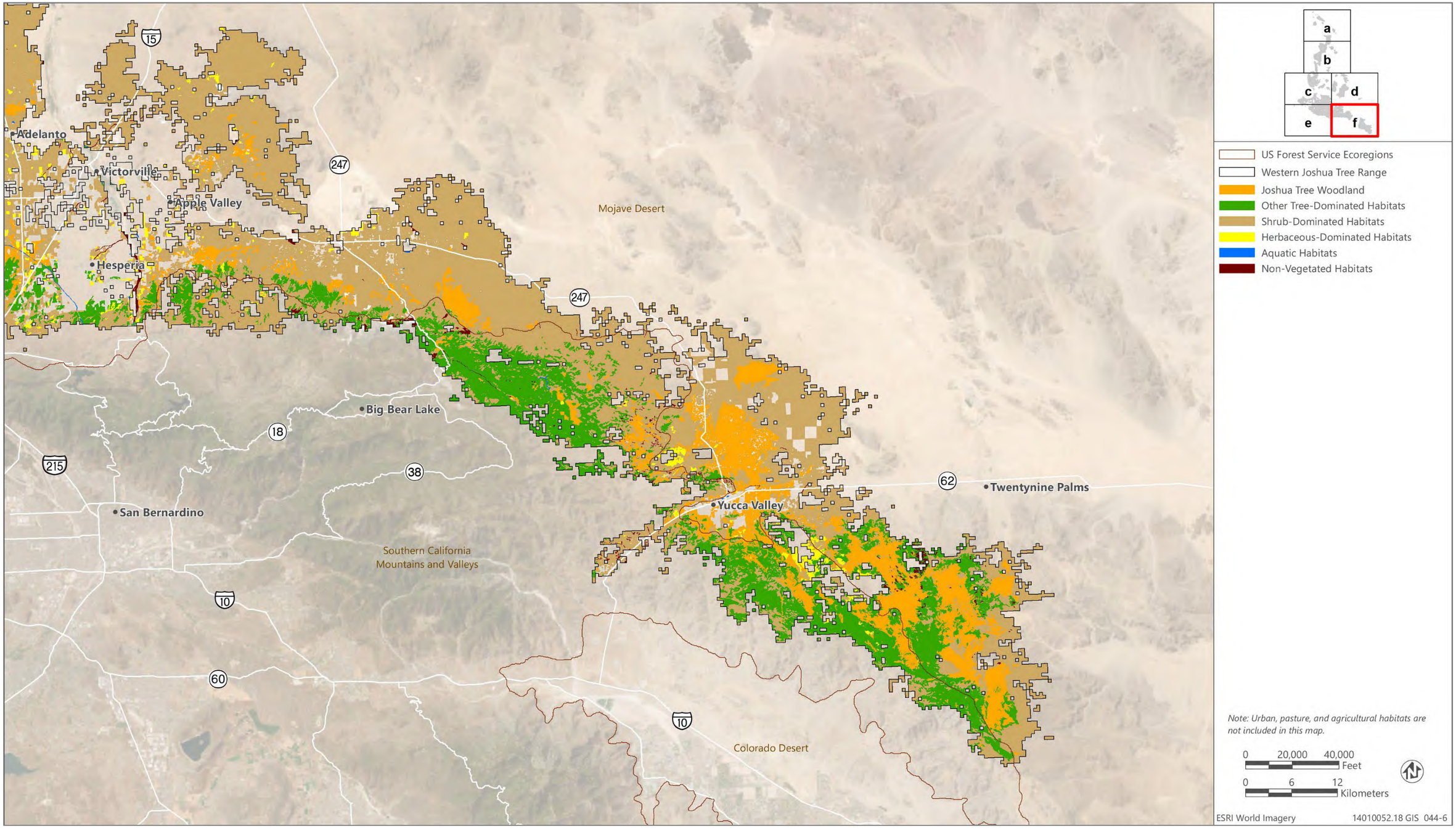
Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2d Land Cover within the Western Joshua Tree Range in California



Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2e Land Cover within the Western Joshua Tree Range in California



Sources: Esque et al. 2023; CAL FIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-2f Land Cover within the Western Joshua Tree Range in California

4.1.3 Life History

Both western and eastern Joshua tree species are relatively long-lived and slow-growing species that require a complex combination of environmental factors to successfully grow and reproduce.

FLOWERING

Joshua trees are mature when an individual plant begins to produce flowers, which occurs when the Joshua tree is approximately 50 to 70 years old (Esque et al. 2015) or when the plant is between 1 and 2.5 meters (3.3 and 8.2 feet) in height (Rowlands 1978). Western Joshua tree flowers between January and May, peaking in late February, but the species can flower as early as November (Barve et al. 2020; Brenskelle et al. 2021; Hess and Baldwin 2022). Flowering of western Joshua tree is thought to occur episodically rather than annually, so mature Joshua trees do not flower every year. Flowering of mature individuals at one small site in the town of Yucca Valley, California ranged from 0 to 90 percent in 15 years of monitoring (Yoder et al. 2024).

Source: Diane Etchison.

Recent research has increased understanding of the conditions needed for flowering (St. Clair and Hoines 2018; Barve et al. 2020; Brenskelle et al. 2021; Yoder et al. 2024). In some years, many western Joshua trees produce large quantities of fruits and seeds synchronously (Kelly and Sork 2002; Borchert and DeFalco 2016; St. Clair and Hoines 2018), which is a reproductive strategy used by western Joshua tree, called "masting" that results in a wide variation in flowering rates from year to year. Seed predators are the primary dispersal mechanism for western Joshua tree seeds. Having a mast seeding reproductive strategy is beneficial because more seeds are produced than seed predators can feasibly consume. Subsequently, surviving seeds have a higher likelihood of successfully establishing and developing into a reproductive adult (Kelly and Sork 2002). These large, synchronous flowering and masting events seem to occur as infrequently as once or twice per decade, and the conditions that produce them are not well understood (Esque et al. 2010; DeFalco and Esque 2014; Borchert and DeFalco 2016). Research conducted by Yoder et al. (2024) found that flowering in Joshua tree is more likely to occur when the growing year leading up to flowering is wetter than the previous

growing year, and that previous growing year is drier than the growing year before it (i.e., going from a year to a drier year and then to a wetter year tends to result in flowering). Yoder et al. (2024) defined "growing year" from April of one year through March of the next year. When flowering does occur in a given year, Brenskelle et al. (2021) found that it is likely to occur following cold and dry conditions. In addition, Yoder et al. (2024) found that flowering is more likely to occur when the maximum vapor pressure deficit (i.e., measure of drought stress on the landscape) is lower in the growing year before flowering and the minimum vapor pressure deficit is relatively stable since the previous growing year. These vapor pressure deficits align with lower drought stress leading up to flowering (Yoder et al. 2024). Flowering was also found to more likely occur when the minimum temperature the growing year before flowering was above freezing and when the maximum temperature has been relatively stable since the previous growing year (Yoder et al. 2024). This finding is consistent with observations that suggest Joshua trees flower much more often in locations that are historically warmer (St. Clair and Hoines 2018) and that winter low temperatures limit distribution of flowering (Dole et al. 2003); however, these findings contradict speculation that freezing triggers flowering (Brenskelle et al. 2021; Rodgers 2023). In addition, Yoder et al. (2024) found that the median interval between flowering years has decreased from historical (i.e., early 20th century) levels of flowering every 5 years to every 4 years.

POLLINATION

Yucca moth larva inside Joshua tree fruit.
Source: Anna Cirimele, National Park Service.

Western Joshua tree relies on the yucca moth (*Tegeticula synthetica*) for pollination and is not pollinated by other insects in California or by wind. The relationship between these two species is an obligate pollination mutualism, meaning both species rely on the other for successful sexual reproduction. The yucca moth pollinates western Joshua tree, and western Joshua tree provides food (i.e., western Joshua tree seeds) for the developing moth larvae. Many yucca moth species (*Tegeticula* and *Parategeticula*) are specialized pollinators for *Yucca* species (Smith and Leebens-Mack 2024). Eastern Joshua tree's obligate pollinating yucca moth (*Tegeticula antithetica*) is not known to co-occur with western Joshua tree in California, but is capable of pollinating western Joshua tree where they co-occur in Nevada, though significantly fewer larvae survive compared to when the moth oviposits on its preferred host (Smith et al. 2009). Yucca moth species aggregate on the flowers of *Yucca* species and mate within the inflorescence (i.e., group or clusters of flowers on one main stem on a plant)

(Smith and Leebens-Mack 2024). *Yucca* species appear to have adapted to yucca moth pollination by having a low pollen-to-ovule ratio, low nectar production, and the ability to abort fruits when they are over exploited (Smith and Leebens-Mack 2024). Although pollination from its yucca moth does impose a cost on the western Joshua tree through the larval consumption of its seeds, both it and its yucca moth pollinator rely on successful seed development for survival.

Yucca moths pollinate Joshua tree by using unique, specialized tentacles to purposefully place pollen into the stigma after egg laying (Smith and Leebens-Mack 2024). This active pollination process in Joshua tree and other *Yucca* species ensures development of seeds for the moth offspring by transferring pollen efficiently, leading to lower pollen-to-ovule ratio (Pellmyr et al. 2020). Yucca moths are also known to lay eggs into the Joshua tree floral ovary, and the growing larvae consume a portion of the fertilized seeds resulting in a tight codependence between each species for survival (Trelease 1893; Pellmyr 2003; Smith and Leebens-Mack 2024). The yucca moths' ovipositor (through which they lay their eggs) length correlates with the style length of the western Joshua tree flower, which allows for successful egg laying in the seed ovules (Smith et al. 2009). Research in the San Bernardino Mountains found approximately 19.5 and 42.8 percent of seeds were damaged by larvae in 2013 and 2014, respectively (Borchert and DeFalco 2016). In yucca plant–yucca moth relationships, typically 5 to 30 percent of the seed crop is consumed, although it can be up to 90 percent (Smith and Leebens-Mack 2024). Although there are costs from larval predation of seeds, western Joshua tree needs its yucca moth for successful sexual reproduction.

For all species of yucca moth, eggs typically hatch in 7 days (Smith and Leebens-Mack 2024). In late summer, the moth larvae fall to the ground from the Joshua tree fruits and enter diapause (i.e., suspended development) (Pellmyr 2003). This stage of diapause can likely last for several years, although the environmental or other cues that trigger metamorphosis into adult moths are not currently known (Pellmyr 2003). The environmental factors that lead to the survival of the yucca moth are not well understood, nor are the components of the natural communities that support both western Joshua tree and the yucca moth. The range of the yucca moth, and therefore the range where western Joshua tree can sexually reproduce, is also not well understood but can be estimated as the range in which pollination and fruiting occurs. Yucca moth presence was recorded in Joshua Tree National Park at study sites from approximately 1,049 to 2,076 meters (3,442 to 6,811 feet) in elevation, but not at the study sites with the lowest (1,004 meters [3,294 feet]) or highest (2,212 meters [7,257 feet]) elevation (Harrower and Gilbert 2018). More research is needed to understand whether the results of this study apply to yucca moth populations elsewhere.

Source: Matt Berger.

Following the yucca moth's pollination of western Joshua tree, fruits containing seeds are produced. The number of fruits and seeds produced by western Joshua trees vary greatly from year to year (Borchert and DeFalco 2016; Wilkening et al. 2020). Borchert (2022) reported approximately 80 seeds in mature western Joshua tree fruits. In research conducted in the San Bernardino Mountains at approximately 1,776 meters (5,827 feet) in elevation, fruits reached full size in late May (Borchert and DeFalco 2016), although timing of the maturing of fruits likely varies at other locations along the elevational gradient of western Joshua tree. Preliminary data show that areas with high fruit production tend to be colder and wetter with uniform precipitation, and sites that differ in the amount of fruit production have significantly different climates (Smith, pers. comm., 2024).

The production of fruits and seeds fluctuates yearly and is dependent upon the number of adults (i.e., defined as flowering Joshua trees) that are present, the presence of yucca moth, and the amount of moisture available while fruits are in development. However, the relative influence of each of these on the abundance and timing of fruit set for Joshua tree has yet to be determined. In one study in Joshua Tree National Park, pollinator abundance, flowering, and seed production were all found to be lowest at the high elevation sites (Harrower and Gilbert 2018). Pollinator abundance was found to be the most limiting factor to viable seed production because seed production is positively correlated with yucca moth presence (Harrower and Gilbert 2018); however, these conclusions may not be generalizable over the entire range of western Joshua tree. For example, the study had a limited sample size, fine-scale variation in seed production, and moth presence within any one site (even at sites in the same climate and elevation zones), which may have captured normal spatial variation in seed production as opposed to variation due to elevation (Smith, pers. comm., 2024). In addition, the study was conducted in a location that represents a small window of climate variation compared to the range of the species (Smith, pers. comm., 2024).

SEED DISPERSAL

Dispersal of Joshua tree seeds is primarily facilitated by other species, so the capacity for the species to expand into unoccupied habitat is dependent on those species. Prehistorically, Joshua tree seeds may have been dispersed long distances by extinct megafauna, including the Shasta ground sloth (*Nothrotheriops shastensis*) and relatives of the elephant (Lenz 2001). However, using genetic data, Smith et al. (2011) found no evidence of a change in the rate of Joshua tree dispersal corresponding with the timing of the extinctions of such herbivores, which would be expected if they were important Joshua tree seed dispersers.

Currently, seeds of western Joshua tree are dispersed by scatter-hoarding rodents (see Section 4.2, below) that either collect seeds from the canopy of western Joshua tree or the ground below and bury the seeds a short distance from the tree (Vander Wall et al. 2006; Waitman et al. 2012; Borchert 2016). Primary dispersal (first caching of seeds) distances of western Joshua tree seeds by seed-caching small rodents of up to 57 meters (187 feet) have been observed, with secondary dispersal (re-caching of seeds) distances of up to 32.2 meters (106 feet) (Vander Wall et al. 2006). The average historical migration rate of Joshua tree over the Holocene period has been estimated to be up to 2 meters (6.6 feet) per year (Cole et al. 2011). Recent research indicates small founder trees occur less than 1 kilometer (0.6 mile) from the edge of established Joshua tree stands (Esque et al. 2023). Other mechanisms of dispersal for Joshua tree seeds have also been suggested including wind, other mammals, and birds (e.g., California scrub-jay [*Aphelacoma californica*]) (Lenz 2001; Borchert 2016).

SEED GERMINATION

Joshua tree seed germination is dependent on favorable environmental conditions that, when absent, seem to result in low rates of seed viability and germination success. While Joshua tree seed germination occurs readily in controlled laboratory conditions (Wallace and Romney 1972; McCleary 1973; Gucker 2006; Bonner and Karrfalt 2008; Waitman et al. 2012; Birker, pers. comm., 2021), seed germination rates decrease dramatically following dispersal in the wild. To model seed viability in the wild, one study conducted in the range of eastern Joshua tree found that after 1 year in an underground cache, approximately 50 to 68 percent of eastern Joshua tree seeds recovered from the field germinated in the lab (Reynolds et al. 2012). After 3 years and 4 months in an underground cache, less than approximately 1 to 3 percent of eastern Joshua tree seeds were able to germinate (Reynolds et al. 2012), suggesting that at least eastern Joshua tree has limited capacity to maintain seed viability in soil for long periods of time. Seed viability may be longer when protected within fruits compared to when loose in the soil. It is possible that uneaten fruits in the tree canopy function as an aerial seedbank, which likely occurs more frequently in masting years when fruit production is high enough to provide ample food for larvae and seed predators (Borchert and DeFalco 2016). One high

desert study found that seeds were ready to germinate in mid-June, approximately 14 days after the Joshua tree fruit reached full size (Borchert and DeFalco 2016).

After dispersal, western Joshua tree seeds appear more likely to germinate following a rain event (Went 1948; Reynolds et al. 2012) and may germinate fastest at approximately 25 degrees Celsius (77 degrees Fahrenheit), as was found in one study for eastern Joshua tree seeds when testing germination in four different temperature conditions (McCleary 1973). Following germination, seedling emergence above the soil from the shoot (i.e., stem and attached organs, such as leaves and flowers) of the plant seems to be greatest in the spring and summer when increased soil moisture and warm soil temperatures co-occur. However, seedlings seem to also emerge at other times of the year, which suggests some potential for adaptation to shifting conditions (Reynolds et al. 2012). Seedling emergence is likely increased when seeds are buried approximately 1 to 3 centimeters (0.4 to 1.2 inches) below the surface (Waitman et al. 2012). Seeds that are left unburied on the soil surface seldom germinate (Waitman et al. 2012). Seed germination and seedling emergence seem to be most successful under nurse plants (e.g., shrubs) compared to out in the open (Vander Wall et al. 2006; Reynolds et al. 2012; Waitman et al. 2012).

RECRUITMENT AND ESTABLISHMENT

As with many plants, western Joshua tree recruitment—the process by which individuals are added to a population, usually by the addition of new individuals from on-site reproduction—can be limited by seed availability and other constraints on seedling establishment (Grubb 1977; Clark et al. 1999; Clark et al. 2007). In some instances, recruitment may refer to clonal offspring, but seedling recruitment, which includes the processes of seed germination, seedling survivorship, and seedling growth, is more common (Eriksson and Ehrlén 2012). Recruitment plays a role in maintaining stable populations if, on average, a reproductive individual is replaced by a successfully recruited offspring (Eriksson and Ehrlén 2012). Seedling establishment of Joshua tree appears to be infrequent because it requires seedling germination and survivorship, and establishment only occurs when the plant begins to photosynthesize (which will allow the plant to grow)(Reynolds et al. 2012). Few Joshua tree seedlings have been observed in the field, particularly at lower elevations (Webber 1953; Wallace and Romney 1972; Comanor and Clark 2000; Esque et al. 2010); however, for younger western Joshua trees, higher survival rates have been observed in western and higher elevation areas (DeFalco et al. 2010; St. Clair and Hoines 2018; Sweet et al. 2019). Sparse seedling observations in some locations may be because of the lower density of Joshua trees or the influence of more recent factors, such as drought, climate change, and invasive species. Sweet et al. (2019) found that higher recruitment of western Joshua tree occurred in areas that had significantly higher annual precipitation, and marginally significantly lower climatic water deficit and maximum temperature of the warmest quarter of the year. Successful seedling establishment likely

requires several successive years of sufficiently wet and/or cool conditions (Wallace and Romney 1972; Cole et al. 2011) and growth to a large size (i.e., approximately 25 centimeters [9.8 inches]) before the arrival of a period of drier and/or hotter conditions (Esque et al. 2015).

Source: Jeb Bjerke, California Department of Fish and Wildlife.

Like other desert plants, Joshua trees can survive with limited water by utilizing moisture reserves in intermediate and deep soils and moisture stored in leaves, trunks, and roots (Crosswhite and Crosswhite 1984). Joshua trees of all sizes seem to have relatively low mortality during periods of average to above-average rainfall (nearly zero in many years) (Esque et al. 2015). Time of year may also affect successful seedling establishment, with one study finding that seedlings survived the longest when emergence occurred in September, although 90 percent still experienced mortality (Reynolds et al. 2012).

Presence under a nurse plant (e.g., shrub) appears to be critical for Joshua tree establishment (Waitman et al. 2012; Reynolds et al. 2012; Esque et al. 2015). This is likely because nurse plants provide a microclimate with higher soil moisture, lower soil temperature, less direct sun, a reduction in water loss to the atmosphere, and a reduction in drying effects from wind (Brittingham and Walker 2000; Legras et al. 2010). Nurse plants for western Joshua trees, such as blackbrush (*Coleogyne ramosissima*), creosote bush (*Larrea tridentata*), and other perennial plants, which likely provide favorable conditions for seedling growth and survival (Loik et al. 2000), potentially offer seedlings some protection from small mammal herbivory, as was found for singleleaf pinyon pine, where 69 percent of seedlings in one growing season emerged beneath nurse plants (Vander Wall 1997).

After establishment, western Joshua tree seedlings and very young plants appear to require sufficient soil moisture, periods of cold temperatures for optimal growth, and avoidance of consumption by herbivores to survive (Went 1957; Esque et al. 2015). One study found that young eastern Joshua tree plants produced the greatest average number of leaves when they were exposed to 10 hours of light (McCleary 1973). Another study investigating different metrics affecting Joshua tree growth found that western Joshua tree seedlings grow most successfully at root temperatures near 18 degrees Celsius (64 degrees Fahrenheit), compared to 10 degrees Celsius (50 degrees Fahrenheit) and 35 degrees Celsius (95 degrees Fahrenheit), and without calcium carbonate in the soil (Wallace and Romney 1972). Exposure to low temperatures may be required for optimal growth once Joshua trees have reached approximately 3 years of age (Went 1957).

Presence of arbuscular mycorrhizal fungi (i.e., soil microorganisms that can form mutualistic relationships with most terrestrial plants) in association with western Joshua tree seedling roots generally appears to have positive benefits for nitrogen absorption and plant biomass (Harrower and Gilbert 2021). Some species of arbuscular mycorrhizal fungi from low elevation areas in Joshua Tree National Park have been found to initially have negative impacts on 1- to 3-month-old western Joshua tree seedlings, but these became positive associations once seedlings reached 6 months old (Harrower and Gilbert 2021). A 22-year-long study of fifty-three 5- to 6-year-old individual western Joshua tree plants with an average height of approximately 21.5 centimeters (8.5 inches) found that 10 western Joshua tree plants with an average height of approximately 1 meter (3.3 feet) survived, an approximately 18.9 percent survival rate (Esque et al. 2015).

ASEXUAL REPRODUCTION

Sexual reproduction (i.e., formation of a seed) is advantageous because it promotes genetically diverse offspring and, in turn, evolutionary adaptation (Hoffman and Sgrò 2011; Yang and Kim 2016), and can increase the dispersal ability of plant species (Winkler and Fischer 2002). However, when the absence of yucca moths precludes western Joshua tree sexual reproduction, the plant is also able to reproduce asexually. Asexual reproduction occurs by vegetative propagation from rhizomes (i.e., horizontal underground plant stems), branch sprouts, and basal sprouts, which generally remain attached to the parent plant. This could allow western Joshua tree individuals to survive indefinitely, although this has not been observed and may not be possible due to factors including normal stochastic processes (i.e., random events that can affect community and population dynamics), as well as shifting climate conditions. A young, asexually produced western Joshua tree is connected underground to the parent plant by rhizomes or basal shoots (Simpson 1975). Asexual reproduction in Joshua tree tends to increase at the edge of its range, as is the case with other plant species (Silvertown 2008), and has been reported to increase in frequency with increasing elevation (Rowlands 1978) and at lower elevations where there is no sexual reproduction (Harrower and Gilbert 2018). Western Joshua tree often reproduces asexually by resprouting following fire (Vogl 1967; Loik et al. 2000; Gucker 2006; DeFalco et al. 2010; Cornett 2022), and like Joshua tree asexual reproduction, fire is more frequent at higher elevation areas of the Mojave Desert (Brooks et al. 2018).

GROWTH AND AGE

Mature trees can reach heights of approximately 5 to 20 meters (16.4 to 66 feet), although western Joshua trees rarely exceed 10 meters (33 feet) (Cornett 1997). Western Joshua trees often have one main trunk that branches approximately 1 to 3 meters (3.3 to 10 feet) above the ground, and older trees can have extensive branching and a large, rounded tree-like

canopy. Western Joshua trees have a monopodial branching pattern (i.e., after branching, one stem remains dominant, even though the branches may appear to be approximately equal in size). Branching of western Joshua tree typically occurs after an inflorescence is produced at the end of a stem or after the growing tissue at the end of a stem is damaged, such as by the yucca weevil or yucca-boring weevil (*Scyphophorus yuccae*) (Simpson 1975).

Because Joshua tree trunks lack growth rings, tree height and annual growth rate assumptions are often used to approximate the age (Gilliland et al. 2006). These age estimates have a high level of uncertainty; however, they are still useful in providing information about the demographic structure of Joshua tree populations. Western Joshua trees that have reached reproductive maturity have high survivorship and are therefore likely to maintain reproductive potential for decades. Although it has been speculated that western Joshua tree may live hundreds or even thousands of years, the actual maximum lifespan of western Joshua tree is unknown (Cornett 2006; Gilliland et al. 2006). Generally, Joshua tree trunk diameters increase over time, although they have also been reported to decrease, perhaps because of drought (Gilliland et al. 2006). Mature Joshua trees may take advantage of infrequent rains by storing near-surface water collected through their extensive network of fibrous roots (Gucker 2006). Roots of eastern Joshua tree have been observed approximately 11 meters (36 feet) away from what appeared to be the aboveground portion of the plant (Bowns 1973). As is the case during western Joshua tree establishment, mycorrhizal associations that form with their roots may contribute to adult western Joshua tree survival (Harrower and Gilbert 2021).

Source: Tom Minczeski.

4.1.4 Population Trends

Population trends may be measured directly, inferred from demographic information, or indirectly inferred from fossil evidence or environmental impacts that have occurred in the past. Population trends can be an important predictor for extinction risk (O'Grady et al. 2004). A sustainable western Joshua tree population would likely have high numbers of young plants, decreasing numbers of older plants, and relatively few old plants. In addition, the average western Joshua tree lifespan must remain longer than the generation length (i.e., time from seedling establishment to reproductive maturity) for populations to remain stable. Using a long-term average growth rate of approximately 3.12 ± 1.96 centimeters per year (Esque et al. 2015), the generation length of western Joshua tree has been estimated to be 50 to 70 years (Esque et al. 2015).

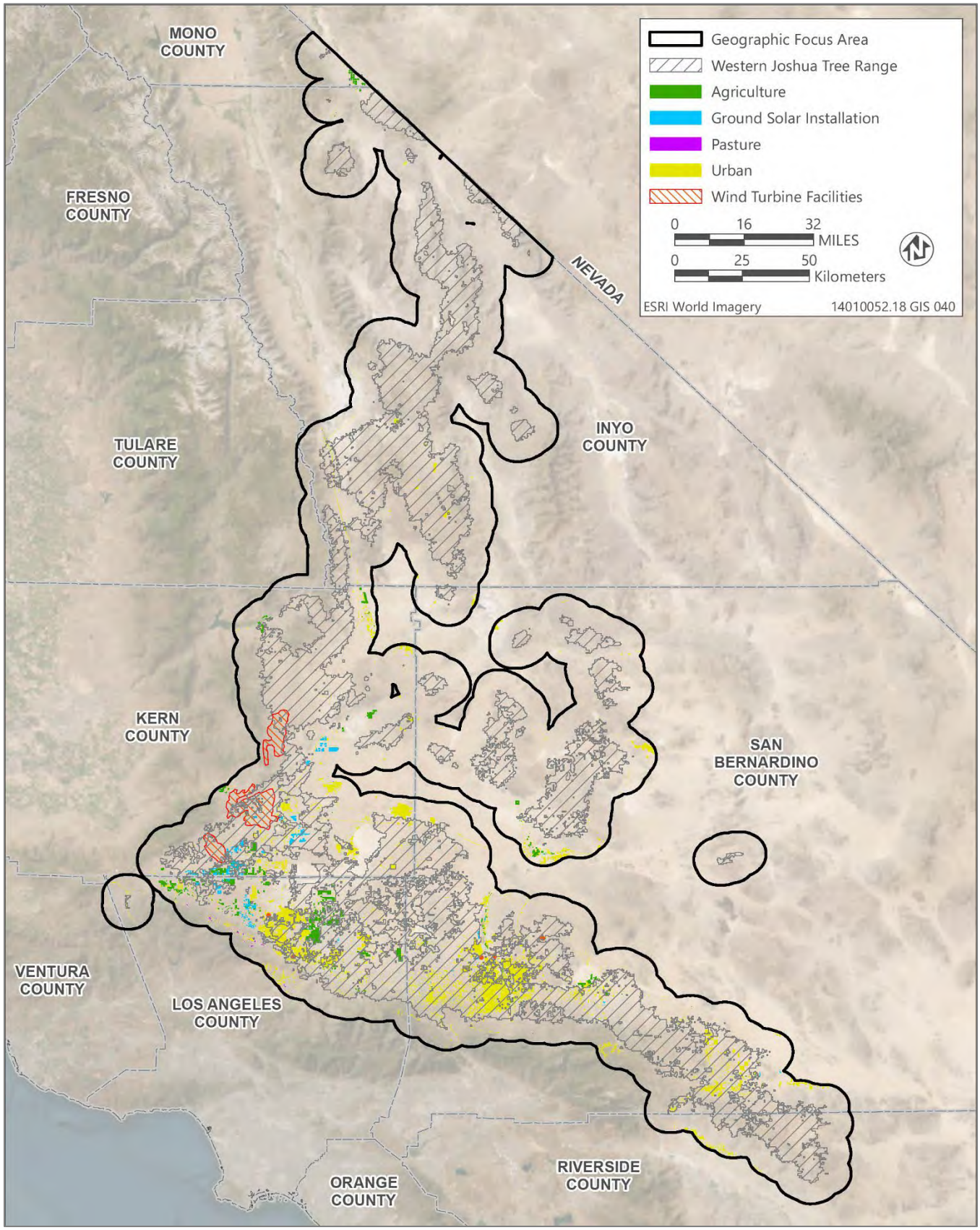
Genetic analyses suggest that approximately 200,000 years ago, western Joshua tree experienced substantial population growth and range expansion from the Mojave Desert southeast into the Sonoran Desert and north-northeast into the Great Basin Desert (Smith et al. 2011). Studies on population trends of Joshua tree over the past 20,000 years are contradictory in their conclusions. Approximately 22,000 to 13,000 years ago, during the Late Pleistocene, the fossil record shows Joshua tree with a larger range compared to today, extending south farther into Southern California, Arizona, and likely into northwestern Mexico (Rowlands 1978; Holmgren et al. 2010; Cole et al. 2011; Smith et al. 2011). A larger range is not synonymous with greater abundance though, and research conducted by Smith et al. (2011) found no indication of significant range or population size reductions at the end of the last glacial period.

Toward the beginning of the Holocene period, approximately 11,700 years ago, fossil evidence indicates the Joshua tree southern range extent contracted northward for approximately 3,700 years until the range reflected the southern extent of today (Cole et al. 2011). This contraction began following an approximately 50-year period where rapid warming occurred, with the minimum winter temperature in the Grand Canyon increasing approximately 4 degrees Celsius (Cole and Arundel 2005) and mean annual sea surface temperature off the coast of Northern California increasing approximately 4 degrees Celsius (Barron et al. 2003). The apparent range contraction of Joshua tree represented in the fossil record starting in the Late Pleistocene suggests that the population of the entire range of Joshua tree has been in decline. However, research conducted by Smith et al. (2011) found no evidence to indicate population declines starting approximately 21,000 years ago, following the last glacial maximum. This suggests that loss of habitat within the southern portion of the Joshua tree range in California, starting in the Late Pleistocene, was potentially offset by habitat expansion in the northern extent of the range (Smith et al. 2011).

Although western Joshua tree has continued to occur within the same general geographical range in California since European settlement of the Mojave Desert, the population size and occupied areas within that geography have declined due to habitat modification and degradation related to land conversion for agriculture and development (Borge 2018; CDFW 2022). Development and other human activities that began with European settlement (see Section 4.3.2) have likely resulted in the greatest decline in the landscape-scale abundance of western Joshua trees in California. Given the limited understanding of western Joshua tree distribution before European occupation and current lack of range-wide population monitoring, this population decline can be estimated by using agricultural land use and development as a proxy to understand habitat loss after European occupation began. Along the southern extent of the western Joshua tree range in California, large portions of western Antelope Valley were cleared for alfalfa production (Borge 2018), which likely resulted in decline of western Joshua tree populations in the area. Large human population centers, particularly in the southern portion of the species range, coincide with large conspicuous areas free of western Joshua tree, including in western Antelope Valley and near the metropolitan areas of Palmdale and Lancaster, which correspond to areas historically cleared for agriculture (Figure 4-3). Agriculture, pasture, and urban data presented in Figure 4-3 were collected from approximately 1990 to 2014 (CAL FIRE 2024a). In the past, these areas, as well as the developed areas of Victorville, Hesperia, and Yucca Valley, likely supported substantially more western Joshua trees. Approximately 30 percent of the habitat occupied by western Joshua tree in California may have been modified in the period between European settlement and the present (CDFW 2022).

> *"In the presence of the Joshua Tree, one cannot help but feel a profound connection to the natural world."*
> *— John Muir*

On the local population scale, trends from available direct monitoring of western Joshua tree are not uniform, but several plots have shown declines in abundance, and observations of recruitment have been minimal (Esque et al. 2010; St. Clair and Hoines 2018; Natural Resources Group 2021; WEST 2021; CDFW 2022). According to the information available, local populations of western Joshua tree are currently exhibiting short-term demographic trends ranging from apparent increase or stability to apparent decline, but no uniform range-wide trend is evident. Demographic data on tree height at some locations show signs of drastic short-term declines in recruitment (CDFW 2022), some show a more gradual decline in recruitment (St. Clair and Hoines 2018), and others appear to be experiencing stable short-term recruitment levels at various locations throughout the species' range (Esque et al. 2010; CDFW 2022).



Sources: Hoen et al. 2018; Esque et al. 2023; Fujita et al. 2023; CAL FIRE 2024a; adapted by Ascent in 2024.

Figure 4-3 Converted Land Cover Uses within the Geographic Focus Area

4.2 WILDLIFE VALUES AND ECOLOGICAL FUNCTION OF WESTERN JOSHUA TREES

Western Joshua tree plays an important ecological role in the desert ecosystem. The species provides foraging opportunities, nesting habitat, and cover for many wildlife species, and supports a biodiverse ecosystem.

The yucca moth is western Joshua tree's obligate, mutualistic pollinating partner (see Section 4.1.3, above). Other moth species potentially parasitize western Joshua tree. Cheater yucca moth (*Tegeticula corruptrix*) is abundant throughout western Joshua tree's range; and while they lay eggs in Joshua tree flowers and feed on seeds, they do not pollinate them (Smith and Leebens-Mack 2024). Two bogus moth species are also known to lay eggs on Joshua tree flowers but do not pollinate them (Smith and Leebens-Mack 2024). *Prodoxus sordidus* lay eggs on the flower stalk, and *Prodoxus weethumpi* lay eggs on the outside of the fruit; however, their larvae do not feed on the seeds and are not considered a direct competitor to the yucca moth (Smith, pers. comm., 2022, cited in USFWS 2023).

Seed-dispersing wildlife include scatter-hoarding mammals that rely on western Joshua tree seeds for nutrition. These species include the Mohave ground squirrel (*Xerospermophilus mohavensis*), which is listed as threatened under the California Endangered Species Act (CESA), and other species, such as white-tailed antelope squirrel (*Ammospermophilus leucurus*), Merriam's kangaroo rat (*Dipodomys merriami*), agile kangaroo rat (*Dipodomys agilis*), San Diego pocket mouse (*Chaetodipus fallax*), little pocket mouse (*Perognathus longimembris*), and pinyon mouse (*Peromyscus trueii*) (Zembal and Gall 1980; Borchert 2016). In addition, black-tailed jackrabbits (*Lepus californicus*) browse on western Joshua tree (Esque et al. 2015).

Source: Samantha Laarman, National Park Service.

Several bird species use Joshua trees for nesting and foraging. Scott's oriole (*Icterus parisorum*) often nests in the crown of Joshua trees and uses fibers stripped from dead leaves hanging below the living crown to construct their hanging, cup-shaped nests (Flood 2020). Ladder-backed woodpeckers (*Dryobates scalaris*) build nests in trunk cavities or limb holes of Joshua trees (Lowther et al. 2020). Swainson's hawk (*Buteo swainsoni*), a species listed as threatened under CESA, has been documented nesting in western Joshua trees in the Antelope Valley of the western Mojave Desert (Bloom et al. 2023). Tricolored blackbird (*Agelaius tricolor*), another species listed as threatened under CESA, has been observed foraging for arthropods within Joshua tree inflorescences in the Kelso Valley of Kern County (Terrill et al. 2019). In addition, common raven (*Corvus corax*) has been observed nesting and perching in Joshua tree branches (Abella et al. 2023). Other bird species that are associated with Joshua tree and may depend on the tree in the Mojave Desert region include cactus wren (*Campylorhynchus brunneicapillus*), loggerhead shrike (*Lanius ludovicianus*), and American kestrel (*Falco sparverius*) (Abella et al. 2023).

Joshua trees provide protection and feeding sites for some Mojave Desert lizard species. Desert night lizards (*Xantusia vigilis*) and desert spiny lizards (*Sceloporus magister*) are often found on Joshua tree bark and in clusters of dead leaves (Gucker 2006). Joshua tree woodland is also habitat for the federally listed threatened and state-listed endangered desert tortoise (*Gopherus agassizii*), which is known to construct burrows under fallen Joshua tree limbs (Abella et al. 2023).

American Kestrel (Falco sparverius) on top of a western Joshua tree.

Source: Carmen Aurrecoechea, National Park Service.

Spiders, scorpions, beetles, and ants use dead Joshua tree leaves and fallen branches for refuge in the Mojave Desert (Gucker 2006). Other insect species feed on western Joshua trees regularly, including the yucca giant-skipper (*Megathymus yuccae*), Navaho yucca borer butterfly (*Megathymus yuccae navajo*), and yucca weevil. Yucca giant-skipper females glue eggs to the leaves of small host plants, and caterpillars feed near the tips of leaves and eventually bore into the ground at the base of the plant and feed on the root (Butterflies and Moths of North America 2023). Navaho yucca borer butterfly lays eggs on adult Joshua trees that arise from asexual growth, then the larvae bore into the rhizomes where they feed and later pupate (Jaeger 1965).

Yucca weevil have been observed eating the inflorescence, sap, and meristem (i.e., the region of cells capable of division and growth in plants) of western Joshua tree. Adult yucca weevils are thought to target flowering plants to bore into and lay their eggs (Heacox, pers.

comm., 2024). Yucca weevil grubs (i.e., larval form of certain beetle species) can be found on the ground, inflorescence, and leaf tips. The adult yucca weevil flies between trees, usually preferring to fly upwind for approximately 40 to 50 meters (131 to 164 feet). The adult stage is thought to last up to 2 years, and adults are easily identifiable because this species will wedge themselves head-first toward a western Joshua tree stem between leaves and can be observed with a hand lens. Yucca weevils have mostly been observed on western Joshua tree individuals that are about 1-meter (3.3 feet) tall, but these data may be biased due to challenges observing taller western Joshua trees.

Several special-status mammals associated with Joshua tree woodland include pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), American badger (*Taxidea taxus*), and bighorn sheep (*Ovis canadensis*) (Miller and Stebbins 1973).

In addition to the known ecological relationships with western Joshua tree described above, many other wildlife species and other organisms likely have ecological relationships with the species that are currently undiscovered.

4.3 KEY STRESSORS, THREATS, AND CONSERVATION ISSUES

"Nature's resilience is mirrored in the Joshua Trees' perseverance."
— John Muir

Western Joshua tree has experienced increasing stressors since Europeans arrived in the Mojave Desert region. Modern-day threats to western Joshua tree include changes in precipitation and temperature patterns due to climate change; increased frequency and severity of wildland fire; proliferation of invasive species; and loss of habitat from land use disturbance, increases in urban and infrastructure development, and recreation or other human activities within the species' range. These threats, coupled with the species' biology (e.g., limited dispersal capacity and slow growth rate) and habitat requirements, are cause for concern that western Joshua tree abundance may decline substantially in California.

4.3.1 Climate Change

California is experiencing increases in warming, droughts, variable precipitation, and intensity of heavy precipitation events due to climate change. These phenomena are predicted to worsen by the end of the 21st century (Garfin et al. 2013; Bedsworth et al. 2018). Climate change impacts to western Joshua tree are summarized in CDFW's March 2022 status review of western Joshua tree (CDFW 2022). Since the status review, information identifying potential western Joshua tree climate refugia has also been developed, which can help evaluate climate impacts on the species. In general, climate refugia are areas that are expected to be

relatively buffered from contemporary climate change over time that enable persistence of valued physical, ecological, and sociocultural resources (Morelli et al. 2016). The direct and indirect effects of climate change are primary threats to western Joshua tree, and studies are increasingly investigating what detectable impacts to Joshua tree are occurring that should be attributed to these causes. For example, one recent study found that Joshua trees are already experiencing impacts from climate change in the form of changes in the frequency of flowering events (Yoder et al. 2024). In addition, areas of higher western Joshua tree recruitment have been observed within or significantly closer to predicted future climate refugia more often than areas of low recruitment (Sweet et al. 2019).

Source: Carmen Aurrecoechea, National Park Service.

Changes in climate suitability for other species, particularly nurse plants of western Joshua tree, will also influence how western Joshua tree is affected by climate change. Singleleaf pinyon pine and blackbrush are some of western Joshua tree's nurse plants, which are important for the survival of western Joshua tree seedlings. Vulnerability assessments conducted by Barrows et al. (2014) show that singleleaf pinyon pine and blackbrush are highly vulnerable and likely vulnerable to climate change, respectively. In this study, Joshua tree itself was found to be likely vulnerable to climate change, although Joshua tree was found to be less vulnerable to climate change compared to singleleaf pinyon pine and blackbrush (Barrows et al. 2014). In addition, new climate suitability models by Thomas et al. (2023) show a much larger impact from climate change on blackbrush compared to western Joshua tree. The climate impacts on singleleaf pinyon pine and blackbrush could reduce the future availability of these western Joshua tree nurse plants, which could affect western Joshua tree's ability to survive past the seedling stage.

Because climate change may cause some areas currently occupied by western Joshua tree to become unsuitable for the species, western Joshua tree climate refugia will be important for maintaining populations of western Joshua tree in the future. Identifying western Joshua tree climate refugia is challenging because it relies on assumptions about global emissions scenarios, results from models of local climate conditions under those scenarios, and species distribution models. However, increasingly sophisticated species distribution models for Joshua tree have been prepared in recent decades (Thompson et al. 1998; Shafer et al. 2001; Dole et al. 2003; Cole et al. 2011; Barrows and Murphy-Mariscal 2012; Thomas et al. 2012; Sweet et al. 2019; Thomas et al. 2023). Furthermore, science identifying potential future climate refugia for western Joshua tree is currently in scientific review and uses newly released western Joshua tree range data from Esque et al. (2023). This new research provides the most accurate western Joshua tree range data to date, which allows models to predict refugia more accurately (Shryock et al. forthcoming). Preliminary results from this work, conducted by the US Geological Survey, have been shared with CDFW for consideration during preparation of this Conservation Plan and are presented in Tables 4-9 through 4-12 below, in Section 4.4.

4.3.2 Development and Other Human Activities

Development and other human activities pose another threat to western Joshua tree and its habitat. Once disturbed, desert systems can be slow to recover due to their arid climate, delicate soils, and slow pace of ecological succession (Randall et al. 2010; Lovich and Ennen 2011). The western Joshua tree range in California has been disturbed by urban areas (which include industrial facilities), renewable energy installations (e.g., ground solar, wind turbine, and energy storage projects), agricultural areas, pastures used mainly for cattle grazing, and resource extraction facilities (Table 4-3; Figure 4-3) (Fujita et al. 2023; CAL FIRE 2024a).

Table 4-3 Converted Land Cover Uses within Western Joshua Tree Range in California

Types	Area in Square Kilometers (sq mi)	Percent of Range (%)
Urban	646.0 (249.4)	4.9
Wind turbine facilities[1]	219.6 (84.8)	1.7
Agriculture	34.1 (13.1)	0.3
Ground solar installations[2]	36.4 (14.1)	0.3
Pasture	0.2 (0.1)	<0.1
Grand total	**936.2 (361.5)**	**7.2**

Notes: sq mi = square miles.

[1] Wind turbine facilities include wind turbines, roads connecting wind turbines, and open areas.

[2] Ground solar installation data includes facilities with capacity of 1 megawatt or more that became operational before 2022.

Sources: Hoen et al. 2018; Esque et al. 2023; Fujita et al. 2023; CAL FIRE 2024a; compiled by Ascent in 2024.

Urban Development

Western Joshua tree has been adversely affected by habitat modification and destruction since European settlement, particularly on unprotected, privately owned lands, and continues to be at substantial ongoing risk of additional habitat modification and destruction through development activities, such as for urban communities, renewable energy projects, and infrastructure. Aerial imagery and data from the US Geological Survey's National Land Cover Database from 1984 to 2021 show continued development within western Joshua tree habitat in the southern portion of the species' range in California in the cities of Palmdale, Lancaster, Yucca Valley, Joshua Tree, Twentynine Palms, Victorville, Hesperia, and Apple Valley (Krantz, pers. comm., 2021, cited in CDFW 2022). A large portion of this recent habitat modification is the result of ongoing urban development, typically on private property near existing development. In addition, these privately owned lands are likely where housing development will occur in the future to accommodate population growth in the region and to address the State's housing crisis (HCD 2022). In these areas, and on private lands in general, western Joshua tree and its habitat have had limited protective regulation prior to CESA candidacy. Approximately 34 percent of western Joshua tree's range in California is privately owned (see Table 2-1 in Chapter 2, "Planning Influences").

Stress from development can reduce western Joshua tree's ability to recruit from seed, which may occur in degraded or disturbed habitat. Western Joshua tree surveys conducted at development sites near the cities of Palmdale and Lancaster found that relatively few western Joshua trees have established from seed in recent decades (CDFW 2022). Development also has the potential to reduce habitat for scatter-hoarding rodents, leading to site abandonment or population declines and limiting western Joshua tree seed dispersal capacity and seed germination rates—both of which are facilitated by scatter-hoarding rodent behavior. In addition, development could eliminate nurse plants from the landscape, which can be critical for western Joshua tree germination and early survival.

The trend of land conversion for renewable energy is expected to continue (BLM 2016a; Smith et al. 2023), which would result in removal of western Joshua tree habitat and mortality of individual western Joshua trees due to the physical impact of land clearance for increased renewable energy development to address climate change (Smith et al. 2023). In recent decades, renewable energy development has been increasing rapidly in the Mojave Desert, mainly on privately owned land and federal lands managed by the Bureau of Land

Management (BLM). To meet California's goals for reduced carbon emission, millions of acres of the Mojave Desert could potentially be converted for renewable energy development; however, there are also conservation areas protected in accordance with the Desert Renewable Energy Conservation Plan (DRECP) (Smith et al. 2023), which has avoidance and minimization measures for Joshua tree woodlands. An update to a Mojave Desert ecoregional assessment (Randall et al. 2010) conducted by Parker et al. (2018) considered two areas of increased renewable energy development. The updated analysis showed that habitat with high conservation value was lost at a higher rate than habitat with low conservation value (Parker et al. 2018).

DRECP has designated focus areas for renewable energy development that overlap with approximately 0.7 percent of the western Joshua tree range in California; approximately 35.1 percent of the development focus areas overlap ecologically core or ecologically intact habitat (Randall et al. 2010; BLM 2016b; Parker et al. 2018). However, DRECP only applies to BLM-owned lands, whereas 60 percent of California's current renewable energy projects are located on private land (USFWS 2023).

Grazing cows rest by a Joshua tree.

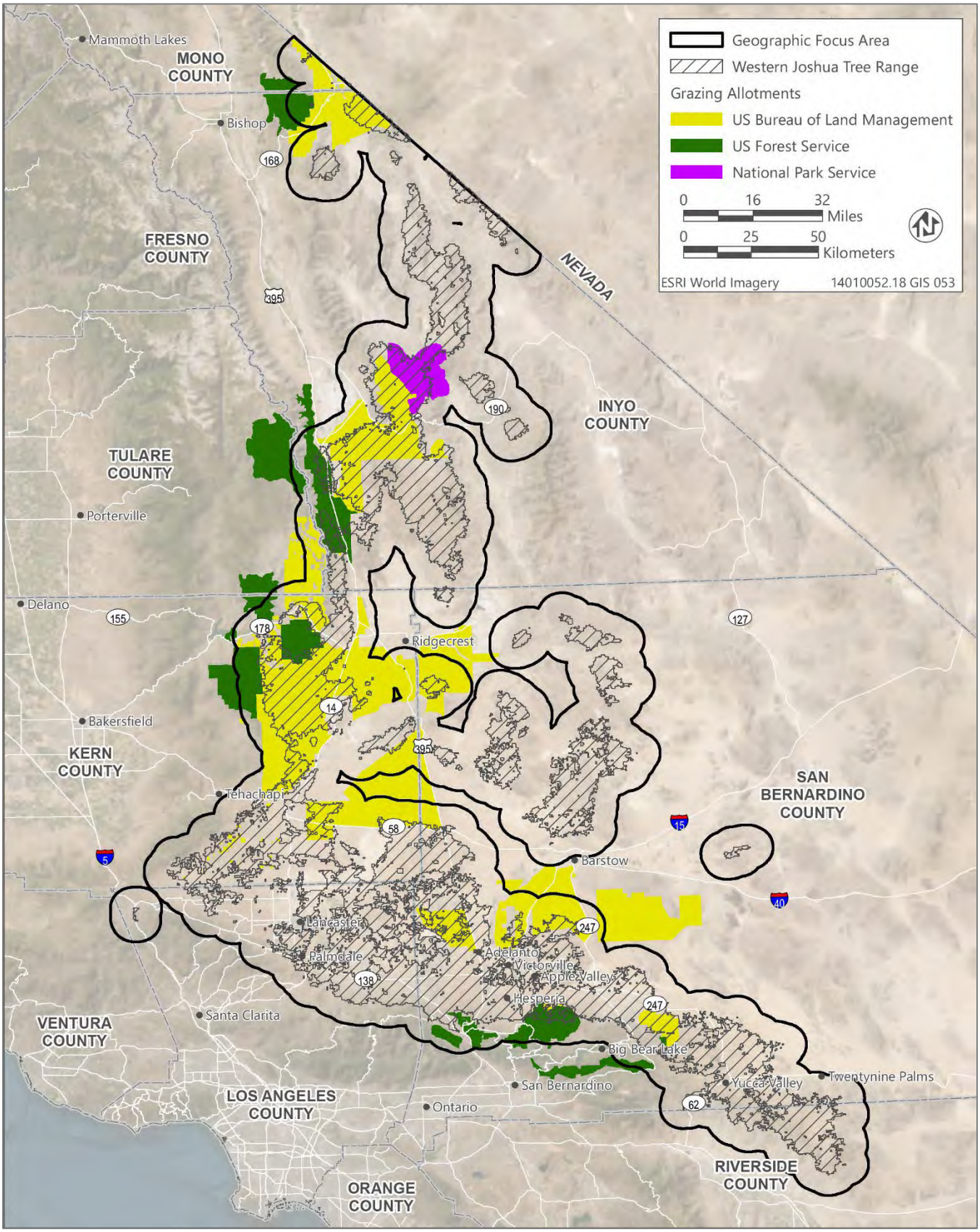
Grazing allotments and permits on federal lands overlap almost a quarter of the western Joshua tree range in California, mostly in the central and northern portions of the range (Table 4-4; Figure 4-4). Pasture land mapped by CAL FIRE (2024a) is minimal in the geographic focus area and only overlaps the western Joshua tree range in California in small patches in the southern and southwestern portions within Los Angeles County and in the eastern portions within Inyo County (Figure 4-3). Grazing can directly destroy or indirectly damage western Joshua trees by animals trampling or consuming individual western Joshua trees, likely young individuals, or nurse plants.

Table 4-4 Grazing within Western Joshua Tree Range in California

Types	Area in Square Kilometers (sq mi)	Percent of Range (%)
Bureau of Land Management grazing allotment	2,589.6 (999.9)	19.8
National Park Service grazing permit	240.5 (92.9)	1.8
US Forest Service grazing allotment	230.6 (89.0)	1.8
Grand total	**3,060.8 (1,181.8)**	**23.4**

Notes: sq mi = square miles.

Sources: Esque et al. 2023; BLM 2024; McNeill, pers. comm., 2024; USFS 2024; compiled by Ascent in 2024.



Sources: Esque et al. 2023; BLM 2024; McNeill, pers. comm., 2024; USFS 2024; adapted by Ascent in 2024.

Figure 4-4 Grazing on Federal Land Overlapping the Geographic Focus Area

An estimated 43 to 46 percent of modeled Joshua tree habitat is managed for multiple uses and is subject to resource extraction or open for unauthorized OHV use (Smith et al. 2023). On public land, incompatible recreational uses also pose a threat to western Joshua tree. Off-highway vehicles (OHVs) traveling off authorized trails and routes can crush young western Joshua trees and nurse plants and either damage or kill them. Western Joshua tree individuals and nurse plants can be trampled by outdoor recreationists, used as attachment points for hammocks and slacklines, and are sometimes collected for firewood. OHVs and campfires have the potential to start fires in western Joshua tree habitat. In addition, outdoor recreation and OHV use have the potential to spread and proliferate invasive species that compete with other plants including nurse plants, act as a fuel source for fire, and create fuel connectivity in Joshua tree habitat.

Impacts from development and other human activities can eliminate western Joshua tree habitat or degrade the quality habitat without eliminating it entirely. Habitat degradation can include habitat fragmentation from clearing for development; soil disturbance and compaction (including degradation or removal of biocrusts); introduction and spread of invasive plants (see Section 4.3.4 below), including more fire-prone invasive grasses; introduction and spread of pathogens; increased dust, pollution runoff, and trash; artificial noise, light, and vibration; and use of herbicides, pesticides, and other chemicals. Land clearing for development and agriculture has resulted in the fragmentation of remaining populations across the landscape, particularly in the species' southern range (Figure 4-3).

Source: Samantha Laarman, National Park Service.

Habitat fragmentation can have impacts to individual species or entire ecosystems, which can include increased edge effects, a reduced ability of species to migrate or colonize, and reductions in species richness (i.e., number of total species) (Haddad et al. 2015). The impacts of habitat fragmentation on western Joshua tree and the yucca moth, as well as their mutualism, are not well understood. Because western Joshua tree is a poor disperser, habitat fragmentation could disrupt population dynamics for the pollinator and plant by altering plant or pollinator densities and changing pollinator behaviors (Xiao et al. 2016). In addition, as fragmentation increases, specialists (i.e., organism adapted to a specific habitat and/or specific diet) such as the yucca moth needed for western Joshua tree reproduction, may decrease in number from the fragmented area while generalists (i.e., organism that occurs in a wide range of habitats and can use a wide variety of resources) become more prevalent (Xiao et al. 2016).

Development, herbicide application, raking, and clearing, and other human activities may have additional impacts on the yucca moth, such as accidental fire ignition, compaction of the soil, and trampling of yucca moths while they are dormant in the soil, or as adults. A lower abundance or absence of yucca moths would reduce sexual reproduction in western Joshua tree individuals, lowering recruitment, and in turn, lowering numbers of new western Joshua tree.

Native shrub communities associated with western Joshua tree in the Mojave Desert can take 100 years or more to recover to their original species composition and structure following disturbance if no action is taken, and perennial plants took an average of 76 years to reestablish following disturbance in an examination of 47 published studies (Abella et al. 2023). Studies evaluating postfire recovery of Mojave Desert shrub communities indicate that these systems may not be capable of achieving species composition similar to prefire conditions without active restoration (Abella et al. 2023). With wildland fire becoming an increasing threat to western Joshua tree, potentially degrading large areas of occupied habitat, restoration of burned sites will be a necessary component of species conservation, which may require many decades of recovery time. In addition, as land is cleared for development, biocrusts can be degraded or eliminated and can take decades to centuries to recover, depending on the impact (Kidron et al. 2020). Estimated biocrust recovery time after the severe disturbance of soil stripping (i.e., full removal of topsoil/A-horizon) by heavy machinery can take anywhere from 56 to 2,000 years (Kidron et al. 2020). Comparatively, biocrust recovery after the severe disturbance of biocrust removal (i.e., removal of 2 to 3 centimeters [approximately 0.7 to 1.2 inches] of topsoil) can take anywhere from 40 to greater than 250 years (Kidron et al. 2020).

4.3.3 Wildland Fire

Wildland fire poses a substantial threat to western Joshua tree. Wildland fire impacts to western Joshua tree are summarized in CDFW's March 2022 status review of western Joshua tree (CDFW 2022), and additional information on wildland fire impacts since the status review is also

presented. Although fire is a key component of most California ecosystems (Keeley et al. 2012; Sugihara et al. 2018), California deserts, where a large part of the western Joshua tree range is located, experience fire generally at a lower frequency and lesser severity compared to many other California ecosystems. Fires that occur in California's southeastern deserts are limited by fuel availability, and California deserts in general tend to have relatively long fire return intervals (i.e., time between fires) (Sawyer et al. 2009; Brooks et al. 2018). One study estimated a fire return interval for middle elevation areas of the Mojave Desert at approximately 687 years (Brooks et al. 2018). Since Joshua trees can be present in forest, shrub, and grassland ecosystems, the fire return intervals to which Joshua tree is subject can vary greatly. Fires occurring from 1900 to present in the western Joshua tree range in California have mostly burned the landscape within the western and southern edges of the range (CAL FIRE 2024b).

Source: Hannah Schwalbe, National Park Service.

Historical fire regime modeling has been developed with input from more than 800 experts throughout the United States during 5 years of workshops using scientific literature, local data (e.g., inventory and monitoring data), and expert judgment (Blankenship et al. 2021). Historical fire regime modeling is presented by elevation in Table 4-5 and shows that the large majority of the western Joshua tree range in California has a V-A fire regime, which is defined as fire burning at any severity with a fire return interval of 201 to 500 years (Figure 4-5) (LANDFIRE 2024a). This historical fire regime constitutes the majority of all elevation classes, except the highest elevation class, which is mostly classified as having a III-B fire regime. The III-B fire regime is defined as having less than 66.7 percent of percent replacement fire (i.e., area that burned hot enough to eliminate all or a majority of vegetation) and a fire return interval of 101 to 200 years. Historical fire regime modeling shows that more than 76 percent of the western Joshua tree range in California has a fire return interval that is at least 100 years or greater, and 14 percent is classified as non-burnable; thus, only approximately 9 percent of the range in California has a historical fire regime of 100 years or less. Fires with perimeters greater than 2,023 hectares (5,000 acres) are mapped in Figure 4-6. The areas and percentage of the western Joshua tree range in California that burned more than once (i.e., reburned) are presented in Table 4-6. The reburn data presented in Table 4-6 shows a decrease in fire return interval within the western Joshua tree range in California. compared to historical fire regime modeling, which classified most of the range in California as having between a 101- and 500-year or 501-year or greater fire return intervals with approximately 64 percent of the range in California having between a 201- and 500-year fire return interval

Table 4-5 Historical Fire Regimes by Elevation within the Western Joshua Tree Range in California

Historical Fire Regime	Low Elevation[1] (percent of range)	Middle-Low Elevation[1] (percent of range)	Middle-High Elevation[1] (percent of range)	High Elevation[1] (percent of range)	Total (percent of range)
I-B: Percent replacement[2] fire less than 66.7%, fire return interval 6–15 years	0.3	0.9	0.3	<0.1	**1.5**
I-C: Percent replacement fire less than 66.7%, fire return interval 16–35 years	0.3	0.4	0.2	<0.1	**0.9**
II-A: Percent replacement fire greater than 66.7%, fire return interval 0–5 years	0	<0.1	0	0	**<0.1**
II-C: Percent replacement fire greater than 66.7%, fire return interval 16–35 years	<0.1	0	0	0	**<0.1**
III-A: Percent replacement fire less than 80%, fire return interval 36–100 years	<0.1	<0.1	<0.1	<0.1	**<0.1**
III-B: Percent replacement fire less than 66.7%, fire return interval 101–200 years	<0.1	0.1	0.8	0.7	**1.6**
IV-A: Percent replacement fire greater than 80%, fire return interval 36–100 years	1.2	4.1	1.4	0.1	**6.7**
IV-B: Percent replacement fire greater than 66.7%, fire return interval 101–200 years	0.4	4.1	0.7	0.1	**5.3**
V-A: Any severity, fire return interval 201–500 years	34.9	18.1	10.4	0.6	**64.0**
V-B: Any severity, fire return interval 501 or more years	1.5	2.8	1.3	<0.1	**5.6**
Total	**48.0**	**34.3**	**16.1**	**1.6**	**–**

Notes: m = meters; ft = feet. Approximately 14.4 percent of the western Joshua tree range is not included in this analysis and was classified as non-burnable agriculture or other non-burnable categories.

[1] The elevational range of western Joshua tree was divided into four equal range classes: low elevation: 585–1,105.9 meters (1,919–3,628 feet); middle-low elevation: 1,106–1,625.9 meters (3,629–5,334 feet); middle-high elevation: 1,626–2,145.9 meters (5,335–7,040 feet); high elevation: 2,146–2,675.9 meters (7,041–8,780 feet).

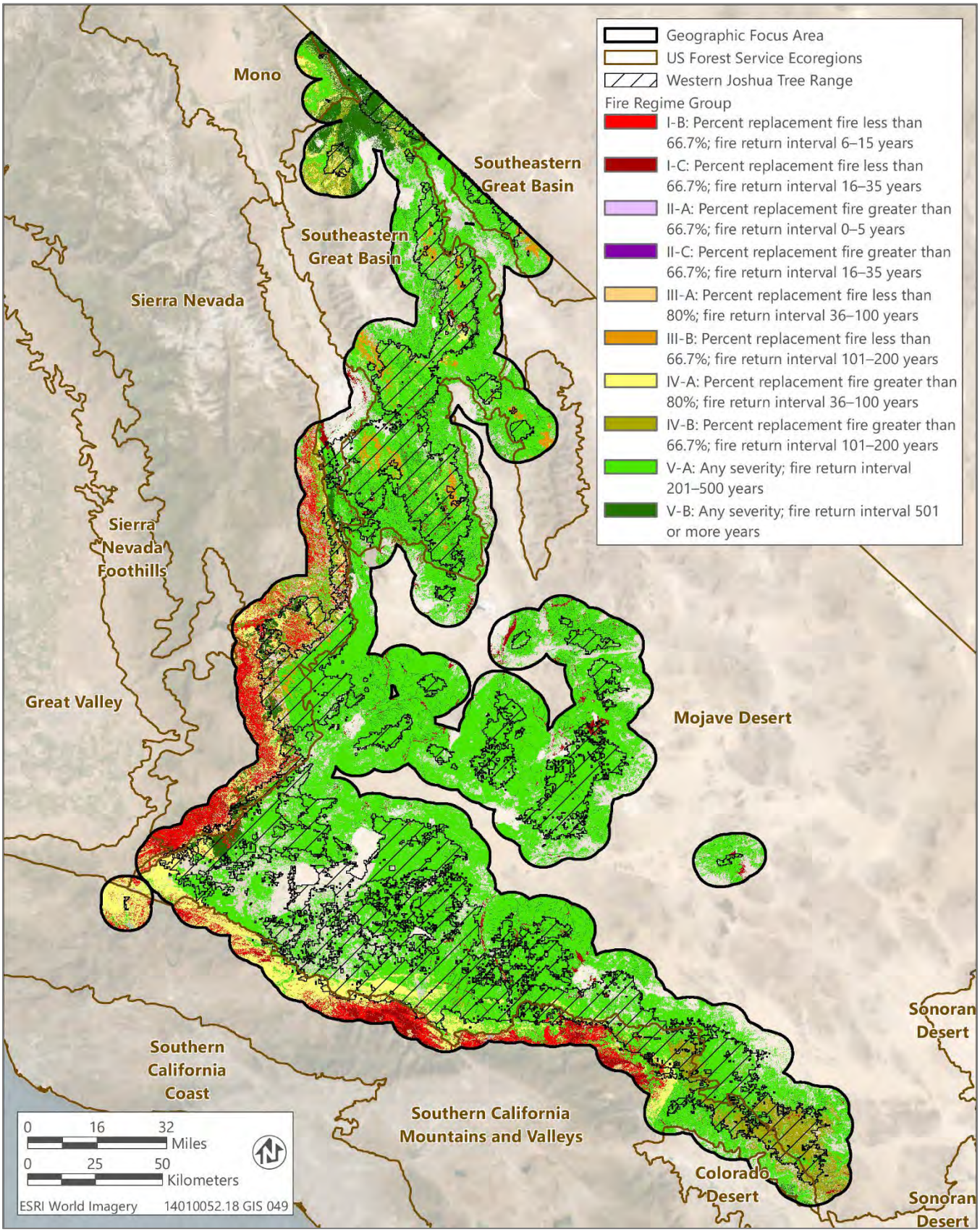
[2] Percent replacement fire refers to the area that burned hot enough to eliminate all or a majority of vegetation.

Source: Esque et al. 2023; LANDFIRE 2024a; compiled by Ascent in 2024.

Table 4-6 Reburns from 1916 through 2023 within the Western Joshua Tree Range in California

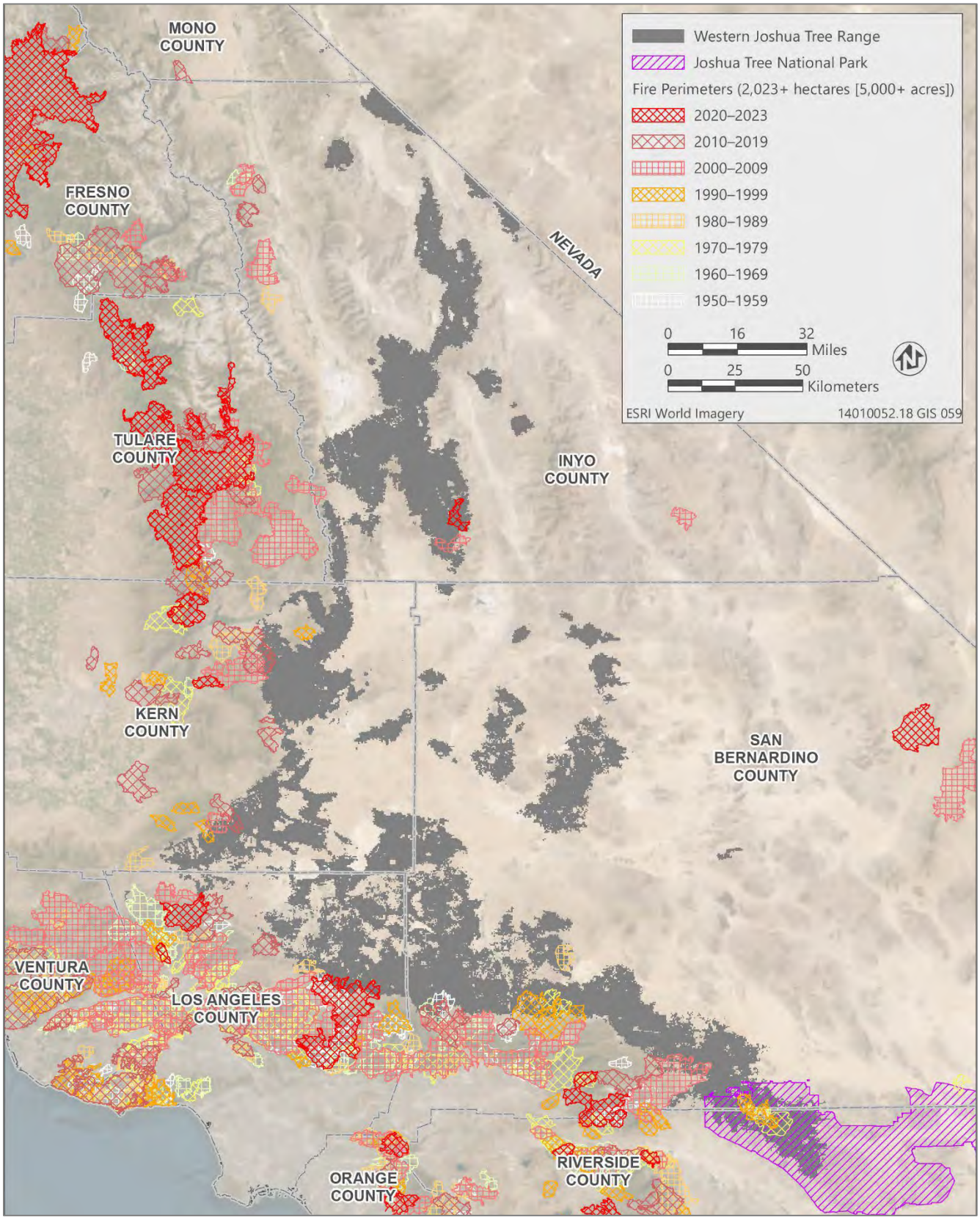
Number of Reburns	Area in Hectares (acres)	Percent of Range
One	69,822.3 (172,534.6)	5.3
Two	14,541.6 (35,933.2)	1.1
Three	2,390.1 (5,906.0)	0.2
Four	154.1 (380.8)	<0.1
Five	76.8 (189.8)	<0.1
One or more times	**86,984.9 (214,944.5)**	**6.6**

Source: Esque et al. 2023; CAL FIRE 2024b; compiled by Ascent in 2024.



Source: Esque et al. 2023; LANDFIRE 2024a; USFS 2024; adapted by Ascent in 2024.

Figure 4-5 Historical Fire Regimes within the Geographic Focus Area



Sources: Esque et al. 2023; CAL FIRE 2024b; adapted by Ascent in 2024.

Figure 4-6 Fires Greater than 2,023 hectares (5,000 acres) within the Western Joshua Tree Range in California

Source: Sasha Travaglio, National Park Service.

Demonstrating how rapidly a wildland fire can affect a dense Joshua tree population, the 2020 Dome Fire burned more than 17,892 hectares (44,211 acres) and was estimated to have fully burned approximately 1.1 million and partially burned 200,000 eastern Joshua trees (Kaiser, pers. comm., 2024). The Dome Fire occurred while several other fires were burning throughout California (Figure 4-7), which limited available firefighting resources and likely led to the fire burning for a longer period. These types of conflicts with fire-fighting resources are anticipated to continue as the frequency of concurrent fires increases (USFWS 2023). Only 3 years later, the York Fire occurred in 2023, approximately 16 kilometers (10 miles) east of the Dome Fire perimeter and burned approximately 37,667 hectares (93,078 acres) within eastern Joshua tree habitat at the Mojave National Preserve (Figure 4-7) (CAL FIRE 2024b). Combined, the Dome and York Fires burned approximately 14.5 percent of the eastern Joshua tree range in California in 3 years (Esque et al. 2023; CAL FIRE 2024b).

Large scale fires can start from ignition sources including lightning strikes, escaped campfires, and combusting piles of mulch. Fire ignition from mulch piles is an issue in Los Angeles County where illegally dumped mulch can generate heat, combust, and develop into a wildland fire (County of Los Angeles 2024).

Postfire vegetation changes can impede the distribution and recovery of native plant species and communities. Increases in fire size and decreases in fire return intervals within the western Joshua tree range can result in changes in vegetation conditions that can reduce the number of western Joshua trees, impair recruitment, and cause local extirpation of western Joshua tree populations. In addition to fire, these vegetation changes can also result from other disturbances, such as the onset of droughts, increased effects of climate change, and effects of continued land use development. Such vegetation change is referred to as "vegetation departure" – a landscape metric that measures how different the current vegetation on a landscape is from historical vegetation conditions. Vegetation departure is classified into categories ranging from very high to very low, indicating the percent change from historical conditions. Within the range of western Joshua tree, the most substantial changes in vegetation conditions are classified as very high departure and have occurred along the southern edge of the range, likely creating highly vulnerable western Joshua tree populations in these areas (Figure 4-8) (LANDFIRE 2024b). Very high vegetation departure is most prevalent in the middle-low elevation class in California for the species (Table 4-7). Most of this change is concentrated

at the southeastern tip of the species range, where there are large patches of very high vegetation departure conditions (Figure 4-8) that partially overlap Joshua Tree National Park. This very high vegetation departure within and around Joshua Tree National Park aligns with two overlapping fire perimeters that are mostly within the park boundaries (Figure 4-6), which likely contributed to the altered vegetation conditions.

Table 4-7 Vegetation Departure Classifications by Elevation Classes within Western Joshua Tree Range in California

Elevation Classes	Very Low (0–16% Departure) (percent of range)	Low (17–33% Departure) (percent of range)	Moderate to Low (34–50% Departure) (percent of range)	Moderate to High (51–66% Departure) (percent of range)	High (67–83% Departure) (percent of range)	Very High (84–100% Departure) (percent of range)	Unclassified for Vegetation Departure[1] (percent of range)	Total (percent of range)
Low elevation class[2]	24.7	0.6	<0.1	6.5	2.6	0.3	13.2	**48.0**
Middle-low elevation class	1.9	1.4	1.0	18.2	2.1	3.6	6.0	**34.3**
Middle-high elevation class	<0.1	1.4	1.4	10.4	1.1	<0.1	1.8	**16.1**
High elevation class	<0.1	0.9	0.1	0.6	<0.1	0	0.1	**1.7**
Total	**26.7**	**4.3**	**2.5**	**35.7**	**5.8**	**3.9**	**21.0**	**-**

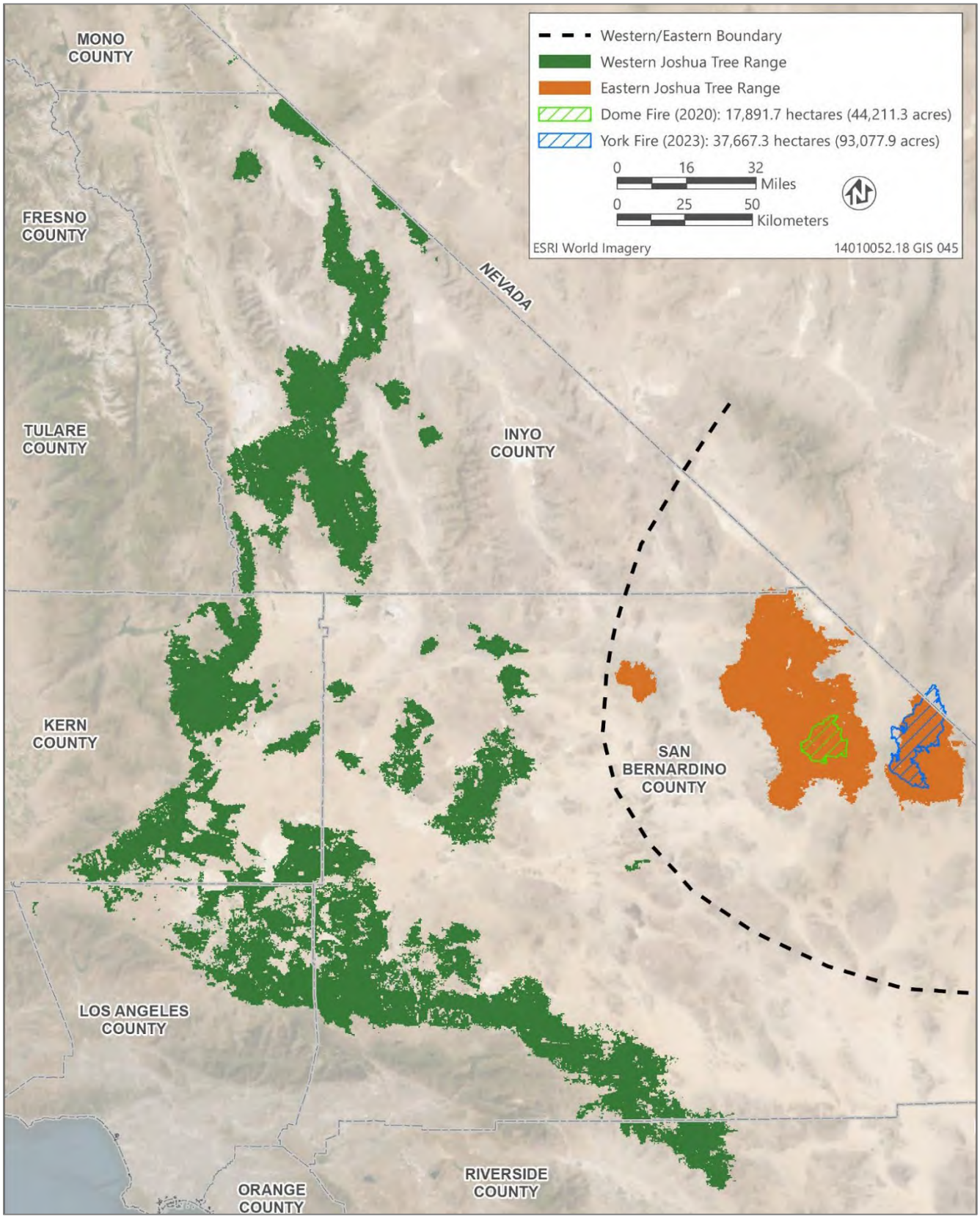
Note: m = meters; ft = feet.

[1] Not included are portions of the range that are classified as water, non-burnable agriculture, non-burnable urban, and sparsely vegetated.

[2] The elevational range of western Joshua tree was divided into four equal range classes: low elevation: 585–1,105.9 meters (1,919–3,628 feet); middle-low elevation: 1,106–1,625.9 meters (3,629–5,334 feet); middle-high elevation: 1,626–2,145.9 meters (5,335–7,040 feet); high elevation: 2,146–2,675.9 meters (7,041–8,780 feet).

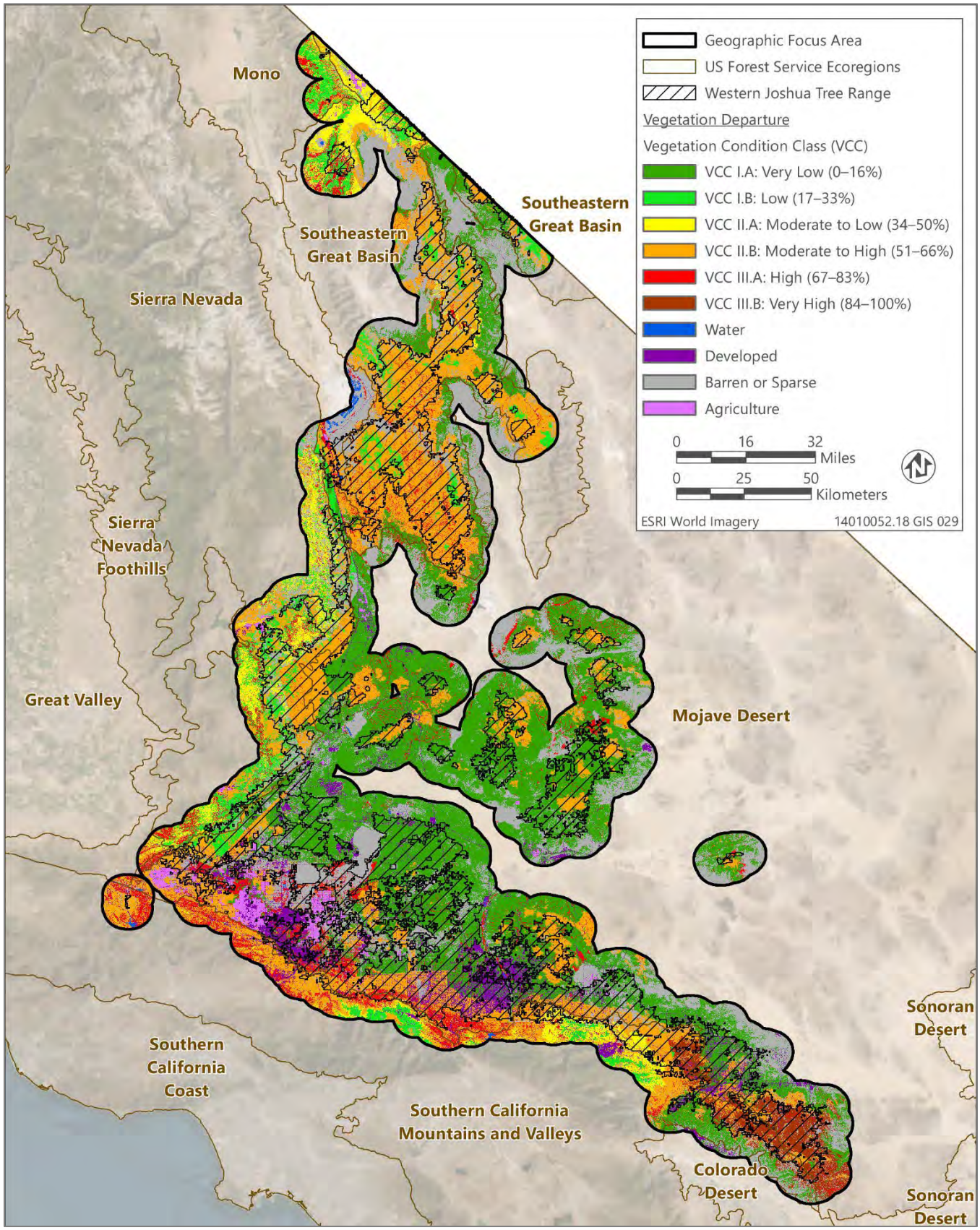
Source: Esque et al. 2023; LANDFIRE 2024b; compiled by Ascent in 2024.

Most of the western Joshua tree range in California is modeled as moderate to high vegetation departure, which is mostly concentrated within the middle-low and middle-high elevation classes (Table 4-7). In addition, there are high and very high departure categories present with these middle-elevation areas. Although vegetation departure is mainly very low in the lowest elevation class where western Joshua tree is present, there is also a large amount of land within this elevation class that is classified as moderate to high and high vegetation departure. The low elevation class is defined as 585 to 1,105.9 meters (1,919 to 3,628 feet) and therefore still represents mid-elevation areas. This substantial vegetation change is likely at least partially explained by the increase in annual fire area in middle-elevation areas from 1984 to 2013 (Brooks et al. 2018).



Sources: Esque et al. 2023; CAL FIRE 2024b; adapted by Ascent in 2024.

Figure 4-7 Dome and York Fires Overlapping the Eastern Joshua Tree Range in California



Sources: Esque et al. 2023; LANDFIRE 2024b; USFS 2024; adapted by Ascent in 2024.

Figure 4-8 Vegetation Departure within the Geographic Focus Area

Wildland fire tends to be unevenly distributed in the Mojave Desert with most large and recurring fires located in areas that experience relatively high amounts of summer precipitation (Tagestad et al. 2016). Higher precipitation leads to more plant growth and in turn, more fuel for fire. Because of fuel availability, fires tend to also be more frequent at middle to high elevations (Brooks et al. 2018).

These patterns of wildland fire occurrence could threaten future western Joshua tree population persistence because some middle to high elevation areas of the Mojave Desert have the highest probability of retaining 20th century–suitable climate conditions for western Joshua tree (Shryock et al. forthcoming), and therefore, fire may disproportionately affect these areas of western Joshua tree climate refugia. The middle-elevation areas, which have experienced recent increases in annual burn area, are where the highest densities of western Joshua trees are usually found (Brooks et al. 2018). The Bridge Fire (2024) burned partially within modeled future climate refugia in the Southern Mountains and Valleys ecoregion near Piñon Hills, California (CAL FIRE 2024c; Shryock et al. forthcoming).

Joshua tree stands can be heavily affected by fire; for example, one study found that 80 percent of the burned western Joshua tree and 26 percent of unburned western Joshua trees died at Joshua Tree National Park approximately 5 years postfire (DeFalco et al. 2010). Burned Joshua tree stands recover slowly following fire, partially because postfire resprouts of young Joshua trees can be heavily targeted by herbivores (DeFalco et al. 2010). One study measured the condition of resprouts 2 years postfire and found that only approximately 49 percent of resprouts were healthy (De Vera 2022). This slow recovery is further exacerbated by the low germination success of Joshua tree seeds; postfire recruitment of new Joshua trees is typically seen only in areas that have not previously burned within the past 40 years (van Wagtendonk et al. 2018). In addition, another study in the Dome Fire footprint found eastern Joshua tree to have an approximately 18 percent survival rate 2.5 years postfire (Sweet et al. 2023). Between 1.5 and 2.5 years postfire, approximately 5 percent of surviving eastern Joshua trees died (Sweet et al. 2023), highlighting that even Joshua trees that initially survive a burn still may not survive. However, the postfire mortality rates of eastern Joshua tree and western Joshua tree may be different (Cornett 2022).

4.3.4 Invasive Plant Species

Invasive species are plants that are nonnative (i.e., do not naturally occur in an area) to an environment, and once introduced, they establish, quickly reproduce and spread, and cause harm to the environment, economy, or human health (Cal-IPC 2024a). Invasive plant species, particularly annual grasses, can rapidly invade Mojave Desert habitats and compete with other plants for light, water, space, and nutrients (Brooks 2000; DeFalco et al. 2003; DeFalco et al. 2007; Blank 2009; Perkins and Hatfield 2014). Western Joshua tree is likely most vulnerable to

competition from invasive plant species in the years immediately following its germination and would become less vulnerable as it gets larger and can better compete for resources. Invasive annual plant species currently indirectly affect all western Joshua trees age classes by providing a fuel source for fire, which increases the fire risk in western Joshua tree habitat.

Red brome, an invasive grass species that occurs in the western Josua tree range.

Source: Robb Hannawacker, National Park Service.

In the greater Mojave Desert region, within the western Joshua tree range, these invasive plant species include those the California Invasive Plant Council has ranked as "high"—meaning they have severe negative ecological impacts on physical processes, plant and wildlife communities, and vegetation structure and moderate to high rates of dispersal and establishment. The species that are ranked high for exhibiting those impacts in the western Joshua tree range in California include Saharan mustard (*Brassica tournefortii*), red brome (*Bromus rubens*), and cheatgrass (*Bromus tectorum*) (Cal-IPC 2024b). In addition, stinknet (*Oncosiphon pilulifer*) is ranked high and has been recognized as an emerging significant threat to Mojave Desert ecosystems that can outcompete native plant species and contribute to increased fire frequency (Cal-IPC 2024d). Additional invasive plant species are present in the region that are ranked as "limited," which are plants defined as having a low to moderate rate of invasiveness and minor ecological impacts on a statewide level or not enough information to justify a higher rating. Plants ranked limited generally tolerate a limited range of environmental conditions and therefore have a limited distribution, but these species may be locally persistent and problematic (Cal-IPC 2024b, 2024c). Invasive plants ranked limited that are present in the range of western Joshua tree include Russian thistle (*Salsola tragus*), Arabian schismus (*Schismus arabicus*), and common Mediterranean grass (*Schismus barbatus*)(Cal-IPC 2024b, 2024c). The presence of invasive plant species in the Mojave Desert is most associated with human disturbance and development, including roads, OHV use, livestock grazing, and agriculture (Brooks and Berry 2006). Even within protected areas, such as Joshua Tree National Park, there are few places that do not support invasive annual plant species (Frakes, pers. comm., 2021, cited in CDFW 2022).

4.3.5 Herbivory and Predation

Western Joshua trees rely on different organisms for reproduction and seed dispersal and provide food and shelter for many other species. Sometimes relationships between western Joshua tree and other organisms that are ordinarily harmless or mutualistic can become predatory or damaging under certain conditions. For example, although the relationship between scatter-hoarding rodents and Joshua trees can be mutualistic (i.e., both organisms benefit one another), in non-masting years when Joshua trees only produce a small number of seeds, an overabundance of rodents may consume all the seeds, which shifts the relationship to a predatory one (Waitman et al. 2012). In addition, small mammal species sometimes strip the bark from Joshua trees for food, nesting material, and moisture. Small mammals, including black-tailed jackrabbits, white-tailed antelope ground squirrels, Botta's pocket gophers (*Thomomys bottae*), and woodrats (*Neotoma* spp.) sometimes strip the bark from Joshua trees, a behavior that occurs with more frequency during drought periods (Esque et al. 2003; DeFalco et al. 2010; Esque et al. 2015). Bark-stripped trees experience higher rates of mortality compared to unstripped trees, and the amount of damage to the tree correlates to its ability to survive (i.e., more damage results in higher likelihood of mortality) (Esque et al. 2003).

Source: Preston Jordan Jr., National Park Service.

Observations of yucca weevil, which can also damage Joshua trees, have increased in recent years (Heacox, pers. comm., 2024). Yucca weevil larvae build protective cases near the ends of Joshua tree branches, and resulting damage to the meristem has been noted to cause branching in affected plants (Jaeger 1965). Adult yucca weevils have been known to feed on host sap, which is thought to not threaten plant health; however, larvae feeding on yucca plants combined with decaying microorganisms that colonize wounded tissue commonly causes infested plants to collapse and die (UC IPM 2020). Recently, adult yucca weevils have been observed feeding and targeting inflorescences of western Joshua tree, the effects of which are not well understood (Heacox, pers. comm., 2024). Signs of yucca weevil infestation on western Joshua tree include rotted branches full of grubs, black sticky substances oozing from holes on the stem and leaves, and discoloration of plant parts. In addition, signs of infestation also include yucca weevil presence on multiple trees in a stand and rotting bases of younger western Joshua trees (Heacox, pers. comm., 2024). However, parasitic wasps, which parasitize yucca moth larvae, may mediate the effects of yucca weevil predation on Joshua tree when present, as has been in observed in Spanish dagger (*Yucca treculiana*)(Crabb and Pellmyr 2006). Lastly, Joshua trees can also experience infestations of other insects, such as a small, contained outbreak of the yucca plant bug (*Halticotoma valida*), which was reported as negatively affecting several planted Joshua trees at a demonstration garden in the town of Joshua Tree, California (JTNP 2017).

4.4 MANAGEMENT UNITS

Conservation management units are defined in the Conservation Plan to organize and prioritize management actions for western Joshua tree based on physical, ecological, and management characteristics. The current and predictable future characteristics of the environment, such as quality of habitat and climate conditions, influence the relative importance and expected effectiveness of specific management actions. Management characteristics are determined by the level of existing protection of western Joshua tree and the entity with authority for land management. Organizing the landscape by its physical, ecological, and management characteristics will help guide the application of the Conservation Plan's management actions.

Climate change is the greatest threat to western Joshua tree, and therefore, climate refugia areas are critical for long-term western Joshua tree conservation. A buffer around climate refugia provides an area that can absorb impacts from other threats to predicted future climate refugia (e.g., invasive species, wildland fire, development). Unoccupied areas of future suitable habitat are important for natural dispersal and possibly assisted migration. Predictions regarding climate refugia using data and modeling from Shryock et al. (forthcoming) was used to determine climate-related criteria, and was based on Shared Socioeconomic Pathways (SSP) emissions scenarios (IPCC 2023). These data are preliminary or provisional and are subject to

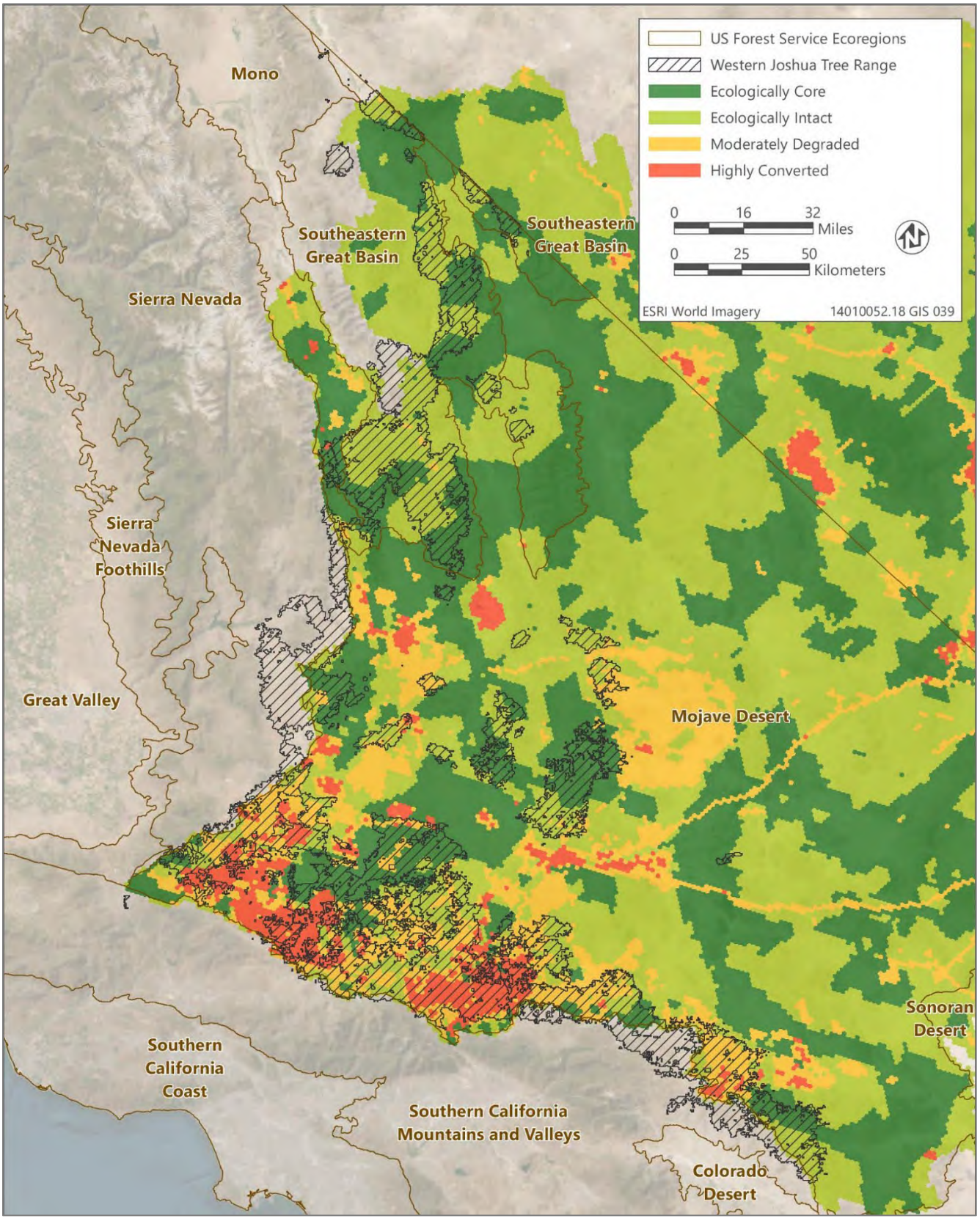
revision. They were provided to CDFW to meet the need for timely science. The data have not received final approval by USGS and are provided on the condition that neither the US Geological Survey nor the US Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data. The categories delineating climate refugia and future suitable habitat for the purposes of this Conservation Plan are:

1. **Predicted climate refugia category:** Areas identified within western Joshua tree distribution that are predicted to continue to provide suitable habitat conditions in the future based on the low emissions (SSP 2-4.5) climate change modeling scenario for the 2071 through 2100 timeframe.

2. **Buffered climate refugia category:** Buffer areas for predicted climate refugia category consisting of a 2.5-kilometer (approximately 1.6-mile) buffer of the predicted climate refugia category boundary that overlaps occupied and unoccupied western Joshua tree habitat.

3. **Unoccupied future suitable habitat category:** Areas where western Joshua tree can disperse naturally that are currently unoccupied by western Joshua tree but are predicted to provide future suitable habitat based on climate models for the low, moderate (SSP 3-7.0), and high emissions (SSP 5-8.5) scenarios in the 2071 through 2100 timeframe. Unoccupied future suitable habitat does not overlap lands in the buffered climate refugia category.

The Mojave Desert ecological assessment (see Figure 4-9) was conducted to describe and understand the ecological character of the region and assist in identifying areas for protection (Randall et al. 2010). This assessment was developed to help inform planning and management for land use and conservation investment across the region (Randall. et. al. 2010). A majority of the habitat that encompasses the western Joshua tree range in California in the Mojave Desert region was split into the following conservation value categories presented from least to most disturbed: ecologically core, ecologically intact, moderately degraded, and highly converted (see Table 4-8 for category definitions and recommended management strategies) (Randall et al. 2010). This initial assessment of the current ecosystem conditions was updated to include recent areas of solar development (Parker et al. 2018). For the Conservation Plan, data for solar and wind development (Hoen et al. 2018; Fujita et al. 2023) were also used. This assessment is an important starting point for prioritizing areas that will be most important for western Joshua tree conservation and management.



Sources: Randall et al. 2010; Hoen et al. 2018; Parker et al. 2018; Esque et al. 2023; Fujita et al. 2023; USFS 2024; adapted by Ascent in 2024.

Figure 4-9 Conservation Value Categories within the California Range of Western Joshua Tree

A variety of strategies may be required to conserve western Joshua tree, depending on the general conservation value of habitat (Table 4-8). Strategies include protecting high conservation value (i.e., ecologically core) lands through redesignation of public lands and acquisition or leasing of private and State School Lands, respectively, enhancing the management and restoration of public lands, and promoting adaptive management. Because the initial assessment covered the entire Mojave Desert region based on satellite data, the ecological assessment authors recommend a finer-scale and site-specific assessment for decision-making regarding specific projects or site-scale planning (Randall et al. 2010).

Table 4-8 Conservation Value Category Definitions and Land Management Strategies for each Category

Conservation Value	Category Definition	Strategies
Ecologically core	These lands of highest conservation value are largely undisturbed and unfragmented and support the conservation targets (species, ecological systems, springs, and seeps) selected for this analysis. Their full protection is critical for long-term conservation of biodiversity in the Mojave Desert.	Protect the large, intact habitat blocks comprising ecologically core lands to conserve irreplaceable conservation targets, support the ecological processes they depend upon, and maintain habitat connectivity. Prevent fragmentation of these areas caused by development and roads, and prevent degradation caused by invasions of exotic species, uncharacteristic (frequent) fire regimes, excessive groundwater withdrawals, and other direct and indirect human impacts.
Ecologically intact	These lands of high conservation value are largely undisturbed and unfragmented and support conservation targets. They buffer ecologically core lands and require levels of protection that will allow them to remain relatively undisturbed to preserve ecological processes and to provide viable habitat and connectivity for native wildlife, plants, and communities. Most ecologically intact lands are functionally equivalent to ecologically core lands and may contain many of the same conservation targets, including sensitive species. However, they may have been classified as ecologically intact because they support more widespread ecological systems, are at higher risk of degradation, or support conservation targets for which the conservation goals have already been met on ecologically core lands.	Promote land uses and management practices that maintain or improve landscape integrity and protect conservation targets. Promote restoration of habitat connectivity, natural vegetation communities, and ecological processes (e.g., sand transport and water-flow regimes).
Moderately degraded	These lands are fragmented by roads or off-road-vehicle trails or are in close proximity to urban, agricultural, or other developments. They often maintain ecological functionality (e.g., maintain groundwater infiltration and flow, serve as sand sources, provide connectivity) or provide habitat for native species, including the conservation targets selected for this analysis.	Encourage sustainable land uses that minimize impacts to native species and communities and other natural resources, allow protection of sensitive species and isolated high value native ecosystems, and maintain landscape permeability to wildlife movement.

Conservation Value	Category Definition	Strategies
Highly converted	These urban, suburban, and agricultural lands are heavily altered. Whereas some can support important conservation targets, their ecological context is highly compromised.	Encourage clustering of new land uses in areas already converted for human uses and encourage siting of developments selected to minimize impacts to conservation targets and other biological resources. Focus conservation and management efforts within highly converted lands on existing open spaces, riparian habitats, and canyons that support local wildlife, improve air and water quality, recharge and prevent overdrafts of groundwater aquifers, and otherwise improve human quality of life. Promote management of agricultural lands and urban landscapes that supports wildlife.

Note: Approximately 15.6 percent of the western Joshua tree range was not mapped by Randall et al. 2010 plus the assessment update by Parker et al. (2018).

Source: Randall et al. 2010; compiled by Ascent in 2024.

Federal, state, local, and tribal jurisdictional boundaries; land ownership; and land management authority are also important considerations in determining which management actions are most important to pursue within management units. Because similar types of management actions and written agreements may be implemented for western Joshua tree conservation within different ownerships and management authorities, categories of land use with similar management have been grouped to define the management units as follows:

1. **Wilderness.** Designated BLM, US Forest Service (USFS), and National Park Service (NPS) wilderness areas, and BLM wilderness study areas.

2. **Preservation with Light Recreation/Other Use.** USFS-recommended wilderness areas, non-wilderness NPS land, California State Parks land (except for State Vehicular Recreation Areas [SVRAs]), BLM areas of critical environmental concern, USFS special interest areas (includes research natural areas and botanical areas), USFS wild and scenic river areas, BLM National Monuments, USFS National Monuments, local county conservation areas (includes wildlife and wildflower sanctuaries), and other protected lands that are managed for conservation (i.e., land trusts and lands with conservation easements).

3. **Defense.** US Department of Defense lands consisting of multiple installations.

4. **Tribal Land.** Lands held in trust by California Native American tribes (rancherias/reservations) or tribal members (individual allotments usually within rancherias/reservations).

5. **Mixed Use.** California SVRAs, BLM recreation management areas, BLM and USFS grazing allotments, NPS grazing permitted land, USFS and BLM lands that are not included in Wilderness or Preservation with Light Recreation/Other Uses, and city-owned infrastructure lands consisting of cemeteries, irrigation districts, water districts, school districts, and community services.

6. **Little or No Protection.** All other lands (including private and State School Lands as well as DRECP development focus areas and variance process lands).

The percent of the current western Joshua tree range within predicted climate refugia category, buffered climate refugia category, and unoccupied future suitable habitat category within each conservation category and management unit is summarized in Table 4-9.

4.4.1 Range-Wide Management Units

Table 4-9 shows the percentage of the western Joshua tree range in California by conservation value category and management unit. The majority of the range in California is in the Little to No Protection unit, followed by Mixed Use and Defense units. Wilderness units constitute another large portion of the western Joshua tree range in California and have more protection than the previous three units due to the management of Wilderness lands, which includes protection of land and preservation of wilderness character. Tribal land contains less than 1 percent of the range in California.

Table 4-9 Percent of Western Joshua Tree Range in California within Conservation Value Categories by Management Unit

Management Unit	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categorized	Total
Little or No Protection	3.0	6.4	14.5	9.1	2.6	**35.5**
Mixed Use	4.4	10.1	1.9	0.1	7.7	**24.1**
Defense	10.4	5.6	1.3	0.3	0	**17.7**
Wilderness	3.7	6.3	<0.1	0	4.2	**14.2**
Preservation with Light Recreation/Other Use	3.4	3.0	0.7	0.1	1.2	**8.4**
Tribal Land	0	<0.1	0	0	<0.1	**<0.1**
Total	**24.9**	**31.5**	**18.4**	**9.6**	**15.6**	**99.99**[1]

Notes: Totals may not sum exactly due to independent rounding.

[1] Data do not equal total species range due to mapping discrepancies.

Sources: Randall et al. 2010; Hoen et al. 2018; Parker et al. 2018; Esque et al. 2023; Fujita et al. 2023; compiled by Ascent in 2024.

The majority of the ecologically core habitat, which is defined as the least disturbed, is within Defense units. The next largest amount of ecologically core habitat is within the Mixed Use and Wilderness units (Table 4-9). The majority of ecologically intact habitat is within Mixed Use units. Wilderness, Little to No Protection, and Defense units also contain substantial portions of ecologically intact habitat. The majority of moderately degraded habitat is within Little to No Protection units, followed by Mixed Use and Defense units. The majority of the highly converted habitat, which is the category of land that is most disturbed within the region, is within Little to No Protection units.

The portion of the western Joshua tree range in California that was not categorized in the Mojave Desert ecological assessment is mainly within Mixed Use units, followed by Wilderness, Little to No Protection, and Preservation with Light Recreation/Other Use units. Approximately 22.6 percent of the western Joshua tree range in California is within areas that already have land protections in place and are generally being managed with conservation in mind: Wilderness and Preservation with Light Recreation/Other Use.

Source: Jeb Bjerke, California Department of Fish and Wildlife.

4.4.2 Management Units for Climate Refugia

PREDICTED CLIMATE REFUGIA CATEGORY

The predicted climate refugia category makes up 23.4 percent of the western Joshua tree range in California. Most of the predicted climate refugia category is within the middle-low elevation (1,106–1,625.9 meters [3,629–5,334 feet]) and middle-high elevation (1,626–2,145.9 meters [5,335–7,040 feet]) classes, constituting 44.7 percent and 43.4 percent of the predicted climate refugia category, respectively. In addition, over half of the predicted climate refugia category is within the Southeastern Great Basin ecoregion in the northern portion of the species' range in California, 26.5 percent is in the Mojave Desert ecoregion, 14.4 percent in the Southern California Mountains and Valleys ecoregion, and 2.0 percent is within the Sierra Nevada ecoregion.

Table 4-10 outlines the percentage of the predicted climate refugia category within each conservation value category and management unit. Most of the predicted climate refugia category is in the Mixed Use management unit, followed by Wilderness, Little to No Protection, then Defense Units. To a lesser extent, Preservation with Light Recreation/Other Use units also contain land in the predicted climate refugia category. Tribal Land units do not contain land in the any predicted climate refugia category.

Table 4-10 Percent of Predicted Climate Refugia Overlapping Conservation Value Categories and Management Units

Management Units	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categorized	Total
Mixed Use	2.2	16.0	0.5	<0.1	9.9	**28.6**
Wilderness	8.2	14.6	<0.1	0	5.3	**28.2**
Little or No Protection	0.7	3.9	5.7	9.6	1.8	**21.7**
Defense	5.2	8.1	<0.1	0	0	**13.3**
Preservation with Light Recreation/Other Use	3.2	1.9	0.2	0.1	2.9	**8.2**
Tribal Land	0	0	0	0	0	**0**
Total	**19.5**	**44.5**	**6.4**	**9.6**	**19.9**	**100.0**

Notes: Totals may not sum exactly due to independent rounding.

Sources: Randall et al. 2010; Hoen et al. 2018; Parker et al. 2018; Esque et al. 2023; Fujita et al. 2023; Shryock et al. forthcoming; compiled by Ascent in 2024.

Most of the predicted climate refugia category is within ecologically intact habitat areas, with lesser amounts in uncategorized areas, ecologically core habitat areas, and highly converted habitat areas. The majority of the ecologically core habitat in predicted climate refugia category is within Wilderness units. The next largest amount of ecologically core habitat is within Defense units, followed by Preservation with Light Recreation/Other Use units. The

majority of ecologically intact habitat in the predicted climate refugia category is within Mixed Use units. Wilderness, Defense, and Little to No Protection units also contain substantial portions of ecologically intact habitat. The majority of moderately degraded habitat in the predicted climate refugia category is within Little to No Protection units. The next largest area in moderately degraded habitat is within Mixed Use units and then Preservation with Light Recreation/Other Use units. Most of the highly converted habitat in predicted climate refugia is within Little to No Protection units.

Approximately 36.4 percent of the predicted climate refugia category is within areas that already have land protections in place and are generally being managed with conservation in mind (i.e., Wilderness and Preservation with Light Recreation/Other Use units), which constitutes 8.5 percent of the western Joshua tree range in California. The portion of the predicted climate refugia category that are in areas that were not categorized in the Mojave Desert ecological assessment is mainly within Mixed Use units, followed by Wilderness, Preservation with Light Recreation/Other Use, and Little to No Protection units.

BUFFERED CLIMATE REFUGIA CATEGORY

The portion of the buffered climate refugia category within the western Joshua tree range constitutes almost 60 percent of the buffered climate refugia category and composes 22.4 percent of the western Joshua tree range in California. Most of the buffered climate refugia category is within the middle-low elevation (1,106–1,625.9 meters [3,629–5,334 feet]), middle-high elevation (1,626–2,145.9 meters [5,335–7,040 feet]), and low elevation (585–1,105.9 meters [1,919–3,628 feet]) classes, constituting 55 percent, 22.4 percent, and 18.3 percent of the buffered climate refugia category, respectively. In addition, over 40 percent of the buffered climate refugia category is within the Southeastern Great Basin ecoregion in the northern portion of the species' range in California, 27.7 percent is in the Mojave Desert ecoregion, 17.8 percent in the Southern California Mountains and Valleys ecoregion, and 12.6 percent is within the Sierra Nevada ecoregion.

Table 4-11 outlines the percentage of buffered climate refugia category within and outside of the western Joshua tree range in California by conservation value category and management unit. The majority of the buffered climate refugia category is in Wilderness units, followed by Mixed Use, Little to No Protection, then Preservation with Light Recreation/Other Use units. Tribal Land units contain a minimal amount of land within the buffered climate refugia category in ecologically intact habitat within the species' California range and uncategorized areas within and outside the species' California range.

Table 4-11 Percent of Buffered Climate Refugia Category Overlapping Conservation Value Categories and Management Units

Management Units	Presence of Western Joshua Tree Range	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categorized	Total
Wilderness	Occupied	3.8	6.7	<0.1	0	3.1	13.6
	Unoccupied	5.5	10.5	<0.1	0	2.3	18.3
	Total	**9.3**	**17.2**	**<0.1**	**0**	**5.4**	**31.9**
Mixed Use	Occupied	2.4	4.9	0.6	0.1	8.1	16.1
	Unoccupied	1.2	2.4	0.4	0.2	6.0	10.1
	Total	**3.6**	**7.3**	**1.0**	**0.2**	**14.1**	**26.2**
Little or No Protection	Occupied	0.9	3.2	6.8	4.5	2.1	17.5
	Unoccupied	0.3	0.7	0.9	1.0	1.5	4.4
	Total	**1.2**	**3.9**	**7.7**	**5.5**	**3.6**	**21.9**
Preservation with Light Recreation/Other Use	Occupied	1.0	1.9	0.5	<0.1	1.0	4.5
	Unoccupied	0.7	1.1	0.1	<0.1	3.7	5.8
	Total	**1.7**	**3.0**	**0.7**	**0.1**	**4.7**	**10.2**
Defense	Occupied	4.3	3.2	<0.1	0	0	7.6
	Unoccupied	1.4	0.7	<0.1	0	0	2.1
	Total	**5.7**	**4.0**	**<0.1**	**0**	**0**	**9.7**
Tribal Land	Occupied	0	0.1	0	0	<0.1	0.1
	Unoccupied	0	0	0	0	<0.1	<0.1
	Total	**0**	**0.1**	**0**	**0**	**<0.1**	**0.1**
Total	Occupied	12.4	19.9	7.9	4.6	14.4	59.2
	Unoccupied	9.2	15.5	1.4	1.2	13.5	40.8
	Total	**21.6**	**35.4**	**9.4**	**5.8**	**27.9**	**100.0**

Notes: Totals may not sum exactly due to independent rounding.

Sources: Randall et al. 2010; Hoen et al. 2018; Parker et al. 2018; Esque et al. 2023; Fujita et al. 2023; Shryock et al. forthcoming; compiled by Ascent in 2024.

Most of the buffered climate refugia category is within the ecologically intact habitat areas, followed by areas that are not categorized, ecologically core habitat, and moderately degraded habitat. The majority of the ecologically core habitat in the buffered climate refugia category is within Wilderness units. The next largest amount of ecologically core habitat is within the Defense units and then Mixed Use units. The majority of ecologically intact habitat in the buffered climate refugia category is also within Wilderness units. The next largest amount of ecologically intact habitat is within Mixed Use, Defense, and then Little to No Protection units. The majority of moderately degraded habitat and highly converted habitat in the buffered climate refugia category is within Little to No Protection units.

Approximately 42.1 percent of the buffered climate refugia category is within areas that already have land protections in place and are generally being managed with conservation in mind: Wilderness and Preservation with Light Recreation/Other Use units. The portion of land within the buffered climate refugia category that was not categorized in the Mojave Desert ecological assessment is mainly within Mixed Use units, then Wilderness, Preservation with Light Recreation/Other Use, and Little to No Protection units.

Source: Jeb Bjerke, California Department of Fish and Wildlife.

UNOCCUPIED FUTURE SUITABLE HABITAT CATEGORY

Most of the unoccupied future suitable habitat category is within the middle-high elevation (1,626–2,145.9 meters [5,335–7,040 feet]) and middle-low elevation (1,106–1,625.9 meters [3,629–5,334 feet]) classes, constituting 71.1 percent and 21.7 percent of the unoccupied future suitable habitat category, respectively. In addition, over 75 percent of the unoccupied future suitable habitat category is within the Southeastern Great Basin ecoregion in the northern portion of the species' range in California, 14.2 percent is within the Sierra Nevada ecoregion, 6.2 percent in the Mojave Desert ecoregion, and 3.8 percent is within the Southern California Mountains and Valleys ecoregion.

Table 4-12 outlines the percentage of unoccupied future suitable habitat category by conservation value category and management unit. The majority of the unoccupied future suitable habitat category is within Wilderness units, followed by Mixed Use, Preservation with Light Recreation/Other Use, and then Little to No Protection units. Tribal Land units do not contain land in the unoccupied future suitable habitat category.

Table 4-12 Percent of Unoccupied Future Suitable Habitat Category Overlapping Conservation Value Categories and Management Units

Management Units	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categorized	Total
Wilderness	32.2	10.2	0	0	27.3	**69.7**
Mixed Use	0.4	3.8	4.4	0	13.8	**22.3**
Preservation with Light Recreation/ Other Use	2.9	0.4	0	0	1.8	**5.0**
Little or No Protection	<0.1	0.6	<0.1	<0.1	2.3	**3.0**
Defense	0	<0.1	0	0	0	**<0.1**
Tribal Land	0	0	0	0	0	**0**
Total	**35.5**	**15.0**	**4.4**	**<0.1**	**45.1**	**100.0**

Notes: Totals may not sum exactly due to independent rounding.

Sources: Randall et al. 2010; Hoen et al. 2018; Parker et al. 2018; Esque et al. 2023; Fujita et al. 2023; Shryock et al. forthcoming; compiled by Ascent in 2024.

Most of the unoccupied future suitable habitat category is within areas not categorized by the Mojave Desert ecological assessment, followed by ecologically core habitat, ecologically intact habitat, and moderately degraded habitat areas. There is minimal highly converted habitat within the unoccupied future suitable habitat category. The majority of the ecologically core habitat in unoccupied future suitable habitat category is within Wilderness units. The next largest amount of ecologically core habitat is within the Preservation with Light Recreation/Other Use units and then Mixed Use units (Table 4-12). Most of ecologically intact habitat within the unoccupied future suitable habitat category is also within Wilderness units. The next largest amount of ecologically intact habitat is within Mixed Use, Little to No Protection, followed by Preservation with Light Recreation/ Other Use units. The majority of moderately degraded habitat is within Mixed Use units. The only highly converted habitat in the unoccupied future suitable habitat category is within Little to No Protection units.

Approximately 74.7 percent of the unoccupied future suitable habitat category is within areas that already have land protections in place and are generally being managed with conservation in mind: Wilderness and Preservation with Light Recreation/Other Use units. The portion of unoccupied future suitable habitat category that was not categorized in the Mojave Desert ecological assessment is mainly within Wilderness units, followed by Mixed Use, Little or No Protection, then Preservation with Light Recreation/Other Use units.

This page is intentionally left blank.

5 CONSERVATION MANAGEMENT ACTIONS AND EFFECTIVENESS CRITERIA

"Wilderness is not a luxury but a necessity of the human spirit."
— Edward Abbey

Management actions necessary to conserve western Joshua tree and objective, measurable criteria to assess the effectiveness of such actions are the heart of the Conservation Plan. This chapter describes the breadth of actions that are likely to be necessary to conserve western Joshua tree and provides a conceptual framework for how to use these actions to achieve the vision, purpose, and objectives of the Conservation Plan described in Chapter 1, "Introduction."

The management actions are guidelines for conservation and the criteria help define the effectiveness of the actions; they do not create new statutory or regulatory mandates. Nevertheless, the management actions in this chapter can be used in several ways. They can be voluntarily adopted and implemented by project proponents, land managers, and philanthropists to help the species or to prevent the species from being harmed. California Native American tribes (Tribes) and the State can work together to co-manage conservation consistent with the Conservation Plan's guidance. The management actions can also be incorporated into project approvals by local governments and regulatory agencies that authorize projects in western Joshua tree's range in California. Researchers can implement management actions related to research, and private citizens and other organizations can implement actions related to education and awareness. Western Joshua tree conservation will require action from many different people and organizations.

Section 5.1 introduces the sources of information behind western Joshua tree conservation. Section 5.2 includes descriptions of management actions in five categories:

- Impact avoidance and minimization,
- Land conservation and management,
- Tribal co-management,
- Research to inform long-term conservation, and
- Education and awareness.

Section 5.3 provides objective, measurable criteria to assess the effectiveness of management actions, the Conservation Plan, and the Western Joshua Tree Conservation Fund (Conservation Fund) for conservation of western Joshua tree in California. Section 5.4 is intended to guide which management actions may be most impactful for conservation in specific western Joshua tree management units.

5.1 SCIENCE INCLUDING TRADITIONAL ECOLOGICAL KNOWLEDGE TO INFORM MANAGEMENT ACTIONS

The Conservation Plan is informed by science including Traditional Ecological Knowledge (TEK). Integration of TEK with other sources of science has been shown to lead to more sustainable, productive, and locally accepted natural resource management systems worldwide (Bussey et al. 2016). Please refer to Chapter 3, "Traditional Values and Uses of Western Joshua Tree by California Native American Tribes," for a description of California Native American uses, values, and TEK related to western Joshua tree. Refer to Section 5.2.3, below, for management actions facilitating co-equal collaboration between the State and Tribes.

The critical role of science supporting effective management and conservation of the species is reflected in the seven-step approach to conservation in the face of climate change described by Smith et al. (2023), as summarized below.

1. **Identify genetic structure and distinct populations.** The first step toward conservation is identifying genetic structure and distinct populations. Genomic (i.e., study of genes) tools can provide accurate estimates regarding populations, such as effective population size, demographic history, and population structure, which are all important for successful conservation efforts (Hohenlohe et al. 2021). Genetic data of populations can be used to identify distinct populations, as well as genes that may be responsible for adaptation to changing environments, highlighting populations that may require different management strategies (Hohenlohe et al. 2021). As discussed in Section 4.1.1, "Range and Distribution," recent research suggests that western Joshua tree populations have significant genetic differences (Smith et al. 2021) that have the potential to respond

differently to climate change (Smith et al. 2023). Population genetic data can also assist in identifying populations with high genetic diversity, which can translate to greater potential for adapting to environmental change (Smith et al. 2023).

2. **Develop species distribution models and identify climate refugia.** Developing species distribution and demographic models for distinct populations using high-quality data that document where western Joshua trees occur (i.e., occurrence data) is important for accurately identifying climate refugia that should be given high priority for protection. These models are imperative for successful species conservation (Morelli et al. 2016; Morelli et al. 2020) and will help determine the degree that climate change poses a threat to a species (Jones et al. 2016). The several species distribution models that have been developed for Joshua tree resulted in very different predictions of suitable habitat distribution by the end of the 21st century (Smith et al. 2023). The wide range of results from these models is a byproduct of different methods used and differences in input data (Smith et al. 2023). For species distribution models to be reliable, accurate occurrence data must be used, then multiple independent data sources must be used to validate models (Sweet et al. 2019). Incorporating physiological (i.e., how plants function) data can also improve the accuracy of species distribution models (Buckley et al. 2010; Evans et al. 2015). Species distribution models can help predict areas of future habitat for a species; however, these models need to include realistic estimates of the species' ability to disperse and access new areas (Bateman et al. 2013). Species distribution models may improve their ability to predict future species distributions under climate change, by incorporating the adaptive potential of populations (Bush et al. 2016; Razgour et al. 2019). Models should focus on fine scale distribution as genetic information becomes available and distinct populations are identified since they may require different management strategies (Hohenlohe et al. 2021).

   An important step toward developing accurate range-wide species distribution and climate refugia models for western Joshua tree has been completed with new species distribution data recently published by Esque et al. (2023). These models used remote sensing and ground-validation methodologies to document western Joshua tree presence and absence throughout the species range. This unprecedented dataset has been used to develop climate refugia models that include identification of possible future habitat that is within dispersal range of its current distribution, but that is not currently populated by western Joshua tree (Shryock et al. forthcoming). These data informed management unit delineation in Section 4.4, "Management Units," land conservation and management actions in Section 5.2.2 (below), and management unit recommendations in Section 5.4 (below).

3. **Validate potential refugia.** Once refugia models have been developed, the next step is to validate the models using demographic data to assess population growth or decline and other data sources to confirm that the potential refugia will be viable in the long term (Sweet et al. 2019). Demographic data can have considerable influence on predicted future species distributions and in validating predicted climate refugia (Merow et al. 2014). Spatial patterns of recruitment can also be used as a predictor of potential climate refugia, which could be compared to predictions based on climate models (Barrows et al. 2020a, 2020b). In addition, incorporating information on the adaptive potential of populations into species distribution models may improve model accuracy for future distribution predictions under climate change (Bush et al. 2016; Razgour et al. 2019).

4. **Assess adaptive genetic variation.** After genetic structure and distinct populations have been identified, the next step is to assess adaptive genetic variation within populations using either association genetics (i.e., identification of genes or genetic markers with underlying important traits) or ideally, experimental approaches coupled with genomic data (Smith et al. 2023). Conservation genetics should focus on the protection of adaptive genetic variation to help manage species that are dealing with climate change (Razgour et al. 2019). Adaptive genetic variation directly affects a species' ability to respond to environmental factors, such as heat stress and drought, highlighting the importance of conserving adaptive genetic variation and not just overall genetic variation (Smith et al. 2023). Landscape genomics (i.e., study of how genetic variation is distributed between populations across a species range) and association genetics can identify genes or genetic markers that are likely the basis for local adaptation to climate variation in current populations (Lotterhos and Whitlock 2015).

Source: Jeb Bjerke, California Department of Fish and Wildlife.

   Genome-wide association studies looking at seedling survival, growth, and specific ecophysiological traits (i.e., physiological processes crucial for interacting with the environment, including gas exchange and water regime) can potentially identify genes underlying climate adaptation (Smith et al. 2023), which can be used to predict these traits in natural populations (Swarts et al. 2017). Studies in common gardens are

particularly important because they can be used to validate the adaptive value of identified genes or genetic markers and reveal underlying physiological mechanisms (Weigel and Nordborg 2015). Common garden experiments are indoor or outdoor plantings of species or populations collected from multiple distinct geographic locations, grown together under shared conditions (Schwinning et al. 2022).

Current common garden research within the US Geological Survey's Mojave Desert Common Gardens network uses Joshua tree seedlings from different locations that are planted outside in various climates throughout the Mojave Desert and in the lab. This research can help determine the extent to which different populations of Joshua tree are adapted to certain local climate conditions and identify the physiological mechanisms by which Joshua trees tolerate drought and heat stress (Smith et al. 2023). Another effort to identify Joshua tree genes and genetic markers associated with specific climate variables is supported by Revive and Restore, a leading wildlife conservation nonprofit organization, to sequence the whole genome from individual Joshua trees sampled across the range of climates in which the species occurs (Smith et al. 2023).

Once climate-associated genes or genetic markers have been identified, the next step will be genotyping (i.e., analyzing genome sequence data) wild populations of Joshua tree to predict long-term potential of adaptation to warming climates (Smith et al. 2023). Populations identified to have the highest probability of adaptation and survival should be prioritized for conservation (Smith et al. 2023).

5. **Identify high priority areas for protection.** Informed by the results of the four steps described above, the next step will be to identify locations within each population that should have the highest priority for protection (Morelli et al. 2020). Determining whether there are any areas slated for development that contain climate refugia and then taking steps to try to protect these areas will be important (Smith et al. 2023). A Mojave Desert ecoregional assessment (Randall et al. 2010; Parker et al. 2018), which identified conservation value for a large portion of the western Joshua tree range, can also be used to help prioritize conservation lands. Even areas that have been identified as highly degraded may still have conservation value if potential refugia is present (Smith et al. 2023). In addition, some areas that have been identified as ecologically intact may experience severe damage due to climate change and, therefore, may have little long-term conservation value (Smith et al. 2023).

   Identification of high priority areas for protection to further the conservation of western Joshua tree will be completed as needed by CDFW and partners and will be supported by information produced by the research and tribal communities. While it would be ideal to complete steps 1 through 4 before prioritizing areas for protection, CDFW must

begin work to conserve western Joshua tree immediately and must therefore begin initial prioritization of areas for protection based on the best, currently available information. As additional information generated from steps 1 through 4 becomes available, CDFW will incorporate it into decision making and future updates of the Conservation Plan.

An initial land-prioritization scheme guided by Smith et al. (2023) has been developed by CDFW (described in Section 5.2.2) to help identify high priority areas for protection.

6. **Protect priority areas while accommodating compatible existing and emerging land uses.** Informed by the results of step 5, high priority areas should be protected while accommodating existing and emerging land uses that are compatible with the overall western Joshua tree conservation strategy (Henson et al. 2018). This work should be done in collaboration with California Native American tribes, state and federal government agencies, local jurisdictions, nongovernmental organizations (NGOs), the public, and affected businesses and property owners. The Mojave Desert region is the homeland territory of many California Native American tribes and is made up of a diverse patchwork of land owned by tribes, federal, state, and local land ownerships and jurisdictions, including the National Park Service (NPS), the Bureau of Land Management (BLM), the US Forest Service (USFS), as well as state and county reserves (Smith et al. 2023). Focus should be on landscape-scale conservation criteria while also engaging with the public to create broad public support (Smith et al. 2023). CDFW will use the Conservation Fund to conserve priority lands.

7. **Identify other impacts and develop management to mitigate them.** The last step is to identify additional factors beyond climate change that could negatively affect the persistence of western Joshua tree (e.g., invasive species, incompatible recreation, inappropriate fire frequencies) and management efforts, including traditional cultural practices, to mitigate these impacts (Morelli et al. 2020). Other impacts on the persistence of western Joshua tree are identified in Section 4.3, "Key Stressors, Threats, and Conservation Issues," and mitigation approaches for them are presented in Section 5.2.1.

Source: Anna Cirimele, National Park Service.

There are marked challenges with identifying and protecting existing populations that meet all the necessary criteria for conservation. Some scientists have suggested assisted migration (i.e., human-assisted movement of species in response to climate change) as a management strategy for species limited by dispersal ability, such as Joshua tree (Cole et al. 2011; Williams and Dumroese 2013). However, some ecologists have strongly criticized assisted migration for its potential to promote invasive species, spread pathogens, and disrupt ecosystems (Ricciardi and Simberloff 2009). Assisted migration may have a high rate of failure if species or populations are strongly adapted to local conditions that are not present at the introduction site (Vitt et al. 2010). Although assisted migration has been suggested for Joshua trees, Smith et al. (2023) do not advise this method. This is partially due to suspected high costs and logistical planning needed for success, as well as this approach not preserving intact, functional ecosystems. In addition to what is outlined in Smith et al. (2023), given that there are climate refugia modeled within the current range of western Joshua tree (Shryock et al. forthcoming), it would be easier to protect the trees where they are currently growing compared with moving them to new places outside the current range. If assisted migration were employed, these areas could still need protection, the trees could need support to establish new self-sustaining populations, and the presence of tribal cultural monitors and a trained arborist may be encouraged (FIICPI, pers. comm. 2024b). More research is needed on assisted migration for western Joshua tree, which is addressed in Action R&I 1.12, "Investigate Assisted Migration."

Ongoing research and field experiences by public agencies, Tribes, NGOs, and academic institutions will continue to improve the information for western Joshua tree conservation. The Conservation Plan will be reviewed every 2 years, at which time, new information relevant to the Conservation Plan's goals, management actions, and effectiveness criteria will be incorporated to maintain the standard of applying science including TEK to decision-making. If relevant science is published or new information is available in the middle of an update cycle, updated management approaches may be implemented before the next update of the Conservation Plan, at the discretion and recommendation of CDFW.

5.2 MANAGEMENT ACTIONS NECESSARY TO CONSERVE WESTERN JOSHUA TREE

"Our task must be to free ourselves…by widening our circle of compassion to embrace all living creatures and the whole of nature and its beauty"
-Albert Einstein

To achieve the Conservation Plan vision, purpose, and objectives described in Section 1.2, "Conservation Plan Vision, Purpose, and Objectives," five major categories of management actions have been identified: avoidance and minimization, land conservation and management, tribal co-management, research to inform long-term conservation, and education and awareness (Table 5-1). Specific management actions within each of these categories are discussed in more detail below. In addition, Appendix D, "Avoidance and Minimization Best Management Practices and Guidelines" provides detailed guidance for implementing management actions that avoid or minimize adverse impacts on western Joshua tree.

Table 5-1 Management Actions

Management Action Title	Management Action Topic
A&M: Avoidance and Minimization	Avoidance and minimization to lessen negative effects of human activities.
LC&M: Land Conservation and Management	Land conservation and management to protect existing populations and increase abundance.
TCM: Tribal Co-Management	Tribal co-management that reflects California Native American tribes' interests and priorities, improves decision-making, protects existing populations, and increases abundance.
R&I: Research to Inform Long-Term Conservation	Research to inform long-term conservation and improve decision-making.
E&A: Education and Awareness	Education and awareness to increases public support and lessen the negative effects of human activities.

5.2.1 Impact Avoidance and Minimization

The first priority for conservation of western Joshua tree and its habitat is to avoid adverse impacts altogether. Although climate change stress may be impossible to avoid in the short-term, other impacts are avoidable, such as project-related degradation and destruction of habitat. Impact avoidance should be emphasized as the first preferred choice whenever feasible, especially in areas identified as climate refugia. Furthermore, the importance of avoiding take to western Joshua tree and its habitat has been emphasized during discussions with Tribes, in particular the principle of not harming a tree unless it is absolutely critical for people (FIICPI, pers comm., 2024b).

When complete avoidance cannot be achieved, efforts should be made to minimize impacts on western Joshua tree and its habitat, and the presence of tribal cultural monitors and a trained arborist to minimize these impacts are encouraged (FIICPI, pers. comm., 2024a). Minimization may include efforts to reduce the number of trees and seeds taken; the area of habitat that is lost or degraded; the severity of impacts on individual trees; impacts on other organisms on which western Joshua tree depends; and indirect impacts on trees, seeds, habitats, and other ecologically related organisms.

The avoidance and minimization actions in this section could be voluntarily adopted and implemented by project proponents and land managers, incorporated into project approvals by local governments and regulatory agencies, or incorporated into voluntary, cooperative agreements between relevant agencies, organizations, and other parties. The Western Joshua Tree Conservation Act (WJTCA) requires the avoidance and minimization of impacts on western Joshua tree to the maximum extent practicable as a condition of obtaining a WJTCA incidental take permit (ITP) (Fish & G. Code, § 1927.3, subd. (a)(2)). WJTCA also states that the Conservation Plan shall include guidance for the avoidance and minimization of impacts on western Joshua trees and protocols for the successful relocation of western Joshua trees (Fish & G. Code, § 1927.6, subd. (a)).

The impact avoidance and minimization (A&M) management actions listed in this chapter are intended to promote the survival of existing western Joshua trees and the protection of their habitat where they could potentially be harmed by development, human activities, and natural hazards. Impacts on western Joshua trees could occur from urban development, infrastructure construction, resource extraction, damage by people and vehicles, and other forms of landscape alteration (see Section 4.3). When these activities affect the root systems or the seedbanks of western Joshua tree, the survival of populations can be compromised.

MANAGEMENT ACTION A&M 1: AVOID DIRECT AND INDIRECT IMPACTS

When landscape-altering projects occur near western Joshua trees, avoidance buffers should be established to avoid direct impacts on aboveground and belowground western Joshua tree parts and their seedbank. Scientific information on western Joshua tree root ball width, root zone width, and seedbank width was used to inform direct impact avoidance buffers. Direct impact buffers for avoidance should apply to ground-disturbing activities, such as construction and resource extraction, fire control and suppression, and any other actions that could harm or kill western Joshua trees or seeds. The following actions provide activity-specific guidance for direct impact avoidance.

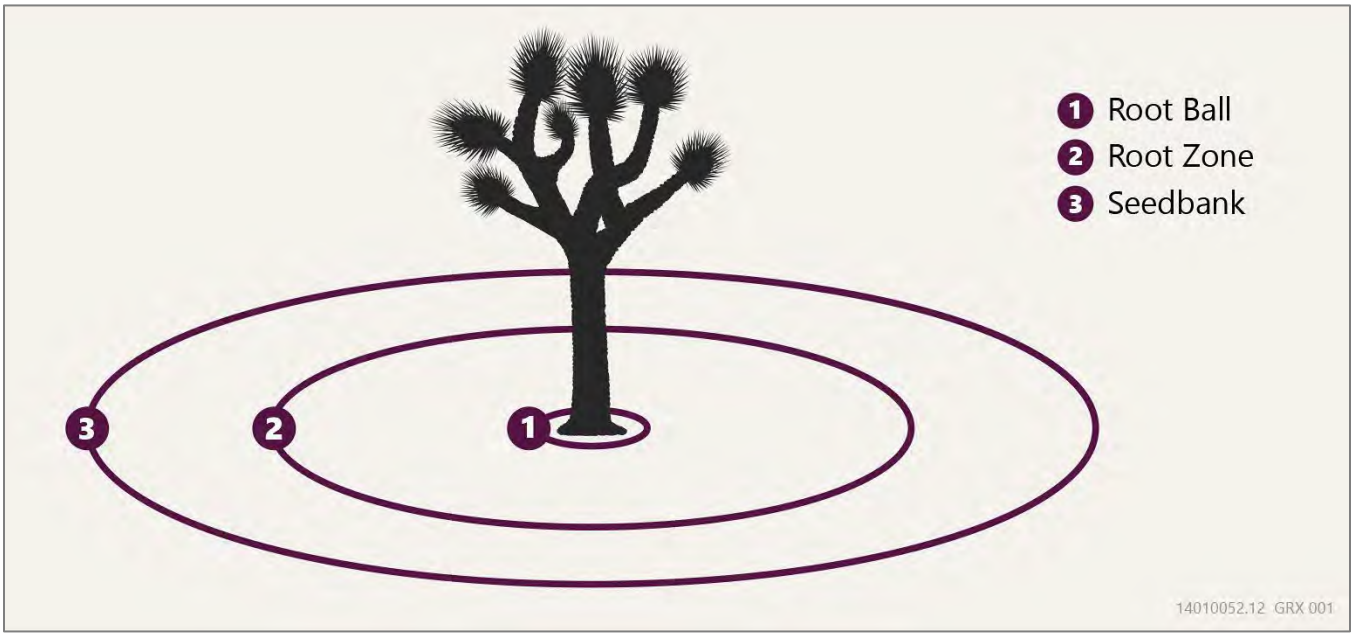
Action A&M 1.1: Retain Healthy Trees

Project proponents (e.g., private and public entities) or agencies (e.g., local, state, and federal agencies) should prioritize retaining healthy western Joshua trees in place when planning a project. Mature/reproductive western Joshua trees in good condition, western Joshua trees in areas within and adjacent to contiguous suitable habitat, and western Joshua trees in habitat that is prioritized as having high value for conservation should be prioritized for retention in place. Signs a tree is healthy may include 60 percent or more living branches, minimal pest damage, recent unrestricted hard growth, recent flowering, and strong tree vigor (see Appendix E, "Relocation Guidelines and Protocols").

Action A&M 1.2: Implement Avoidance Buffers

When activities occur in the vicinity of western Joshua trees, project proponents, land managers, and agencies should implement buffers around western Joshua trees to avoid direct impacts (see Figure 5-1). In accordance with western Joshua tree primary seed dispersal distances, root growth, and salvage techniques, CDFW recommends buffers to avoid impacts for certain activities. The recommended minimum buffers for ground disturbance are:

- 56.7 meters (186 feet) from the base of a mature (i.e., sexually reproductive) western Joshua tree to avoid impacts on the primary seed dispersal zone,
- 15 meters (50 feet) from the base of a western Joshua tree 1 meter or greater in height or 7.5 meters (25 feet) from a western Joshua tree less than 1 meter (3.3 feet) in height to avoid damage to the root zone, and
- 0.61 meters (2 feet) from the base of a western Joshua tree 1 meter or greater in height or 0.3 meters (1 foot) less than 1 meter (3.3 feet) in height to avoid impacts on the root ball (i.e., the mass of soil that contains concentrated roots growing from the base of the stem of a western Joshua tree).



Note: Graphical representation of buffer zones (not to scale).

Source: Compiled by Ascent in 2024.

Figure 5-1 Western Joshua Tree Buffer Zones

These recommended buffers may be adjusted based on project-specific information and impacts. Additional information to consider when determining a buffer may include, but is not limited to:

- Density of trees within each project site as provided by the project census or other biological survey information.
- Location of a tree in relation to existing structures, such as fences, driveways, or other permanent structures.
- Intensity of proposed ground-disturbing activities (e.g., trenching and excavation impacts may be different than installing fencing).
- Duration of proposed impacts (temporary or permanent).
- Additional minimization measures to reduce impacts of buffer encroachment (e.g., supplemental watering, protecting roots and trees from access, or avoiding equipment damage, etc.).
- Geographic location (e.g., Is the project located in an urban area or within targeted climate refugia?).
- Life stage of tree, including reproductive stage. Branched trees are more likely to have produced seed and may have more extensive root structures.

Disturbances outside of these buffers are less likely to negatively affect the health and survival of the tree or its seeds. CDFW will continue to review the science including TEK on western Joshua tree during implementation of the Conservation Plan and update impact avoidance buffers as appropriate.

Action A&M 1.3: Avoid Impacts during Pesticide Application

Project proponents, landowners, land managers, and agencies should not apply pesticides on western Joshua trees and should implement best management practices that avoid pesticide drift onto western Joshua trees, nontarget native vegetation (e.g., nurse plants), pollinators, and seed-dispersing rodents. See Action A&M 1.3.1, "Avoid Impacts during Pesticide Application" in Appendix D for recommended best management practices related to this Action.

Action A&M 1.4: Avoid Impacts Related to Unauthorized Vehicle Use

Land managers should implement measures to prohibit unauthorized off-highway vehicle (OHV) and other vehicle use off designated trails in western Joshua tree habitat, such as by closing areas outside of designated routes with signage, vertical mulching, or installing other barriers. On public lands authorized for open, overland OHV recreation within western Joshua tree habitat, vehicle use rules should be modified to restrict travel to existing designated trails.

Action A&M 1.5: Avoid Impacts from Overgrazing

Land managers and regulatory agencies should prohibit grazing activities within western Joshua tree habitat if grazing is causing adverse effects. This can be accomplished by not renewing existing grazing leases, excluding portions of allotments with western Joshua trees, and installing property fences to avoid free range or trespass grazing. Feral, nonnative grazing animals (e.g., burros, horses) should be removed or relocated from western Joshua tree habitat. However, targeted grazing by prescribed herbivory may be useful to reduce annual invasive species (see Action A&M 2.7, "Minimize Impacts from Grazing Activities," and Appendix D, Action A&M 3.5.1, "Implement Fuel Treatments") (Berryman et al. 2023).

MANAGEMENT ACTION A&M 2: MINIMIZE DIRECT AND INDIRECT IMPACTS

If avoidance is not feasible, direct and indirect impacts on western Joshua tree and its habitat should be minimized. When landscape-altering projects occur near western Joshua trees, effort should be made to minimize direct impacts on western Joshua tree. The following actions provide activity-specific guidance for direct impact minimization.

Action A&M 2.1: Minimize Impacts from Climate Change

Climate change is a significant threat to western Joshua tree. All entities, including governments, businesses, and individuals should reduce greenhouse gas emissions to help minimize the impacts of climate change on species (IPCC 2023).

Action A&M 2.2: Minimize Impacts on Occupied Western Joshua Tree Habitat

Landowners, developers, and land managers should minimize the area of western Joshua tree habitat that is directly affected by their activities, and minimize the number of trees that are taken or harmed. Minimization of habitat disturbance should include minimizing impacts on areas with nurse plants and minimizing disruption of the movements of small mammal seed dispersers (e.g., not using rodent barrier fencing). Western Joshua tree habitat that is in good condition, in ecologically core or intact areas, and within predicted climate refugia should be prioritized first for avoidance and conservation, but if this avoidance is not feasible, impacts on these areas should be minimized to the maximum extent possible. The importance of minimizing harm to western Joshua trees and their habitat has been emphasized during discussions with Tribes. It is important for trained tribal cultural monitors to be present during destruction or removal of western Joshua trees to provide cultural protection of trees and respect ancestral lands (FIICPI, pers. comm., 2024b).

Action A&M 2.3: Relocate Trees

Western Joshua trees should be relocated when project proponents, landowners, developers, and land managers are unable to retain trees in place or when there is a high probability of substantially damaging or lethal impacts occurring to a retained tree. Project proponents, landowners, land managers, and agencies should follow the Western Joshua Tree Relocation Guidelines and Protocols provided by CDFW (presented in Appendix E) when determining whether a tree should be relocated or not. Appendix E also provides a detailed protocol for conducting tree relocations, including recommendations for selecting relocation areas,

consideration of maintaining genetic integrity of healthy receiver western Joshua tree populations, methods for physically relocating the tree, types of relocation, and maintenance and monitoring standards. It is important for trained tribal cultural monitors to be present during transplantation of western Joshua trees to provide cultural protection of trees and ensure proper removal methods are followed (FIICPI pers comm 2024b).

Action A&M 2.4: Collect and Store Seeds

Collection and long-term storage of viable western Joshua tree seeds can preserve local genetic diversity and therefore can help minimize the loss of western Joshua tree diversity from project activities. In addition, seeds kept in long-term conservation storage can provide source material for restoration of existing habitat or outplanting to other viable locations (such as climate refugia) and can be used to inform conservation, including targeting locations for conservation nurseries. Seed collection and storage activities should follow Center for Plant Conservation's *CPC Best Conservation Practices to Support Species Survival in the Wild* (CPC 2019) or other accepted standards, and seed collection and storage may be a required minimization measure in western Joshua tree incidental take permits issued by CDFW. CDFW may provide additional specific guidelines and methods for using western Joshua tree seed collection as a minimization measure in the future and update recommendations in the Conservation Plan if necessary.

Action A&M 2.5: Minimize Impacts from Invasive Plants

Project proponents, landowners, land managers, and agencies should implement best management practices to prevent the spread of invasive plants (Cal-IPC 2012) for all activities that have the potential to spread invasive species in western Joshua tree habitat. These activities include but are not limited to construction, resource extraction, OHV use, outdoor recreation, fire control and suppression, fuel treatment implementation, and grazing. See Appendix D, Action A&M 2.5.1, "Minimize Impacts from Invasive Plants" for best management practices.

Action A&M 2.6: Minimize Impacts during Pesticide Application

Project proponents, landowners, land managers, and agencies should implement best management practices that minimize pesticide drift or other inadvertent contact affecting western Joshua trees and other nontarget native vegetation (e.g., nurse plants) (see Appendix D, Action A&M 2.6.1, "Minimize Impacts during Pesticide Application").

Action A&M 2.7: Minimize Impacts from Grazing Activities

When grazing is adversely affecting western Joshua tree, landowners, land managers, and grazing practitioners should decrease grazing intensity when complete avoidance is not feasible (see Action A&M 1.5, "Avoid Impacts from Overgrazing"). Guidance to minimize the

impact of grazing can include implementing rotational grazing, lowering stocking rates and the allowable annual forage utilization rate, implementing short grazing periods for herds and long post-recovery (i.e., rest) periods, and retaining sufficient litter and plant cover to protect the soil from erosion and allow plant regrowth. In areas where western Joshua trees are recovering from wildland fire, grazing should be suspended to allow resprouts and seedlings to establish (See Appendix D, Action A&M 3.3.1, "Minimize Impacts from Postfire Rehabilitation"). In addition, incompatible land uses, such as livestock grazing, should be addressed through the restoration design (see Action L&M 4.3, "Develop and Implement Restoration/Enhancement Plans"). Land managers and project proponents should consult with CDFW prior to implementing prescribed grazing to ensure potential impacts including but not limited to disease transfer to special-status species, including bighorn sheep, are avoided.

Action A&M 2.8: Minimize Impacts from OHV Use and Outdoor Recreation

On public lands where OHV recreation is allowed, land managers should restrict OHV use to designated roads and trails. If new trails are developed, they should avoid western Joshua tree populations. Land managers should encourage responsible OHV use behaviors through continued implementation of education programs to minimize damage to western Joshua tree root systems, nurse plants, and seedbanks. Education programs should emphasize practice and principles for responsible outdoor recreation, such as those provided by Tread Lightly (Tread Lightly 2024) and other organizations.

MANAGEMENT ACTION A&M 3: MINIMIZE IMPACTS FROM WILDLAND FIRE AND FIRE MANAGEMENT

Wildland fire is a significant threat to western Joshua tree, but efforts to reduce wildland fire risks, fight active wildland fires, and restore landscapes after fires can also damage western Joshua trees and their habitat. This management action includes activities to minimize impacts on western Joshua tree from wildland fire, and from fire risk reduction, suppression, and postfire restoration activities. Wildland fire is unpredictable; however, planned activities for responding to wildland fire events can effectively minimize impacts on western Joshua tree habitat.

Action A&M 3.1: Fight Active Wildland Fires

Land managers and wildland fire responders should aggressively fight and contain active wildland fires in or near western Joshua tree habitat to protect the habitat, minimize loss of western Joshua trees, and sustain western Joshua tree habitat values.

Action A&M 3.2: Minimize Impacts from Fire Suppression

Bulldozer, firefighter, and fire engine conducting fire suppression efforts on the Elk Fire in 2024
Source: Hannah Schwalbe, National Park Service.

To minimize impacts on western Joshua trees and their habitats caused by wildland fire suppression response, when it does not threaten the safety of firefighters, the public, or important infrastructure, land managers and wildland fire responders should minimize direct and indirect tree damage or removal, ground disturbance in western Joshua tree habitat, and degradation of habitat values from fire suppression and control activities. Minimum Impact Suppression Techniques (MIST) and best management practices are provided in Appendix D, Action A&M 3.2.1, "Minimize Impacts from Fire Suppression." Examples of best practices for wildland fire response include using preexisting fuel breaks as fire lines and stopping all habitat-damaging tactics as soon as they are no longer required.

Action A&M 3.3: Minimize Impacts from Postfire Rehabilitation

Land managers should minimize direct impacts on western Joshua trees after a wildland fire by developing and implementing measures when rehabilitating burned areas. A postfire monitoring plan should include measures to protect existing western Joshua trees, replant western Joshua trees using appropriate seed sources if they no longer exist, replant other native species, control invasive plants, and protect exposed soil as part of plans for landscape revegetation. Appendix D, Action A&M 3.3.1, "Minimize Impacts from Postfire Rehabilitation" contains specific elements to include in a postfire monitoring and control plan.

Action A&M 3.4: Minimize Accidental Ignition of Fires

Best management practices should reduce the potential for accidental ignition of wildland fires and be implemented during construction, outdoor recreation activities, operation and maintenance of infrastructure, and other activities involving overland use of motorized vehicles or mechanical equipment. Fire extinguishers, backpack sprayers, water trailers, or water tenders equipped with hoses should be available to suppress accidental ignitions during hot, dry, or windy conditions. To reduce the potential sources of ignition that may accidentally burn vegetation, best management practices should be implemented as described in Appendix D, Action A&M 3.4.1, "Minimize Accidental Ignition of Fires."

Action A&M 3.5: Implement Fuel Treatments

Fuel treatments in the vicinity of western Joshua trees could be conducted when appropriate, such as when high fuel loads are present (e.g., invasive plants) or when an area has burned more frequently than the natural fire return interval.

Land managers should develop and implement measures to avoid and minimize direct impacts on western Joshua trees during fuel treatment for wildland fire risk reduction. Several types of fuel treatments that could be implemented in western Joshua tree habitat include fuel breaks, treatments in the wildland-urban interface, and treatments focused on removing invasive species and restoring areas to the natural fire regime (i.e., ecological restoration). Fuel breaks (areas cleared of vegetation or graded as a fuel treatment in anticipation of a fire) have been found to be ineffective at containing wildland fire under certain circumstances, for example high winds (Syphard et al. 2011; Oliveira et al. 2016), but they are useful for firefighter access (Syphard et al. 2011). Treatments in the wildland-urban interface "consist of strategic removal of vegetation to prevent or slow the spread of non-wind driven wildland fire between structures and wildlands, and vice versa" (California Board of Forestry and Fire Protection 2019). Fuel treatments designed for ecological restoration are intended to restore "degraded, damaged, or destroyed ecosystems and habitats to conditions associated with a natural fire regime" and may be implemented in areas where invasive species such as red brome (*Bromus rubens*), cheatgrass (*Bromus tectorum*), Sahara mustard (*Brassica tournefortii*), stinknet (*Oncosiphon pilulifer*), Russian-thistle (*Salsola tragus*), or red-stemmed filaree (*Erodium cicutarium*) or dead, woody debris have increased in cover and have resulted in a shift in the fire regime (Brooks and Minnich 2018; Cal-IPC 2024). Additional guidance to avoid and minimize impacts on western Joshua tree and its habitat during fuel treatments can be found in Appendix D, Action A&M 3.5.1 "Implement Fuel Treatments."

5.2.2 Land Conservation and Management

With climate change as a primary threat to western Joshua tree, protecting and managing lands that are occupied by the species and predicted to be climate refugia are high priorities for conserving the species. Managing climate change refugia and maintaining ecological functions necessary for western Joshua tree survival also allows time for natural systems to adapt and for humans to develop longer-term solutions for conservation (Peterson et al. 2011).

The goal of land conservation is to permanently protect western Joshua tree habitat from development and other incompatible human uses. Conserving lands before habitat degradation and destruction occur is a critical first step toward ensuring the land remains occupied by and suitable for western Joshua tree in the future.

The goal of land management is to create and maintain environmental conditions on conserved land that promote viable populations of western Joshua trees and their habitat. The threats from climate change, wildland fire, invasive species, and other human activities may still be present after land is permanently protected from development. Land management will be necessary to avoid, minimize, and remediate these threats on a long-term basis to ensure that conserved lands continue to support sustained populations of western Joshua trees and the natural processes on which they depend.

Land conservation and management actions have been developed with principles of conservation biology in mind and will be a critical component in achieving the goals of the Conservation Plan.

MANAGEMENT ACTION LC&M 1: IDENTIFY PRIORITY CONSERVATION LANDS

With finite resources available for conservation efforts, CDFW will define criteria for prioritizing lands that are most suited to the persistence of western Joshua tree. The criteria will help guide agencies, NGOs, Tribes, and others in protecting conservation land. Smith et al. (2023) suggest that western Joshua tree conservation efforts focus on protecting populations that meet criteria for resiliency to climate change and that have demographic signatures of long-term viability. Protecting lands that are already occupied by western Joshua tree should also be prioritized because establishing populations of western Joshua tree in new areas is extremely challenging, sometimes controversial, and costly with a high risk of failure.

Smith et al. (2023) recommend the following four steps (which are summarized further in Section 5.1 under the seven-step approach to conservation) for identifying locations within western Joshua tree populations that should have highest priority for protection:

1. Identify genetic structure and distinct populations.
2. Develop species distribution models for these populations using high-quality occurrence data to identify climate refugia.
3. Validate potential refugia using demographic studies and other independent data sources.
4. Assess adaptive genetic variation within populations, using either association genetics or, ideally, experimental approaches coupled with genomic data.

Detailed information on the genetic structure, distinct populations, and the adaptive genetic variation of western Joshua tree is not currently known. A species distribution model for western Joshua tree using high-quality occurrence data was developed by Esque et al. (2023) and has been applied to a model developed to identify western Joshua tree climate refugia range-

wide (Shryock et al. forthcoming). Categories of climate refugia based on these data (described in Section 4.4, "Management Units") were used to help identify priority conservation lands. Detailed range-wide data from western Joshua tree demographic studies to validate potential refugia are not yet available but will be incorporated into the Conservation Plan in the future.

The intactness of ecosystems is an important predictor of ecosystem function and overall conservation value. Ecosystems that are more intact are better equipped to support western Joshua tree habitat functions and are essential for maintaining the species in the future. Parker et al. (2018) updated the ecological assessment conducted by Randall et al. (2010) and assessed the conservation value of areas that overlap western Joshua tree's range as part of an assessment of the impacts of solar and wind development in two locations in California. This assessment was conducted on a coarse scale—2.59 square kilometers (1 square mile) hexagons—based on 2017 conditions. Parker et al. (2018) assigned each hexagon one of the following four conservation values (in order of decreasing value) from the Randall et al. (2010) framework: ecologically core, ecologically intact, moderately degraded, and highly converted.

Young western Joshua trees growing at high elevation of 5,817 feet

Source: Michael Faist, National Park Service.

As a range-wide strategy, CDFW will apply conservation priority to the areas identified as climate refugia (comprising categories of predicted and buffered climate refugia, and unoccupied future suitable habitat; see Section 4.4) or assigned conservation values of ecologically core or intact, recognizing they will be the areas most valuable for western Joshua tree in the future. Areas of climate refugia that are moderately degraded may also be valuable for western Joshua tree in the future. Additional information on climate refugia and ecological intactness is in Section 4.4.

On a local scale, CDFW will identify priority conservation lands based on the best available site data relevant to western Joshua tree's ecological needs for long-term viability. Available information will be analyzed initially, and additional information will be collected to properly assess the relative conservation value of the evaluated lands.

Synthesizing the characteristics of land with the highest conservation value for western Joshua tree, priority conservation lands should possess all or at least some of the following attributes:

- A large area occupied by western Joshua tree.
- A high density of reproductive adult individuals.
- Presence within predicted climate refugia.
- A high recruitment rate.
- Presence of pollinator moths, nurse plants, and small mammal seed dispersers.
- Low risk of stressors from adjacent land use (e.g., fire ignition risk, invasive species encroachment, OHV-related damage, planned development; disturbance from high-traffic roads).
- High-value lands that currently have little to no protection.
- Good overall tree health within populations (e.g., few signs of pests, damage, exposed roots, or health problems; higher vigor; trees and limbs upright).
- Large patch size (low perimeter-to-edge ratio) and connectivity to other areas occupied by western Joshua tree.
- Connectivity to climate refugia, such as landscape connections across elevation gradients and ecological transition zones (e.g., where desert communities transition to montane communities of the Sierra Nevada and Transverse ranges [Randall et al. 2010] and between the Mojave Desert and Great Basin).
- Genetically distinct populations with adaptive genetic diversity.

A weighted scoring system is useful for evaluating and prioritizing potential conservation lands. CDFW has used the preliminary lands assessment criteria (presented in Appendix F, "Conservation Lands Prioritization Assessment") as an initial tool to help focus Conservation Fund expenditures on the acquisition and protection of lands with the greatest western Joshua tree conservation value. CDFW will update or revise this tool as needed in the future based on new information and data.

MANAGEMENT ACTION LC&M 2: PROTECT PRIORITY CONSERVATION LANDS

CDFW will apply a multifaceted approach to safeguard conservation lands supporting western Joshua trees on a local scale and within predicted climate refugia range-wide. Protection of areas identified as priority conservation lands is particularly important to achieve the goals of this Conservation Plan, but any lands supporting western Joshua tree may contribute to the conservation of the species. Strategies for land conservation may include designations by state, federal, local, and tribal governments (e.g., designated parks, preserves, monuments, conservation areas, and wilderness areas); protection of lands for conservation by NGOs; acquisition of fee title or conservation easement; and implementation of interagency agreements or written memoranda of understanding (MOUs). Durable legal protection mechanisms are described further in Chapter 6, "Implementation."

Action LC&M 2.1: Implement Priority Conservation Land Protection

Lands identified through Management Action LC&M 1, "Identify Priority Conservation Lands," as high priority for western Joshua tree conservation could be protected through the following implementation approaches:

- Establishment of a State Parks Natural Reserve or Natural Preserve within a State Park or State Recreation Area, CDFW Ecological Reserve, and conserved land under state conservancies or Resource Conservation District land protection programs.
- Purchase or lease of State School Lands from the California State Lands Commission for western Joshua tree conservation purposes.
- Conservation of other state lands through written MOUs or other collaboration agreements with CDFW.
- Designation of national monuments, federal conservation areas, wilderness areas, national parks, and other federal protections.
- Conservation of other federal lands through interagency agreements or written memoranda of understanding and other mechanisms in coordination with US Fish and Wildlife Service (USFWS) (see example agreements in Section 2.2.2, "Federal Listing Status").

- Acquisition of land by governments, Tribes, or NGOs from willing sellers through fee title or conservation easement acquisition.
- Establishment of conservation easements cooperatively by landowners.
- Written MOUs for conservation on tribal land.
- Establishment and protection of public open space, parks, or/and preserves by local agencies.

Action LC&M 2.2: Track Progress of Conserved Lands

Regardless of the land protection approaches used, a central tracking system for conserved lands should be maintained by CDFW to track progress in protecting priority conservation lands. The system should use a geographic information system to document locations of protected lands in relation to western Joshua tree's distribution and priority conservation lands identified under Management Action LC&M 1, "Identify Priority Conservation Lands."

MANAGEMENT ACTION LC&M 3: MANAGE CONSERVATION LANDS

Long-term management of conservation lands should be carried out to support western Joshua tree populations and habitat. Land management activities, such as invasive species control, fuel break maintenance, fence repair, garbage removal, monitoring and adaptive management, and law enforcement, are often required to avoid, minimize, and remediate ongoing and persistent threats. Land management is particularly important for priority conservation lands at high risk from wildland fire, invasive species, ongoing and adjacent land use, and illegal or trespass activities. Land management is an important action for maintaining the natural processes western Joshua tree needs in its habitat. TEK would help define beneficial land management practices for western Joshua tree, as discussed in Section 5.2.3, below.

Source: Anna Cirimele, National Park Service.

Management of federal and state lands is typically the responsibility of an agency, with resources allocated based on the budget and priorities of the agency in compliance with its laws and regulations. Although some agencies allocate resources with biodiversity conservation in mind, land use policies or mandates may conflict with conservation priorities and can negatively affect biodiversity. Even if conservation is a priority, agency resources may be limited to implement land management for the benefit of western Joshua tree.

Action LC&M 3.1: Develop Long-Term Plan for Conservation Lands

Landowners, land managers, and agencies should develop management and long-term monitoring plans to promote long-term persistence of western Joshua tree on conservation lands. These plans should describe how the land will be managed to maintain habitat function and minimize or remediate threats to western Joshua tree. CDFW will work with land managers to develop long-term monitoring and management plans or conservation easement stewardship agreements for conserved lands.

Land management plans should be tailored to the needs of individual properties based on site evaluations. Management priorities may include invasive species control, wildland fire risk reduction, cultural burning, restoring degraded areas, and measures to reduce threats from adjacent land uses or to prevent trespassing and unauthorized uses. Monitoring for adaptive management should be incorporated into plans to track the condition of western Joshua trees and other habitat characteristics. Management actions or alternative management approaches should then be implemented, if necessary, based on monitoring results.

Management should emphasize protecting priority conservation lands from wildland fire where fire risk to western Joshua tree populations is high. Maintenance of existing fuel breaks and establishment of new low-impact fuel breaks may be effective approaches to protecting western Joshua tree populations from wildland fire damage. Existing roads and other infrastructure should be maintained as fuel breaks to the extent feasible and effective.

Action LC&M 3.2: Prioritize Management of State and Federal Lands for Western Joshua Tree

Approximately 2 and 63 percent of the western Joshua tree range in California are on state and federal lands, respectively. Therefore, CDFW will seek to establish written MOUs or other written agreements with state and federal agencies for long-term monitoring and management to benefit western Joshua tree on priority conservation lands. Approximately 28 percent of these lands are within predicted climate refugia, which increases the importance of managing these lands to conserve western Joshua tree.

Action LC&M 3.3: Establish Endowments and Provide Other Long-Term Funding Mechanisms for Management of Conservation Lands

Funding for long-term land management is necessary to ensure that critical monitoring and management activities of conservation lands are implemented. Funding may be provided with endowments, annual budgets, grants, use of the Conservation Fund, or other mechanisms applicable to the land management agency, organization, or California Native American tribe.

MANAGEMENT ACTION LC&M 4: RESTORE AND ENHANCE HABITAT

Restoration of damaged or degraded lands and enhancement of lands to help support western Joshua tree can aid in the conservation of the species. Given that desert ecosystems are slow to recover after disturbance, active restoration can be a valuable tool for increasing ecosystem recovery and improving habitat suitability for western Joshua tree (Abella et al. 2023).

Habitat restoration is the holistic process of reestablishing ecological function and repairing characteristics of a site to return it to a condition that is self-sustaining. Realizing self-sustaining habitat may be achieved under the care of Tribes and/or by aiming to re-create conditions that existed before it was damaged or degraded by natural or human disturbances post-colonization. Restoration actions may include reconstructing natural topography or other physical characteristics of the land, rehabilitating compacted soils, removing invasive plants, and replanting native vegetation. Examples of habitat restoration include replanting western Johua trees and associated native plants on a site where these species were destroyed by wildland fire and reestablishing natural topography where OHV use created rills and gullies (Abella et al. 2023). In some circumstances, restoring moderately or highly degraded lands occupied by western Joshua tree can provide conservation value for the species overall. Restoration is especially valuable where ecologically core or ecologically intact lands are not available, or where degraded or converted lands are within or connected to predicted climate refugia.

Habitat enhancement involves the modification of certain characteristics of a site with the goal of increasing specific habitat functions based on management objectives, such as increasing habitat suitability for a particular species (Vaughn et al. 2010). An example of habitat enhancement is vertical mulching a site occupied by western Joshua tree that is lacking sufficient nurse plants to support western Joshua tree recruitment. Another example is implementing projects that use science-based, assisted gene flow methods to introduce climate-adapted genes into stands of western Joshua trees to enhance their capacity for climate adaptation and resilience, provided there is sufficient scientific justification to do so. Habitat enhancement may be appropriate on some ecologically core or ecologically intact conservation lands, such as those that are within predicted climate refugia. Enhancement may also be beneficial on sites that support populations with advantageous genetic traits,

such as climate resilience adaptations, to increase seed production or recruitment within those populations.

Land managers should use a comprehensive restoration approach to return ecosystem functions to degraded sites, or to enhance a site's resilience, ecological function, and ability to recruit western Joshua trees. Where appropriate, funds from the Western Joshua Tree Conservation Fund could be used for restoration efforts on strategically located habitats that have been degraded by fire, invasive plants, development, grazing, unauthorized OHV use, or other disturbances.

Action LC&M 4.1 Identify Priority Restoration Areas

Western Joshua tree habitat of high conservation value that is damaged by wildland fire or other stressors should have priority for restoration. Habitat of high conservation value includes sites within or connected to predicted climate refugia and other priority conservation areas as determined through implementation of Management Action LC&M 1, "Identify Priority Conservation Lands." Other priority restoration sites should be selected based on predicted climate refugia areas where research indicates climate-adapted individuals are already found growing. Other factors to consider when evaluating lands for restoration potential include adjacent land uses, western Joshua tree cover and demography, seed sources or presence of a seedbank, soil condition, absence of invasive plant infestation, condition of topsoil, presence of biotic soil crusts, and availability of nurse plants.

Action LC&M 4.2 Identify Priority Enhancement Areas

Enhancement should be implemented to improve ecosystem processes on sites already occupied by western Joshua tree to increase recruitment and population resilience. Enhancement projects would be focused on relatively undisturbed areas to ecologically improve western Joshua tree habitats on priority conservation lands. Enhancement activities should be focused on sites that are situated in predicted climate refugia or other priority conservation areas where natural processes or habitat functions could be improved for a specific conservation objective, and where enhancement projects will clearly result in an overall net improvement in ecosystem processes for western Joshua tree and its habitat. The following are examples of enhancement for conservation objectives:

- Assist the natural regeneration of western Joshua trees and nurse plants.
- Introduce climate-adapted genes in populations through assisted gene flow methods, such as translocating individuals and outplanting nursery stock.
- Irrigate during drought periods.
- Improve regeneration by introducing yucca moth pollinators.

Action LC&M 4.3: Develop and Implement Restoration/Enhancement Plans

Once a site is identified for a restoration or enhancement project, a detailed design plan for implementing the project should be developed. The design plan should incorporate clear, explicit, and measurable goals based on current baseline potential and site conditions before disturbance. The design plan should include a summary of the site's existing habitat conditions, a description of habitat features required for western Joshua tree persistence, quantitative metrics to define goals and measure success, a monitoring and management plan, an undisturbed reference site to compare with the restoration or enhancement site to help evaluate success, an estimate of the project's cost, and review of the design plan by a qualified desert restoration specialist.

Joshua tree habitat restoration site managed by Mojave Desert Land Trust.

Source: Jessie Quinn, Ascent

The steps to implementing enhancement activities should be site specific depending on management goals; however, any potential restoration action on a disturbed site could likely be implemented on a relatively undisturbed site to improve natural processes, habitat functions, or climate resiliency for western Joshua tree.

Typical restoration or enhancement goals for western Joshua tree habitat include increasing western Johsua tree recruitment; increasing cover of native plant species, especially native shrubs; reducing competition from invasive annual plant cover; and stabilizing and repairing soils including soil microbiomes (biocrusts). Typical challenges to achieving restoration or enhancement goals in desert ecosystems include low and unpredictable precipitation; hot, dry summers; infertile, shallow, or damaged soils; intensive herbivory when other forage plants are limited; limited availability of plant resources for revegetating restoration sites; and competition from invasive plants (Abella et al. 2023). The restoration or enhancement design plan should identify methods to address these challenges.

Modified and disturbed habitats often have little or no remaining cover of live western Joshua trees and native associate plants and therefore require active planting as an element of restoration. These sites must be revegetated with western Joshua tree and nurse plant species. Depending on the needs of the site, availability of plant and seed sources, and funding availability, revegetation may use a combination of these methods: outplanting appropriate

nursery stock, salvaging and transplanting from other sites, planting cuttings from plants, and seeding. Ideally, this would include planting western Joshua tree seedlings grown from seeds that are collected from individuals genetically adapted to similar site conditions, from the same general geography, and from individuals with climate adaptive traits. Where necessary and feasible for vegetation establishment, all plantings of western Joshua tree and nurse plants should be caged to prevent damage from herbivory, and supplemental irrigation should be provided. Assisted natural regeneration of western Joshua trees and nurse plants may be an appropriate element of restoration to promote their growth and establishment, which might include tree shelters, removal of competing invasive vegetation, and other techniques based on science including TEK.

Disturbed lands often have degraded soils and may require soil rehabilitation before revegetation. Soil conditions should be evaluated before beginning revegetation, and a strategy for improving soil suitability for western Joshua tree establishment should be incorporated into the restoration design plan as necessary. Soil rehabilitation techniques may include decompaction, roughening soil surfaces, replacing topsoil, and inoculating soil with associated beneficial microorganisms (e.g., arbuscular mycorrhizal fungi).

Active restoration of biotic soil crusts (biocrusts) can be an important part of returning degraded sites to conditions favorable for western Joshua tree by limiting soil erosion, increasing soil organic matter and nutrients, facilitating native plant seed germination, and limiting invasive plant establishment. Arbuscular mycorrhizal fungi live in the soil and form mutualistic symbiosis with plant roots that facilitate nutrients to roots, increase drought tolerance by increasing water uptake in roots, and may increase resistance to soil pathogens. As new research improves understanding of biocrust restoration and arbuscular mycorrhizal fungi associations with western Joshua tree, strategies in restoration plans should be updated and refined.

Vertical mulching consists of placing dead plant material upright into the ground to provide vertical structure that replicates some functions provided by nurse plants, such as shading, trapping windblown sand and seeds, and moisture retention. If appropriate for the site, this technique can be implemented to reduce erosion, discourage vehicle or foot traffic, and facilitate the establishment of western Joshua tree and native shrub seedlings (Abella et al. 2023).

Climate change is predicted to make the region hotter for longer periods of the year and increase the occurrence of droughts, variable precipitation, and intensity of heavy precipitation events; therefore, reducing as many other threats and stressors as possible will increase the likelihood of restoration success (Abella et al. 2023). Anything that degrades the habitat value for western Joshua tree, such as invasive plants, incompatible land uses (e.g., livestock grazing, OHV use), erosion, and wildland fire (e.g., fuel breaks around the restoration site) should be addressed through the restoration design. If appropriate and feasible,

restoration sites should be fenced to prevent human activities (e.g., foot traffic, OHV use, cattle grazing, illegal dumping) from influencing restoration success.

Restoration or enhancement activities should include conducting an invasive species assessment of the site, including mapping infestations. Then, if appropriate, invasive species control should be conducted, using targeted herbicides (e.g., indaziflam) or other treatment methods appropriate for target species, early in the growing season before restoration occurs, as well as for maintenance (see Action A&M 2.6, "Minimize Impacts during Pesticide Application").

Yucca moths play a critical role in western Joshua tree reproduction; therefore, introducing yucca moth pollinators to restoration or enhancement sites where they are absent should be considered as part of a restoration or enhancement design plan and incorporated as appropriate to facilitate pollination and contribute to successful regeneration. Ongoing monitoring to track moth survival and reproduction and management to protect moths from threats would be necessary for successful establishment of a self-sustaining yucca moth population.

Source: Anna Cirimele, National Park Service.

Regular maintenance and monitoring are necessary to ensure ecological processes are trending toward meeting the goals described in the design plans. Monitoring allows projects to be adaptively managed if performance standards are not being met along the way. Quantitative performance criteria that trigger adaptive management actions if performance standards are not being met should be incorporated into the maintenance and monitoring plan. Monitoring duration and intervals should be included in the plan. Restoration and enhancement projects should be monitored for long periods of time following completion of the initial restoration or enhancement activities due to the slow nature of desert ecosystem

processes. Monitoring, maintenance, and adaptive management should continue until success criteria are met.

MANAGEMENT ACTION LC&M 5: DEVELOP AND IMPLEMENT A SEED CONSERVATION STRATEGY

While preserving western Joshua tree in the wild is the top priority, developing a seed conservation strategy that includes establishment of seed banks is an important way to minimize loss of western Joshua tree genetic diversity over the long term (see Action A&M 2.4). Seeds collected for long-term conservation storage could be used to grow western Joshua trees for restoration and enhancement projects or research. With sufficient additional research, the conservation seed bank could provide opportunities to assist gene flow to facilitate climate adaptation by planting western Joshua trees in areas of climate refugia.

A comprehensive seed conservation strategy should be implemented to develop a seed repository that is representative of western Joshua tree genetic diversity over a wide geographic area across a range of environmental conditions. The seed strategy should include protocols for seed collection, storage, and distribution for conservation and recovery purposes following the guidelines published in Center for Plant Conservation's *CPC Best Conservation Practices to Support Species Survival in the Wild* (CPC 2019) that will ensure long term preservation of a viable, genetically diverse western Joshua tree population.

Action LC&M 5.1: Develop Seed Collection Standards and Protocols

Joshua tree seed pods.
Source: Anna Cirimele, National Park Service.

In collaboration with other agencies and institutions, CDFW will develop and adopt standards and protocols for western Joshua tree seed collection strategies to maximize genetic seed diversity. The seed collection standards and protocols will be designed to conserve western Joshua seeds that are adapted to climates expected to persist in the future. Collections will include seeds from areas at high risk of wildland fire, areas recently subjected to wildland fire, and areas with hotter, drier microclimates (i.e., seeds from genetically adaptive individuals). This would likely include collection of seeds during masting years. Seed collection could also be a permit condition for take of western Joshua tree (see Action A&M 2.4). The seed collection standards will be based on the Center for Plant Conservation's *CPC Best Conservation Practices to Support Species Survival in the Wild* (CPC 2019) and will include the following actions:

- Obtain necessary permits from CDFW and permission from the landowner before attempting any collection of western Joshua tree seeds.
- Collect no more than 10 percent of seeds produced within a given western Joshua tree population in any 1 year, or no more than the maximum amount of seeds allowed by CDFW and/or the relevant permitting authority.
- Capture the full genetic diversity of the population by collecting from individuals across the whole site, from as many maternal plants as possible, and from all sizes of seed-producing plants present. Collect seeds over multiple years, if possible, to increase genetic diversity of seeds collected.
- Collect only mature seeds and collect the full diversity of seed morphologies represented in the population.
- Track seed origin, or georeferenced latitude and longitude, of the parent plant from which the seeds were collected. Seed origin is important because genetic material and adaptations of seeds can vary widely between different locations. Offspring from seeds collected in a specific geography may not be genetically adapted for growth under environmental conditions in another location. Therefore, tracking their origin can help identify the geographic range suitable for growing the seed, increasing the odds of successful growth.
- Record accession information for seed collections, such as collector, date, location, habitat and associate species information, population demographics, and number of individuals from which seeds were collected.

Action LC&M 5.2: Develop Seed Storage Standards and Protocols

Stored seed will be important for use in ecological restoration/reforestation projects and assisted gene flow programs. Assisted gene flow programs could be used to enhance climate change resilience by translocating genetically adaptive individuals into western Joshua tree populations that do not currently support individuals with climate change adaptations. Seed viability and germination testing should be conducted prior to being put into storage and then retested for viability at regular intervals and before seeds are used to grow trees. Seeds should be stored following practices that promote high seed quality and increase seed longevity, as discussed in CPC (2019), such as:

- Keep accurate records, including documentation and accession information.
- Clean seeds prior to storage.
- Follow the recommended drying conditions.
- Package seeds from different maternal lines separately.

- Divide collected seeds into two batches and store at separate storage institutions to mitigate loss from natural or human-caused catastrophe.
- Adhere to the appropriate moisture targets to maintain relative humidity during storage.
- Store at the appropriate temperature.
- Monitor storage conditions and seed viability.

Action LC&M 5.3: Develop Nursery Standards and Protocols

Nurseries used to grow seedlings should be qualified and abide by established standards and protocols. When western Joshua tree plants are required for restoration projects or assisted gene flow attempts, viable seeds from the repositories should be grown in a qualified nursery until seedlings have established to a point where they have a greater chance of survival in the wild. Standards should include guidance on plant and seed distribution and tracking, how long juvenile plants should grow in the nursery before they are ready for outplanting, proper soil mixtures, watering schedules, recommended pot sizes, and how seedlings should be transported to identified restoration and outplanting sites. CDFW may develop nursery standards and protocols for western Joshua tree propagation and outplanting and include them in a future Conservation Plan update, if necessary.

5.2.3 Tribal Co-Management

CDFW recognizes that California's Native American tribes have long taken care of California's fish, wildlife, and plants and possess unique and valuable expert knowledge and practices for conserving and using these resources in a sustainable manner. Engaging in co-management is key for western Joshua tree conservation, and it is important to do so in ways that respect the interests and priorities of Tribes. The goal of co-management is to collaboratively share management functions and responsibilities for conservation of western Joshua tree and its habitat. Co-management provides an avenue to improve the conservation strategies by ensuring Tribes have access and pathways to implement their extensive life experience and unique understanding of the landscape. This also ensures their knowledge is incorporated into the Conservation Plan, as appropriate, while acknowledging that the Tribes choose what and how knowledge is shared.

Source: Native American Land Conservancy.

The process to develop meaningful co-management will require time that extends beyond the publishing timeline of the Conservation Plan. TEK shared by Tribes will influence management actions in the Conservation Plan. In turn, this tribal knowledge and guidance will inform specific standards for co-management of the species. The actions in this section describe establishing the framework needed to guide development, incorporation, and implementation of co-management functions and responsibilities.

MANAGEMENT ACTION TCM 1: ESTABLISH CO-MANAGEMENT PRINCIPLES

Collaboratively establishing core principles of co-management is an essential first step toward co-creating written agreements and long-term collaborations between the State and Tribes for western Joshua tree conservation. The goal of developing co-management principles is to guide future decision making and the elements of co-management practices between CDFW and Tribes. These core principles may include expectations and use of vocabulary that signifies the respect, commitment, intent, and responsibilities of multiple sovereign governments and integrate their respective management philosophies into mutually beneficial approaches to achieve a common set of goals. It is important that the co-management principles reflect tribal interests and priorities that complement other actions designed to implement WJTCA and to comply with other California laws. Therefore, development of co-management principles requires time and multiple discussions to achieve an approach and written agreement that works for both CDFW and Tribes. This will warrant ongoing work together after the initial adoption of the Conservation Plan.

After reviewing the Advisory Council on Historic Preservation's Policy Statement on Indigenous Knowledge and Historic Preservation (ACHP 2024), CDFW developed initial foundational commitments, which was requested by tribal members (FIICPI, pers. comm., 2024a). A draft of CDFW's foundational commitments is provided in Appendix G, "Foundational Commitments by CDFW for Developing Western Joshua Tree Conservation Plan Co-Management Principles with California Native American Tribes." The following topic summaries are addressed in the commitments:

- **Respect and relationship building**. Tribal knowledge, including TEK, will be treated with respect in all circumstances.
- **Valid and self-supporting knowledge**. TEK held by a tribe is a valid, sound, and self-supporting source of information and is an aspect of science.
- **Cultural and religious significance of Traditional Ecological Knowledge**. Conservation actions affect resources and properties that may be of religious and cultural significance to tribes.

- **Fair compensation**. If a state agency requests a tribe to provide TEK via research, survey, monitoring, or other efforts, the state agency and the tribe are encouraged to collaborate to identify potential funding mechanisms (which may include grants, to the extent permitted by applicable laws and regulations and sufficient resources) to fairly reimburse or compensate the tribe.
- **Transparency and records of tribal involvement**. Maximum transparency is essential to demonstrate how and what tribal priorities, including TEK and other sensitive information, will be documented in conservation project records.
- **Consultation timelines**. Timelines will reflect the complexity and nature of the undertaking and will recognize and seek to accommodate to the capacity of tribes throughout the decision-making processes.
- **Professional qualifications of tribal representatives**. The State recognizes that representatives of tribes have professional qualifications.
- **Managing and protecting sensitive tribal information**. The State will prevent or limit to the maximum extent feasible any inappropriate disclosure of confidential or sensitive information through all available mechanisms.

Source: Jessie Quinn, Ascent.

MANAGEMENT ACTION TCM 2: MUTUALLY DEFINE ELEMENTS OF CO-MANAGEMENT

Guided by the foundational commitments and co-management principles from Management Action TCM 1, "Establish Co-Management Principles," CDFW and California Native American tribes will co-create elements of the Western Joshua Tree Conservation Plan actions that incorporate tribal values, knowledge, priorities, and co-management on tribal land or other properties that contain resources or lands that may be of religious and cultural significance to Tribes. Mutually defining elements that should be included in co-management agreements to carry out both traditional and contemporary land stewardship practices promote meaningful collaboration and tangible outcomes. The following actions present elements that need to be addressed and agreed upon with Tribes for inclusion as co-managed conservation actions:

- Articulate a process for take of western Joshua tree by California Native American tribes in a culturally appropriate manner or for a specific purpose (FIICPI, pers. comm., 2024a).
- Continue consultation to provide a platform for Tribes to articulate aspects of TEK that include spiritual and cultural elements that may be new to agencies. Agencies should seek to consider these unfamiliar aspects of environmental protection and include them in guidance and policies (FIICPI, pers. comm., 2024b).
- Upon request of a California Native American tribe, collaborate on developing a process to relocate western Joshua trees to tribal lands when there is an opportunity to do so. For example, an opportunity may be related to coordinating with a developer that is openly seeking a pathway for relocating trees they are permitted to take.
- Encourage the presence of tribal cultural monitors at development or other ground-disturbing projects during the salvage, destruction, or removal of western Joshua trees as a measure to provide spiritual and cultural protection to western Joshua trees that are either taken or are affected in the project area. Ideally, tribal cultural monitors may also be trained as arborists working as desert native plant specialists to ensure proper salvaging methods are implemented (FIICPI, pers. comm., 2024b).
- Encourage employment of trained tribal members or local tribal conservation crews to support restoration and relocation efforts of western Joshua trees that are carried out with cultural and biological integrity.
- Collaborate with Tribes to identify where ethnographic studies are requested. Identify needs and potential resources, including but not limited to funding, so Tribes can carry out these studies.
- Identify priority lands of significance to individual California Native American tribes that may overlap with the biological criteria outlined in Management Action LC&M 1 so that they can be prioritized for long-term conservation and tribal stewardship.

- Collaborate and identify initiatives for tribal management of western Joshua trees, for example, supporting nurseries developed and led by California Native American tribes for western Joshua tree conservation.
- Incorporate California Native American tribes' TEK or provide supporting pathways for Tribes to implement TEK into western Joshua tree conservation strategies. For example, Tribes and CDFW will collaborate to incorporate cultural burning where it would be an effective tool (outlined under Management Action LC&M 3) for reduction of wildland fire risk or enhancement of western Joshua tree population conditions on tribal lands (ACTCI, pers. comm., 2024).
- Collaborate and identify all applicable and available sources of funding (including but not limited to the use of the Conservation Fund) to support tribal TEK implementation. Non-tribal parties assuming TEK implementation responsibility without explicit tribal permission would be a breach of intellectual property use and would be an extractive practice toward the California Native American tribes (FTBMI, pers. comm., 2024).
- Develop written MOUs or other written collaboration agreements between CDFW, California Native American tribes, and relevant entities that would embody co-management principles (see Section 6.4, "Tribal Co-Management").

5.2.4 Research to Inform Long-Term Conservation

The scientific understanding of the long-term persistence of western Joshua tree is evolving as research continues. It is currently difficult to determine what ecological factors are influencing long-term persistence. These difficulties are centered around a lack of range-wide demographic data and the amount and frequency of recruitment necessary to maintain populations, uncertainty about the magnitude and timing of heat and drought stressors and how western Joshua tree will respond, and lack of information about the environmental tolerances and population dynamics of yucca moth (USFWS 2023). Therefore, additional research is necessary to fill these information gaps.

MANAGEMENT ACTION R&I 1: CONTINUE RESEARCH AND INFORMATION DEVELOPMENT

CDFW will encourage scientific research needed to inform effective conservation of western Joshua tree. There are currently numerous information gaps related to species genetics, distinct populations, demography, distribution, microbial associations, fire effects, climate response, and other factors that will be important to the conservation and management of western Joshua tree. Science and research are fundamental to long-term species conservation and for developing meaningful strategies to avoid, minimize, and mitigate threats to western Joshua tree. The seven-step approach recommended by Smith et al. (2023) for effective species

conservation in the face of climate change requires acquisition of information that is currently lacking for western Joshua tree. Research also provides a foundation from which to track the success of conservation and management actions and adapt management strategies as needed if monitoring indicates performance targets are not being met.

Action R&I 1.1: Identify Genetic Structure and Distinct Populations

Research focused on genetic studies is needed for western Joshua tree conservation. Preserving a species' full range of genetic variation is one of the pillars of conservation biology. Understanding the range of western Joshua tree's genetic variation is needed to inform effective conservation. Specifically, genomic research is needed following these steps, which are outlined in Smith et al. (2023):

- Quantify neutral diversity (i.e., genetic variation that is not affected by natural selection).
- Delineate genetically distinct populations.
- Identify climate-adaptive variants.
- Catalog adaptive diversity (i.e., range of adaptive traits that make individuals better suited to withstand the effects of climate change and other stressors).

Action R&I 1.2: Collect and Analyze Range-Wide Demographic Information

Develop a program of long-term, range-wide direct population and vegetation monitoring with emphasis on leading and trailing edges, and highest and lowest elevations of the species' range in California. Range-wide demographic information is needed to detect baseline population trends, and identify populations with high recruitment (i.e., addition of new adult plants that develop from seeds or sprouts) and those that do not appear to be recruiting/reproducing new individuals onsite at sustainable levels (i.e., plants are not reproducing at a sufficient rate to replace themselves generation after generation). Researchers should look for collaboration opportunities to develop standardized monitoring protocols to collect demographic data and abundance trends across the species' range, and to establish and maintain a database for data collected.

Action R&I 1.3: Develop Refined Species Distribution Models

Once genetically distinct populations have been delineated, research should use these data to develop refined species distribution models to help identify habitat suitable for western Joshua tree in the future (Smith et al. 2023). Potential refugia models should be validated with range-wide demographic data collection and other independent data sources (Smith et al. 2023).

Action R&I 1.4: Assess Adaptive Genetic Variation

Research should evaluate climate adaptive genomics. Once genetic variation of the species is better understood, researchers should identify subpopulations with adaptive traits that make them better suited to withstand the effects of climate change. Researchers should consider genome-wide association studies, as recommended by Smith et al. (2023), to identify adaptive genes responsible for greater tolerances to heat, drought, and other stressors. Genotypes (genome sequence data) of individuals that survive climate extremes and from populations with greater numbers of individuals with these adaptive traits should be prioritized for conservation and used for assisted gene flow (i.e., relocating genetically adaptive individuals or their propagules to areas already occupied by western Joshua tree to facilitate climate change adaptation).

Action R&I 1.5: Study Yucca Moth

Research should investigate the western Joshua tree's obligate pollinator, yucca moth's life history, environmental tolerances, distribution, local adaptation to host plant populations, and association genetics or other approaches to identifying adaptive genetic variation (see "Pollination" in Section 4.1.3, "Life History"). Researchers should produce range-wide species distribution models for yucca moth; determine the percentage of larvae in diapause that are lost to predation and other factors, such as project-related impacts; and study the cues that trigger metamorphosis.

Action R&I 1.6: Update Ecoregional Assessment

Update previous work done by Randell et al. (2010) and Parker et al. (2018) or other datasets to assess ecological intactness within the entirety of western Joshua tree's range.

Action R&I 1.7: Research Microbial Associations and Restoration Techniques

Research should investigate biocrust associations and arbuscular fungi associations and their role in western Joshua tree conservation, as well as other microbial associations that may be important to western Joshua tree survival. Research should include techniques to restore biocrusts and fungi associations important to western Joshua tree, such as biocrust salvage and transplantation in the wild, and propagation and inoculation techniques in nursery settings. Biocrusts could also be applied to fuel breaks to reduce exposed soil and limit invasive plant establishment while maintaining effective fuel breaks (Condon et al. 2023).

Action R&I 1.8: Investigate Fire Resilience/Postfire Recovery

Research should investigate fire resiliency of western Joshua tree and its nurse plants. Studies could include postfire monitoring of western Joshua tree recruitment, seed production of trees that survive, or basal sprouting. Sweet et al. (2023) suggests monitoring could include collecting baseline data in nurse plant cover at burned sites and following recruitment

patterns. Research should also investigate fire regime-plant community interactions, including the positive feedback loop invasive plants can have on promoting recurrent fire in western Joshua tree habitat (Brooks and Matchett 2006). This research should consider impacts of annual rainfall amounts to inform when invasive plant control is needed to protect western Joshua tree populations (Brooks and Matchett 2006).

Action R&I 1.9: Investigate Invasive Plant Control Techniques

Research should investigate the most effective ways to control the spread and abundance of invasive plant species to reduce fire risk through the following possible activities:

- Identify the most effective treatment strategies to manage invasive species that optimize benefits while minimizing negative tradeoffs under a range of conditions (Abella et al 2023; Reed et al. 2009; Darst et al. 2013; Tuma et al. 2016).
- Investigate indirect effects of herbicide application (e.g., indaziflam) in western Joshua tree habitats, particularly on western Joshua tree seedlings and nurse plants, as well as other native plants. Using this information, identify demographic effects and appropriate avoidance buffer standards and application methods for herbicide use in areas occupied by western Joshua tree (Abella et al 2023).

Action R&I 1.10: Research Long-Term Climate Effects

Research should investigate the effects of multiyear and multidecade climate variability patterns on western Joshua tree recruitment, survival, and population density. Research should aid the development of a large-scale demographic study that is needed to inform conservation acquisitions and other forms of protection.

Source: Drew Kaiser, California Department of Fish and Wildlife.

Action R&I 1.11: Study Salvage and Relocation Methods

Evaluate and improve salvage and relocation methods to increase survival of western Joshua trees salvaged from development sites and transplanted to mitigation sites. Successful relocation can increase the persistence of western Joshua tree and ensure genetic diversity and adaptive variation are retained from populations lost to development.

Action R&I 1.12: Investigate Assisted Migration

Research the feasibility, practicality, effectiveness, and risks of implementing future assisted migration and translocation into areas modeled as climate refugia to which western Joshua tree cannot naturally migrate (Figure 5-2) (Shryock et al. forthcoming). This information would be used to inform the usefulness of conserving lands that are outside the current range of western Joshua tree but that may become suitable for the species in the future under different climate scenarios. Western Joshua trees have low capacity to colonize newly available areas on their own because of their low dispersal ability and limited connectivity between currently occupied and potential future habitat. Assisted migration is frequently contemplated as a conservation tool to get species to newly available habitat; however, further study is needed to determine how this can be done successfully, cost effectively, and without adverse effects to the receiving ecosystems (Smith et al. 2023).

Action R&I 1.13: Study Basal Sprout Survival and Vulnerabilities

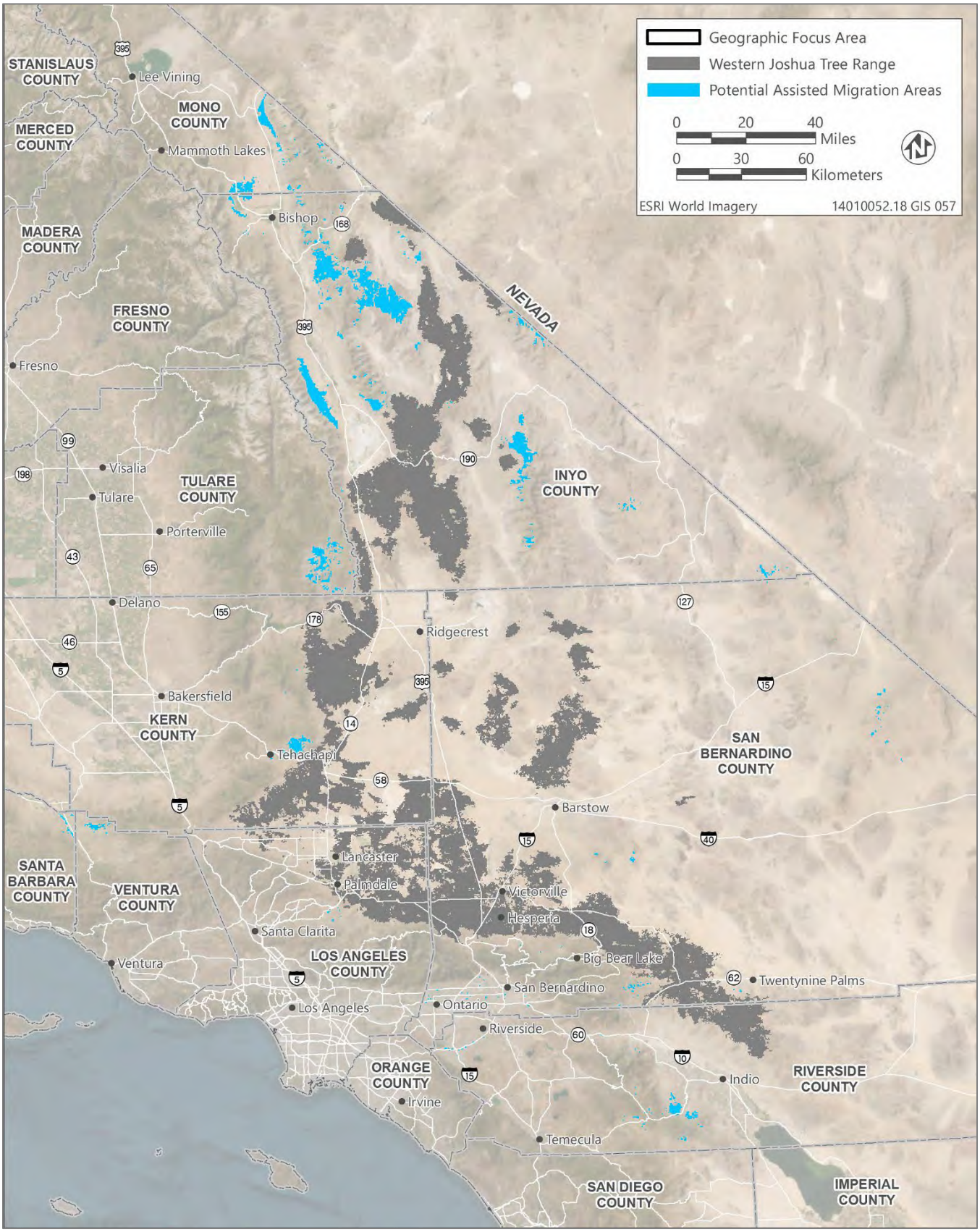
Research the resource needs (e.g., nutrients, water) and vulnerability of basal resprouts of western Joshua tree to increase persistence, for example, whether they may be vulnerable to drought or herbivory. Further study could include an analysis of survival data based on various environmental and biological factors and may include unburned reference sites for estimating background mortality. Analysis of these data is ongoing pending further funding support (Sweet et al. 2023). These data will enhance understanding of demographic trends. Research should help inform potential site-specific management needed to ensure growth and survival of individual western Joshua trees.

Action R&I 1.14: Tribal Ethnobotanical Studies

Ethnobotanical studies of the greater Mojave Desert and Great Basin regions and western Joshua tree habitat should be conducted if requested by a California Native American tribe. Ethnobotanical studies research how people of a particular culture and region use native plants for food, medicine, shelter, dyes, fibers, oils, resins, soaps, waxes, ceremonial purposes, and more (USFS 2024).

Action R&I 1.15: Develop Additional Fuel Treatment Methods

CDFW will coordinate with California Department of Forestry and Fire Protection (CAL FIRE) and others on developing additional fuel treatment methods for western Joshua tree habitat, including manual and mechanical treatment methods. Once developed, these treatment methods could eventually be included in the minimization measures in Section 5.2.1, above.



Source: Data received from Shryock et. al. in 2024; adapted by Ascent in 2024.

Figure 5-2 Potential Assisted Migration Areas

5.2.5 Education and Awareness

Education and awareness programs will enhance public understanding of western Joshua tree ecology, foster community pride and ownership of western Joshua tree conservation, connect people with their natural world, and inspire people to care about western Joshua tree and its habitat so they will support conservation of the species. A key priority will be ensuring that underserved and overburdened communities have access to—and can engage in—education and awareness programs and opportunities.

MANAGEMENT ACTION E&A 1: SUPPORT EDUCATION AND OUTREACH

Education and outreach programs that increase awareness and appreciation of the cultural, biological, and ecological value of western Joshua tree may provide long-term benefits for conservation of the species. Education and outreach programs can also promote opportunities for all communities to be involved with western Joshua tree appreciation, stewardship, and conservation.

Action E&A 1.1: Support Tribal-Led Educational Outcomes

CDFW will work with Tribes to support tribal priorities for education and outreach to their communities. The following are examples of undertakings or materials that may be developed to support tribal-led and tribal-designed efforts:

- ethnobotanical studies,
- lesson plans and curricula for various age groups,
- professional certification programs (e.g., for tribal cultural monitors, TEK practitioners, fire and restoration specialists),
- printed materials designed to strengthen cultural knowledge, and
- workshops.

Action E&A 1.2: Develop Publicly Distributed Information

CDFW will work with partners to develop accessible informational items for distribution to the public in multiple languages. The informational items may be handouts, brochures, presentations, digital materials, surveys, interactive web pages, or other outreach tools. Materials should be made available to communities throughout western Joshua tree's range in California with a dedicated focus on reaching underserved communities. Informational items may include the following materials:

- a handout describing how to care for western Joshua tree with information on:
  - watering (none unless they show signs of heat/drought stress),
  - invasive plant removal,
  - nurse plant species to incorporate into landscaping, and
  - signs of pests and solutions for pest infestations;
- science kits, handouts, and web-based western Joshua tree activities for schools to educate young citizens about western Joshua tree and its need for conservation such as:
  - coloring and activity sheets focused on western Joshua tree "fun facts" and biology;
  - a western Joshua tree junior ranger program based on collecting information about the species; and/or
  - a science kit developed in collaboration with local scientists and educators that includes hands-on activities through storytelling, art, or field trips, focusing on western Johsua tree and climate change impacts and solutions, such as a traveling trunk for Climate Kids with the Climate Science Alliance;

Source: Amita Bubb.

- materials and opportunities for the public to participate in western Joshua tree conservation efforts and education, such as:
  - a calendar of volunteer events (e.g., seed collection and restoration) and educational webinars,
  - iNaturalist citizen science project information, and/or
  - Information on recreating outdoors with western Joshua trees responsibly (see Action A&M 2.8, "Minimize Impacts from OHV Use and Outdoor Recreation");
- collaborations to fund and open a western Joshua tree art gallery or exhibit that could be made available to the public within the geographic focus area of this Conservation Plan and virtually online; and/or
- interactive, web-based ArcGIS StoryMaps for western Joshua tree conservation and education.

Action E&A 1.3: Establish a Tree Adoption Program

CDFW will reach out to partners to encourage organizations to develop opportunities for an adopt-a-Joshua tree program. This program may include the following activities:

- establishing a program in which members of the public can "adopt" western Joshua trees salvaged from development sites and replant them on their private property, and/or
- providing signage that landowners can place on their property to identify "adopted" western Joshua trees.

Action E&A 1.4: Explore Authorizing a Specialized Interest License Plate

CDFW or other organizations may coordinate with the California Department of Motor Vehicles to develop a specialized western Joshua tree interest license plate. Monies generated from sales of the license plates could be added to the Conservation Fund.

Action E&A 1.5: Support Media Promotion

CDFW will coordinate with partner organizations to encourage development of newsletters and conduct western Joshua tree–focused social media campaigns.

Action E&A 1.6: Support Volunteer Opportunities

Cattle sheltered by western Joshua trees.

CDFW will support and encourage volunteer opportunities by promoting them on their website, social media, and printed media (e.g., handouts, newsletters). Special focus will be given to providing opportunities for underserved (i.e., communities that have historically received inadequate investment, resources, or services) and overburdened (i.e., communities that are disproportionately affected by pollution, environmental hazards, and health risks) communities and young people to participate in and benefit from. This includes connecting these communities with natural areas containing iconic western Joshua trees.

The following volunteer programs may benefit western Joshua tree:

- National Park Service Volunteers-In-Parks (VIP) program,
- California State Parks Volunteer in Parks Program,
- Mojave Desert Land Trust volunteer programs,
- Transition Habitat Conservancy volunteer programs,

- CDFW-led seed collection/banking efforts,
- Yucca weevil tracking projects, such as Mojave Desert Land Trust's 2023 Yucca Weevil Watch hosted on iNaturalist, and
- western Joshua tree flowering/masting tracking projects hosted on iNaturalist.

Action E&A 1.7: Develop Guidance for Grazing Practices

CDFW will coordinate with agricultural organizations to encourage development of guidance regarding grazing best practices in western Joshua tree habitat and make it available to ranchers, rangeland managers, and others in the grazing community.

Action E&A 1.8: Encourage Urban Conservation and Recovery

CDFW will coordinate with local governments to encourage the development of educational materials for private residential and other property owners with western Joshua trees to participate in urban conservation and recovery efforts.

5.3 EFFECTIVENESS CRITERIA

The management actions described in this chapter are necessary to achieve the vision, purpose, and objectives of the Conservation Plan. WJTCA requires that the Conservation Plan include objective, measurable criteria to assess the effectiveness of management actions. This section presents preliminary effectiveness criteria to help CDFW and the Commission measure how effective the management actions are in conserving western Joshua tree. These criteria are divided into two sets. One set of criteria is related to the overall conservation of western Joshua tree in California, and the other set of criteria is related to the effectiveness of the Conservation Plan and the use of the Western Joshua Tree Conservation Fund in making progress toward the vision of this Conservation Plan. Although these two sets of criteria are interrelated, the former set is more relevant to the Commission's decision-making authority under the California Endangered Species Act (CESA), and the latter is more relevant for assessing the effectiveness of this Conservation Plan and the Western Joshua Tree Conservation Fund as implemented by CDFW.

5.3.1 Effectiveness Criteria for Conservation of Western Joshua Tree in California

- Global greenhouse gas emissions are reduced to a level that ensures the species is not at risk of extinction from climate change impacts in California. The measurable details of this criterion should be based on science and therefore may change as information improves on critical levels of greenhouse gases in the atmosphere for western Joshua tree survival.

Source: Anna Cirimele, National Park Service.

- By 2033, when the Commission must reconsider whether listing western Joshua tree is warranted (Fish & G. Code, § 1927.9), 90 percent of land within the predicted climate refugia category under a low emissions scenario (SSP 2-4.5) that remains ecologically core, ecologically intact, or moderately degraded is permanently protected and managed to maximize ecological function for the species and its co-occurring native species. The measurable details of this criterion should be science-based and therefore may change as information improves on critical levels of greenhouse gases in the atmosphere for western Joshua tree survival. This criterion is also dependent on models of the predicted climate refugia category.
- A large and genetically representative distribution of western Joshua tree is permanently protected and managed to maximize ecological function for the species, and its co-occurring native species. This criterion is dependent on science regarding western Joshua tree population genetics and on models of the predicted climate refugia category. The target for this criterion is 70 percent of priority conservation lands, as identified through Management Action LC&M 1, "Identify Priority Conservation Lands," across the full range of western Joshua tree in California by 2033.
- Cooperative multiagency strategies are in place to reduce fire risk, aggressively fight wildland fires that threaten western Joshua trees, and fully fund restoration plans that will be implemented in response to wildland fires that kill a demographically significant number of western Joshua trees.
- A program to monitor and assess western Joshua tree population status based on science has been developed and adopted, and assessments under this program demonstrate that western Joshua tree is sustainable in California for the foreseeable future.

5.3.2 Effectiveness Criteria for the Conservation Plan and the Western Joshua Tree Conservation Fund

- Initial draft priority conservation areas have been identified by December 2025.
- Every 2 years, beginning in 2026 (Fish & G. Code, § 1927.8, subd. (a)), the acreage of priority conservation lands preserved in perpetuity is greater than in the prior 2-year review period. CDFW will first focus on protecting priority conservation lands identified via Management Action LC&M 1, "Identify Priority Conservation Lands." CDFW will seek to protect an additional 3 to 5 percent of occupied western Joshua tree range every 2 years until the effectiveness criteria related to land protection for conservation of western Joshua tree in California are achieved.
- Conservation lands that are protected via the Conservation Fund have an endowment that is sufficient to fund management to maximize ecological function for the species and its co-occurring native species in perpetuity.
- At least one USFWS-approved written MOU or other written collaboration agreement has been established on federal land that protects and safeguards priority conservation lands representing at least 10 percent of occupied western Joshua tree range by 2033.
- At minimum, one written MOU or other written collaboration agreement incorporating co-management principles has been established between CDFW or other land managers and California Native American tribes by 2028.
- As measured every 2 years, more local jurisdictions have incorporated the Conservation Plan's A&M measures into adopted plans and policies.
- CDFW, local fire departments, CAL FIRE, and federal agencies have developed and implemented guidelines for avoiding direct impacts on western Joshua trees during wildland fire suppression and control activities, for fuel treatment implementation, and for preventing accidental ignition of fires during other activities, such as construction and recreation. Local fire departments in the geographic focus area, CAL FIRE, and federal agencies have entered into agreements with CDFW to implement the guidance. The number of jurisdictions implementing the guidelines increases every 2 years.

The preliminary criteria listed above are intended to help CDFW evaluate whether management actions are resulting in long-term conservation of the species. If they are not, it may be necessary to determine if and how the management actions should be modified or replaced.

As ongoing research develops metrics for demonstrating long-term persistence of western Joshua tree in California in the face of climate change, some effectiveness criteria may be modified or added when the Conservation Plan is reviewed and updated.

These initial effectiveness criteria help determine how successful implementing these important actions have been to conserve the species. These criteria will be used to determine if administration of the Western Joshua Tree Conservation Fund, development and execution of written interagency agreements or written MOUs with land management entities, and other actions are effective at achieving the vision, purpose, and objectives of the Conservation Plan.

5.4 PRIORITY MANAGEMENT ACTIONS FOR MANAGEMENT UNITS

Management units are outlined and delineated in Section 4.4, "Management Units," based on criteria for expected climate conditions, quality of habitat, existing management authorities, and land ownership. Organizing the landscape into management units based on these characteristics of the landscape will help guide the application of the Conservation Plan's management actions.

Although the management actions described in this chapter (which are summarized in Table 5-2 below) could apply to any management unit, certain management actions are recommended as priorities for specific management units (Table 5-3). For example, regardless of habitat conservation value, the management actions in Tribal Land units will prioritize establishing co-management principles and mutually defining elements of co-management. Some management actions could be applied throughout the species range without prioritization by management units. For example, conducting research and gathering information will help inform management in all management units in the future. Conducting education and outreach will similarly help educate the public and improve management in all management units.

Table 5-2 Summary of Management Actions

Management Action Abbreviation	Management Action Title
A&M 1	Avoid Direct and Indirect Impacts
A&M 2	Minimize Direct and Indirect Impacts
A&M 3	Minimize Impacts from Wildland Fire and Fire Management
LC&M 1	Identify Priority Conservation Lands
LC&M 2	Protect Priority Conservation Lands
LC&M 3	Manage Conservation Lands
LC&M 4	Restore and Enhance Habitat
LC&M 5	Establish Seed Banks and Nurseries
TCM 1	Establish Co-Management Principles
TCM 2	Mutually Define Elements of Co-Management
R&I 1	Continue Research and Information Development
E&A 1	Support Education and Outreach

Source: Compiled by Ascent in 2024.

Table 5-3 Priority Management Actions for Western Joshua Tree Management Units by Conservation Value Category and Predicted Climate Refugia

Management Unit Type[1]	Ecologically Core and Intact	Predicted Climate Refugia Category [2] in Ecologically Core and Intact	Moderately Degraded and Highly Converted	Predicted Climate Refugia Category in Moderately Degraded and Highly Converted
Wilderness	A&M 3[3] LC&M 3[3] LC&M 4[3]	A&M 3[3]	LC&M 3[3] LC&M 5[3]	LC&M 1[4] LC&M 3[3] LC&M 5[3]
Preservation with Light Recreation/ Other Use	A&M 1 A&M 2 A&M 3 LC&M 3 LC&M 4 LC&M 5	A&M 1 A&M 2 A&M 3	LC&M 3 LC&M 4 LC&M 5	LC&M 1[4] LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3
Defense	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3

Management Unit Type[1]	Ecologically Core and Intact	Predicted Climate Refugia Category [2] in Ecologically Core and Intact	Moderately Degraded and Highly Converted	Predicted Climate Refugia Category in Moderately Degraded and Highly Converted
Tribal Land	TCM 1 TCM 2 A&M 1 A&M 2 A&M 3 LC&M 3 LC&M 4 LC&M 5	TCM 1 TCM 2 A&M 1 A&M 2 A&M 3	TCM 1 TCM 2 LC&M 3 LC&M 4 LC&M 5	TCM 1 TCM 2 LC&M 1[4] LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3
Mixed Use	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3
Little or No Protection	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3	LC&M 1 LC&M 2 LC&M 3 LC&M 4 LC&M 5 E&A 1	LC&M 1[4] LC&M 2 LC&M 3 LC&M 4 LC&M 5 A&M 1 A&M 2 A&M 3

[1] Although actions described in this chapter can be applied to any management unit, the actions listed in this table identify the highest priority management actions for each unit.

[2] Recommendations for the predicted climate refugia category can be applied to any unoccupied future suitable habitat category that is identified.

[3] Management activities on conservation lands may be allowed in wilderness areas or may be limited by the administering agency to protect wilderness values.

[4] If priority conservation lands are identified in the predicted climate refugia category that is present within moderately degraded or highly converted land, management should prioritize avoiding and minimizing impacts.

Source: Compiled by Ascent in 2024.

In ecologically core and intact habitat that currently have land protections (i.e., Wilderness, Preservation with Light Recreation/Other Use), avoiding and minimizing impacts should be prioritized. Because management actions in wilderness areas are limited to protecting wilderness values, coordination with BLM, USFS, and NPS will be imperative. In addition, these areas should prioritize identifying, protecting, restoring, and managing priority conservation lands (Actions LC&M 3, LC&M 4, and LC&M 5), including collecting seed when appropriate. In Tribal Land units, management should follow recommendations for Wilderness and Preservation with Light Recreation/Other Use units, as well as implementing tribal focused management actions. In ecologically core and intact habitat that do not currently have protection or have minimal land protections (i.e., Little to No Protection, Mixed Use, and

Defense), management should focus on identifying, protecting, and managing priority conservation lands and avoiding and minimizing impacts.

Although some lands are classified as ecologically core and intact habitat in the ecoregional assessment, there may be opportunities in these areas to benefit from restoration based on finer-scale and site-specific assessments for specific projects or site-scale planning decisions (Randall et al. 2010). This would be determined on a site-by-site basis.

Source: Jeb Bjerke, California Department of Fish and Wildlife.

Within the moderately degraded or highly converted habitat that have minimal to no land protections (i.e., Little to No Protection, Mixed Use, Defense units), management should focus on identifying, protecting, managing, and restoring priority conservation lands and avoiding and minimizing impacts. For the Little to No Protection units categorized as moderately degraded or highly converted habitat, education and awareness should also be prioritized. In areas of moderately degraded or highly converted habitat that have land protections (i.e., Wilderness, Preservation with Light Recreation/Other Use), management should focus on identifying, protecting, managing, and restoring priority conservation lands and avoiding and minimizing impacts. To protect wilderness values, some actions may not be allowed or may be limited in Wilderness units by the administering agency. In Tribal Land units, management should follow recommendations for Wilderness and Preservation with Light Recreation/Other Use units, as well as implementing tribal focused management actions.

Management of land in the predicted climate refugia category within ecologically core or intact habitat that have minimal or no protections (i.e., Little to No Protection, Mixed Use, and Defense units) should prioritize identifying, protecting, managing, and restoring priority conservation lands. Management units containing land in the predicted climate refugia category in ecologically core or intact habitat with land protections (i.e., Wilderness, Preservation with Light Recreation/Other Use) should prioritize avoidance or minimizing impacts to the greatest extent feasible. In Tribal Land units, management should follow recommendations for Wilderness and Preservation with Light Recreation/Other Use units, as well as implementing tribal focused management actions.

There may be areas that are degraded but have land in the predicted climate refugia category, so it should be determined whether restoring these areas would further the conservation of the species. Management should prioritize avoiding and minimizing impacts

on any priority conservation lands within degraded areas, or priority conservation lands that contain minimal or no protections that are also within the predicted climate refugia category. The recommendations for areas in the predicted climate refugia category also apply to land within the unoccupied future suitable habitat category where western Joshua trees could naturally disperse (Shryock et al. forthcoming).

In addition, opportunities for assisted migration in areas that are currently unoccupied by western Joshua tree but are potentially suitable for the species and modeled as future climate refugia should receive further evaluation if scientific evidence supports its feasibility and effectiveness. Assisted migration may have conservation value if questions about its effectiveness for species conservation are resolved, costs become feasible, and the owners and managers of receiving land are supportive.

This page is intentionally left blank.

6 IMPLEMENTATION

6.1 INTRODUCTION

This chapter describes key mechanisms for Conservation Plan implementation, the roles of the implementing parties, and the ongoing implementation monitoring and adaptive management features of the Conservation Plan. Pursuant to Western Joshua Tree Conservation Act (WJTCA), CDFW must implement the Conservation Plan in collaboration with the Commission, governmental agencies, California Native American tribes (Tribes), and the public (Fish & G. Code, § 1927.6, subd. (a)). Elements of Conservation Plan implementation are summarized below. Details supporting some of the implementation elements are provided in the appendices to the Conservation Plan. Permitting guidance is available on CDFW's western Joshua tree website.

> *"During nights in the open, lying in a snug sleeping-bag, I soon learned the charm of a Joshua Forest… The desert with its elusive beauty…possessed me, and I constantly wished that I might find some way to preserve its natural beauty."*
>
> *— Minerva Hamilton Hoyt*

6.2 ROLES OF IMPLEMENTING PARTIES

6.2.1 California Department of Fish and Wildlife

CDFW is responsible for developing and implementing the Conservation Plan, managing the expenditures and accounting of the Western Joshua Tree Conservation Fund (Conservation Fund), and implementing the permitting processes set forth in WJTCA. These responsibilities include the following:

- Working with collaborators to conserve western Joshua tree and to complete the management actions described in Chapter 5, "Conservation Management Actions and Effectiveness Criteria," of the Conservation Plan.
- Expending monies from the Conservation Fund to acquire, conserve, and manage western Joshua tree conservation lands and to complete other activities to conserve western Joshua tree.
- Periodically reporting on the efficacy of management actions and other outcomes to the Commission and California State Legislature (Legislature).
- Implementing the permitting programs set forth in WJTCA in a manner that supports meeting the conservation needs of western Joshua tree.

In addition, CDFW will continue to consult with Tribes and federal, state, and local agencies to plan and implement activities consistent with western Joshua tree conservation; identify opportunities to conserve western Joshua tree on CDFW-owned lands; integrate protective measures for western Joshua tree into CDFW guidelines and regulations for public use and into land management plans; implement restoration or enhancement of western Joshua tree habitat; receive relocated western Joshua trees; and manage wildland fire risk.

6.2.2 California Fish and Game Commission

The Commission is responsible for review and approval of the Conservation Plan. WJTCA requires the Commission to take action on the Conservation Plan by June 30, 2025. Prior to taking action, as part of its review of the Conservation Plan, the Commission will conduct a public process, which is described on the Commission's website. As a discretionary action by a public agency that would result in changes to the physical environment, compliance with California Environmental Quality Act (CEQA) is necessary. The Commission is the lead agency under CEQA for approval of the Conservation Plan.

After initial approval, CDFW and the Commission shall, if necessary, periodically update the Conservation Plan to achieve conservation of western Joshua tree. The Commission will review the status of western Joshua tree and the effectiveness of the Conservation Plan at a public meeting beginning in 2026 and at least every 2 years thereafter. The Commission and the Legislature will receive annual reports from CDFW assessing the conservation status of western Joshua tree and overall implementation of WJTCA.

In addition, the Commission must assess the impact and effectiveness of the Conservation Plan, WJTCA, and related information when determining whether listing western Joshua tree under California Endangered Species Act (CESA) is warranted, as described in Chapter 2, "Planning Influences."

6.3 COLLABORATION

A purpose of the Conservation Plan is to guide the conservation of western Joshua tree in California by focusing attention on the most urgent and important management actions informed by science including Traditional Ecological Knowledge (TEK), and principles of co-management with California Native American tribes. As outlined in Section 1.3, "Collaboration, Outreach, and Public Review," collaboration between CDFW and Tribes, public agencies, organizations, and the general public is essential for the conservation of western Joshua tree and for implementation of the Conservation Plan. Collaborators will include California Native American tribes, and may include state and federal government agencies, local jurisdictions, landowners/neighbors, nongovernmental organizations, businesses, and academic institutions. Various agencies, organizations, and others are already implementing actions that are described in, or are similar to, those described in the Conservation Plan. Identifying these existing actions; gaining the benefit of these entities' input, knowledge, and experience; and developing new written agreements will all help to achieve the vision, purpose, and objectives of the Conservation Plan. In addition to engaging with Tribes as described in Section 1.3.2, "California Native American Tribes," and Appendix C, "Tribal Input Summary Memo," CDFW conducted local, state, and federal agency outreach as described in Section 1.3.1, "Local, State, and Federal Government Agencies," and sent agencies and organizations a feedback questionnaire (Appendix A, "Agency Feedback Questionnaire"). This outreach helped CDFW understand what Tribes and other agencies and organizations are already doing to conserve western Joshua tree.

Source: National Park Service.

Collaborators can help conserve western Joshua tree by incorporating aspects of the Conservation Plan into their existing projects, operations, and land management activities. Collaborators may also choose to implement projects designed to achieve or align with the vision of the Conservation Plan. Relationships with collaborators may be established through a written memorandum of understanding (MOU) or other agreement.

6.3.1 Federal Agencies

Because the majority of western Joshua trees' distribution is on land managed by federal agencies, collaboration with federal agencies will be important for achieving the purpose and vision of the Conservation Plan. As mentioned in Action LC&M 3.2, "Prioritize Management of

State and Federal Lands for Western Joshua Tree" (see also Management Action LC&M 3, "Manage Conservation Lands," in Section 5.2.2, "Land Conservation and Management"), federal collaboration could help achieve many of the management actions described in the Conservation Plan, such as protecting western Joshua trees on federal lands, planting or relocating trees to suitable but degraded federal lands, establishing avoidance buffers, and restoring and enhancing western Joshua tree habitat. Federal agencies may also consider designating western Joshua tree as a sensitive or protected species under applicable agency policies, management plans, or regulations. A designation may facilitate the implementation of many impact avoidance and minimization actions described in the Conservation Plan.

CDFW may enter into written MOUs or other written agreements with one or more federal agencies related to the conservation and management of western Joshua tree, similar to the durability agreements described in Section 2.2.2, "Federal Listing Status." Even in the absence of such an agreement, CDFW may collaborate with federal agencies informally through meetings, research programs, information sharing, and other ongoing management activities. CDFW consulted with federal resource and land management agencies during the development of the Conservation Plan by distributing a feedback questionnaire to discuss western Joshua tree conservation measures being undertaken on federal land. CDFW will continue to collaborate with interested federal agencies to coordinate management actions and share conservation information. The extent and type of federal lands in the Conservation Plan's geographic focus area are described in more detail in Section 2.3.3, "Federal Land Management." A summary of responses from potential federal agency collaborators to outreach meetings and the questionnaire is provided below:

- **US Fish and Wildlife Service (USFWS)** may recommend measures and conditions to minimize impacts to western Joshua tree when it reviews federal projects proposed on public lands, even though western Joshua tree is not currently a federally listed species. USFWS is a key partner in the USFWS interagency Joshua Tree Biological Working Group and is helping to implement management actions on federal lands. USFWS has played a key role in the development of the Conservation Plan as a research and ecological science partner, sharing with CDFW knowledge gained in its conservation activities on federal land. USFWS does not own or manage lands within the Conservation Plan geographic focus area. CDFW will prioritize the execution of a written MOU or other agreement with USFWS to document shared goals and aspirations for conservation of western Joshua tree.
- **National Park Service (NPS)** may include in its strategic plans and resource stewardship strategies, management actions designed to aid in the conservation of western Joshua tree that are identical or similar to those in Chapter 5 and Appendix D, "Avoidance and Minimization Best Management Practices and Guidelines," of this Conservation Plan. NPS may also protect existing western Joshua trees on NPS lands, conduct comprehensive

restoration and enhancement projects, and conduct monitoring or research related to western Joshua tree. Agreeable terms could be negotiated and finalized in a conservation agreement, written MOU, or other agreement. NPS lands within the Conservation Plan geographic focus area consist of Joshua Tree National Park and Death Valley National Park.

- **Department of Defense (DOD)** may implement management actions for the protection of natural resources, including western Joshua tree. A written MOU or other agreement may be executed to coordinate actions with DOD resource managers. DOD lands within the Conservation Plan geographic focus area consist of Edwards Air Force Base, Marine Air Ground Task Force Training Command and Marine Corps Air Ground Combat Center Twentynine Palms, Marine Corps Logistics Base Barstow, National Training Center and Fort Irwin, and Naval Air Weapons Station China Lake.
- **Bureau of Land Management (BLM)** may include protections for western Joshua tree in land management plans for protecting existing trees on BLM lands, accepting relocated trees, allowing or supporting restoration efforts, and managing lands for a specific conservation focus through written durability agreements. Agreeable terms could be negotiated and finalized in a written MOU or other agreement. BLM's Bakersfield, Barstow, Bishop, Palm Springs–South Coast, and Ridgecrest field offices each administer western Joshua tree lands within the Conservation Plan geographic focus area.
- **US Forest Service (USFS)** may evaluate the addition of western Joshua tree to the species of conservation concern list for national forests within the Conservation Plan geographic focus area, implement special management considerations for western Joshua trees on USFS lands with an emphasis on climate refugia, reduce wildland fire risk in western Joshua tree habitat, establish avoidance buffers around western Joshua trees, limit western Joshua tree removal, relocate western Joshua trees when avoidance is not possible, limit ground disturbance in western Joshua tree habitat, restore degraded habitat, enhance western Joshua tree habitat (e.g., science-based assisted gene flow), host range-wide monitoring plots, and accept and manage adjacent or in-held western Joshua tree lands purchased using the Conservation Fund. Agreeable terms could be negotiated and finalized in a written MOU or other agreement. USFS lands within the Conservation Plan geographic focus area include all or portions of Angeles National Forest, Inyo National Forest, Sequoia National Forest, and San Bernardino National Forest.

In addition to these federal agency collaborators, the Mojave Desert Sentinel Landscapes Partnership's mission, as described in Section 2.3.3, includes conserving natural resources and enhancing resilience to climate change, which align with the goals of the Conservation Plan. CDFW has initiated communication with the Sentinel Landscapes Partnership in acknowledgement of these shared goals as they relate to western Joshua tree conservation and will seek collaborative opportunities to implement restoration and enhancement activities.

6.3.2 State Agencies

Collaboration with state agencies could help achieve many of the management actions described in the Conservation Plan, particularly on state-owned or managed lands (see Action LC&M 3.2, "Prioritize Management of State and Federal Lands for Western Joshua Tree," in Section 5.2.2). Examples of management actions that collaboration with state agencies could facilitate on state-owned lands include relocating western Joshua trees; minimizing impacts to western Joshua tree; conducting monitoring; implementing management actions; implementing habitat restoration or enhancement activities; managing wildland fire risk and acquiring conservation lands; minimizing grazing conflicts; and establishing buffers around western Joshua trees.

Source: Jessie Quinn, Ascent.

CDFW has coordinated with state resource agencies throughout the development of the Conservation Plan and will continue to collaborate on Conservation Plan updates, as needed. Potential collaboration between CDFW and other state agencies is described in more detail below and could be guided by written MOUs or other written agreements. Collaborative management actions could also be conducted through existing agency permits or management plans. Other state agencies that may collaborate on the conservation of western Joshua tree in the future include the California Conservation Corps, California Energy Commission, California High-Speed Rail Authority, California Public Utilities Commission, and California Department of Transportation.

- **California State Parks (CSP)** has been collaborating with CDFW to identify ways to implement management actions for western Joshua tree in State Park units. Examples include potentially receiving relocated western Joshua trees, when appropriate and consistent with CSP Department Operations Manual Policy 0310.4.1 on genetic integrity in revegetation and relocation efforts; hosting range-wide monitoring plots for western Joshua tree, its pollinator, and nurse plants; and receiving and managing priority conservation lands. Planning for any of these actions could be led by CSP in collaboration with CDFW and could be guided by written MOUs or other written agreements, State Park unit general plans, or applicable management plans.

- **California Department of Forestry and Fire Protection (CAL FIRE)** could implement management actions to conserve western Joshua tree together with its land management activities to protect human safety and infrastructure from wildland fires. CAL FIRE works with CDFW staff to review CAL FIRE fuel treatment projects in western Joshua tree habitat and to develop treatments that are protective of western Joshua tree and its habitat, as described Action R&I 1.15, "Develop Additional Fuel Treatment Methods" (see Section 5.2.4, "Research to Inform Long-Term Conservation").
- **California State Lands Commission (CSLC)** could require implementation of management actions in leases of State Lands to promote the protection of western Joshua trees. CSLC, in its capacity as landowner in trust for the people of California, could also undertake measures similar to those of CSP, such as limiting impacts to western Joshua trees, implementing habitat restoration activities, managing wildland fire risk, establishing buffers around western Joshua trees, and accepting relocated western Joshua trees on CSLC lands.

6.3.3 Local Agencies

Collaboration with local agencies, such as cities, counties, and special districts, could help implement Conservation Plan management actions. Local agencies can adopt policies and ordinances for avoidance and minimization of impacts through land use planning and efficient permitting processes. In addition, Regional Conservation Investment Strategies (RCISs) and Natural Community Conservation Plans (NCCPs) can include actions to conserve the species. Local agencies can also identify tree relocation receiver sites, monitor western Joshua tree populations, and conduct education and outreach for landowners and the public.

CDFW consulted with local agencies in the development of the Conservation Plan and will continue to collaborate with local agencies to implement the Conservation Plan and incorporate new or updated information, adjusted management actions, fees, or permitting processes into Conservation Plan amendments. CDFW continues to welcome feedback from the agencies on issues, successes, and ideas for improving western Joshua tree conservation efforts. CDFW will also seek feedback on aspects of the permitting process and written delegation agreements, ways to foster public awareness and engagement in western Joshua tree conservation in their communities, and creative solutions for specific projects to promote consistency with the conservation of western Joshua tree and WJTCA. In addition, counties and cities may adopt and enforce plans, policies, or ordinances that require, as a condition of approving a project, more protective measures for western Joshua tree conservation than those described in the Conservation Plan (Fish & G. Code, § 1927.11). Local agencies may also conserve western Joshua tree within their jurisdictions, such as by enacting additional local ordinances (e.g., western Joshua tree preservation ordinance), establishing county or city general plan policies (e.g., avoid or minimize impacts on western Joshua tree), preserving

trees within protected open space, and developing other conservation initiatives related to protection of western Joshua tree. Delegation of western Joshua tree take permitting authority to local governments per WJTCA (Fish & G. Code, §1927.3, subd. (c)) is described further in Section 6.5.1 below.

6.3.4 Public

GENERAL PUBLIC, UTILITIES, AND BUSINESSES

The public plays an important role in the protection of western Joshua tree. Private landowners, utilities, and businesses can protect existing trees on private lands through avoidance and minimization of impacts, beneficial land use practices, planting trees on their lands, and accepting relocated trees. Landowners may also protect in perpetuity western Joshua tree populations and habitats on their lands by recording conservation easements. The public may also organize or participate in volunteer opportunities that support conservation, research, and monitoring (e.g., local tree counts), as discussed in Section 5.2.5, "Education and Awareness."

Utilities, other businesses (e.g., energy companies, land developers), and private mitigation bank operators can implement business-oriented or voluntary actions for conservation of western Joshua tree. There are currently two CDFW-approved, privately owned mitigation banks that have created western Joshua tree credits for purchase. Mitigation banks protect habitat for the species in perpetuity, often through a conservation easement. Additional western Joshua tree mitigation banks, ideally within climate refugia or buffered climate refugia, are in process and may be approved in the future. The purchase of approved mitigation credits is one option for mitigating take of western Joshua tree.

NONGOVERNMENTAL ORGANIZATIONS

Nongovernmental organizations (NGOs), such as land conservancies, nonprofit conservation organizations, and land trusts, may voluntarily protect existing trees or plant trees on their lands. The Conservation Fund is a potential source of funding for these types of NGO activities (see Section 6.6 below for more detail). Examples of NGOs that currently play a role in western Joshua tree conservation, or may in the future, are National Fish and Wildlife Foundation (NFWF), through administration of the Conservation Fund; Center for Biological Diversity, which petitioned the species for listing under CESA; and Native American Land Conservancy, Mojave Desert Land Trust, and Transition Habitat Conservancy, through land acquisition and stewardship, public outreach, and seed banking. The Mojave Desert Land Trust has also received grant funding from the Wildlife Conservation Board to convene interested parties including, but not limited to, public agencies, Tribes, academic research

partners, and nongovernmental conservation organizations. The Mojave Desert Land Trust is leading the development of a Joshua Tree Conservation Coalition to provide input to inform Joshua tree conservation efforts.

RESEARCHERS

Organizations and agencies currently conducting research related to western Joshua tree include, but are not limited to, US Geological Survey; NPS; BLM; CSP; California State Parks Foundation; Mojave Desert Land Trust; Transition Habitat Conservancy; Willamette University; California State University, Northridge; University of California, Riverside; University of California, Santa Cruz; and Reed College. CDFW can help identify and support priority research efforts by working with universities, the USFWS-led Joshua Tree Biological Working Group of land management agency scientists, the Joshua Tree Conservation Coalition, and other research-oriented groups. CDFW can also help identify and support funding opportunities through CDFW and other agency grant opportunities.

6.4 TRIBAL CO-MANAGEMENT

The type of written agreements CDFW and California Native American tribes may co-develop and implement include written MOUs, memoranda of agreement, commitment letters, and conservation agreements. An example of a successful conservation strategy implemented through tribal co-management is an agreement between CDFW and the Winnemem Wintu Tribe in Northern California to fund co-management for restoration of the winter-run Chinook salmon population in the McCloud River Watershed (CDFW 2023). The agreement, which acknowledged the Tribe as a co-equal decision-maker with CDFW and the National Marine Fisheries Service, laid the foundation for the Tribe to apply its Traditional Ecological Knowledge and practical understanding of the species to specific management actions for its recovery. The co-management allowed the agencies to "…expand and accelerate our efforts to restore and recover Chinook salmon" (Cathy Marcinkevage, assistant regional administrator for National Oceanic and Atmospheric Association Fisheries West Coast Region) (Traverso 2023).

As an example of a coalition of Native American tribes establishing a co-management agreement with agencies, the Hopi, Navajo, Uintah and Ouray Ute, Ute Mountain Ute, and Zuni tribes formed the Bears Ears Inter-Tribal Coalition to propose the creation of Bears Ears National

Monument in Utah in 2015. The proposal included a legal basis and implementation strategy for collaborative management between the coalition, BLM, and USFS, leading to the development of an intergovernmental cooperative agreement (Bears Ears National Monument Cooperative Agreement 2022). The cooperative agreement established commitments to cooperative planning and program development, regularly scheduled meetings and agendas, confidentiality and protection guidelines for sensitive tribal information, and involvement of the coalition in land management, among other initiatives. Under the agreement, the Native American tribes in the Bears Ears Inter-Tribal Coalition advanced their own National Environmental Policy Act (NEPA) alternative for the Bears Ears National Monument Draft EIS and co-created the proposed Resources Management Plan, both of which were released to the public in March 2024.

The following provides additional examples of tribal co-management implementation.

- Establish programs and facilities that allow tribal members to engage in co-management. This could include establishment of a Tribe-led conservation corps, training for tribal members to become arborists and co-managers with CDFW in maintaining and monitoring existing and relocated western Joshua trees, and support for tribal facilities related to western Joshua tree conservation (e.g., nurseries or restoration work facilities) on tribal lands.
- Establish opportunities for ongoing collaboration and information sharing between CDFW and California Native American tribes while respecting Tribes' right to safeguard their traditional knowledge and cultural identities. Establish preferences in how information is shared between CDFW and Tribes for effective communication and respecting capacity of partners.
- Establish written agreements to notify Tribes of opportunities for western Joshua tree relocations.
- Mutually develop and document tribal and CDFW conflict resolution processes.
- Seek out and apply for grants to support the tribal co-management process, which would include compensation for participation in this process.
- Use available funding sources to support tribal co-management implementation.
- Clearly articulate the level of measurable support (e.g., capacity, time, expertise needed) for specific actions (e.g., grant application, accessibility) that CDFW can provide California Native American tribes to support implementation of co-management and provide said level of support.

6.5 PERMITTING AND REGULATIONS

WJTCA provides a framework for authorizing take of western Joshua tree through the issuance of permits (Fish & G. Code, § 1927.3, subd. (a)). Pursuant to this framework, permittees may elect to pay fees in-lieu of completing mitigation obligations. These fees are deposited into the Conservation Fund, which is the primary source of funds available to CDFW for implementation of the management actions in the Conservation Plan.

Each permit for take of western Joshua tree that is incidental to an otherwise lawful activity includes conditions and requirements that must be met for avoidance, minimization, and mitigation of impacts to western Joshua tree. These permit conditions are tailored to each project and are developed in consideration of available information regarding the efficacy of measures for the protection of the species (see Section 5.3, "Effectiveness Criteria"). The relocation protocol for western Joshua tree is provided in Appendix E, "Relocation Guidelines and Protocols." The various types of permits that may be issued for take of western Joshua tree are described below.

6.5.1 WJTCA Permitting

INCIDENTAL TAKE PERMITS ISSUED UNDER FISH AND GAME CODE SECTION 1927.3

Take of western Joshua tree may be authorized pursuant to WJTCA (Fish & G. Code, § 1927.3, subd. (a)). A WJTCA incidental take permit (ITP) may be issued when an applicant wishes to remove, trim, relocate, or work within the applicable avoidance buffer of one or more western Joshua trees for the purpose of completing a project. The applicant pays statutorily prescribed in-lieu fees to the Conservation Fund to mitigate and must also avoid and minimize take and impacts to western Joshua tree to the maximum extent practicable (Fish & G. Code, § 1927.3, subd. (a)(2)). The in-lieu fee amount is based on the location, number, and size classes of trees to be taken and is paid prior to CDFW issuing the ITP. Reduced fees are available for impacts to western Joshua trees in areas designated by WJTCA (Fish & G. Code, § 1927.3, subds. (d)(1)(A) and (B)). A map of the reduced fee area will be maintained on CDFW's Western Joshua Tree Conservation Permitting website (CDFW n.d.).

WJTCA ITP applications must include a description of the project, quantification of impacts to western Joshua tree, and a description of CEQA compliance for the project. ITPs issued under WJTCA must include a census of western Joshua trees on the project site with size-class information for and photographs of each individual tree. Project-specific permit conditions are included in a WJTCA ITP and could include avoidance and minimization measures, such as relocation of western Joshua tree, avoidance buffers, seed collection, limits on pesticide use, and use of desert native plant specialists, as defined in Section 5.2.1, "Impact Avoidance and Minimization," as well as monitoring and reporting. The permittee is responsible for following

the relocation protocol for western Joshua tree provided in Appendix E and implementing measures to ensure the survival of the relocated western Joshua trees. Landowners that agree to allow western Joshua trees to be relocated onto land they own will not be liable for survival of the relocated trees or changes to land use practices unless specified in written agreement with the permittee (Fish & G. Code, § 1927.3, subds. (g)(1) and (2)).

HAZARD MANAGEMENT PERMITS ISSUED UNDER FISH AND GAME CODE SECTION 1927.4

Under WJTCA, CDFW may also issue permits to authorize the removal or trimming of dead western Joshua trees or the trimming of live western Joshua trees, provided certain conditions are met (Fish & G. Code, § 1927.4). Pursuant to these permits, property owners and their agents may remove detached dead western Joshua trees and detached limbs of western Joshua tree, whereas all other removals or trimmings (i.e., attached trees or limbs) must be completed by a desert native plant specialist. Trimming of a live western Joshua tree pursuant to a hazard management permit cannot result in the death of the tree (e.g., trimming a tree so that no live branches remain).

CDFW may issue hazard management permits without requiring the payment of fees or other mitigation, provided that the dead western Joshua trees and any limbs to be removed have fallen over and are within 30 feet of a structure, are leaning against an existing structure, or create an imminent threat to public health or safety.

Western Joshua trees create hazards by falling on power lines or structures.

For the purposes of Fish and Game Code section 1927.4, a western Joshua tree must meet at least one of the following criteria to be considered dead:

- Has not burned and has no green leaves, no new growth on the main stem, and no basal sprouts.
- Has partially or fully burned at least 18 months prior and otherwise meets the above-listed criteria.
- Has fallen and is completely detached from its roots or has fallen and its roots are no longer in contact with the soil.

INCIDENTAL TAKE AND HAZARD PERMITS ISSUED BY COUNTIES AND CITIES PURSUANT TO DELEGATION AGREEMENTS

WJTCA allows CDFW to enter into an agreement with any county or city to delegate the ability to authorize, by permit, the taking of a western Joshua tree associated with developing single-family residences, multifamily residences, accessory structures, and public works projects, provided certain conditions are met (Fish & G. Code, § 1927.3, subd. (c)). Section 1927.3, subdivision (c)(3) of the Fish and Game Code specifies limits on the number of individual western Joshua trees that a project may take pursuant to a permit issued under a county's or city's delegated authority, depending on the project type, and requires CDFW's concurrence that certain projects have avoided and minimized the take of western Joshua trees to the maximum extent practicable. To receive this limited delegation of authority, a county or city must adopt an ordinance requiring the satisfaction of all requirements in section 1927.3 as a condition of approval for any take permit issued under such authority (Fish & G. Code, § 1927.3, subd. (c)(1)).

WJTCA ITPs may be issued by a county or city under a delegation agreement if the applicant is seeking take authorization for a maximum of 10 trees for a multifamily, single-family, or accessory structure project or for a maximum of 40 trees for a public works project, within the county's or city's jurisdiction. CDFW's written concurrence is needed prior to authorizing the take of more than 20, but no more than 40, individual western Joshua trees for a public works project. Delegation agreements must include the following conditions:

- The county or city must adopt an ordinance that mandates, as a condition of any WJTCA ITP issued by the county or city, satisfaction of the requirements of WJTCA.
- The county or city collects in-lieu fees for permits issued and remits them quarterly for deposit into the Conservation Fund.
- The county or city may impose a reasonable fee to cover the administrative costs of issuing the permit.
- CDFW retains express authority to suspend or revoke the county's or city's delegated authority to issue WJTCA ITPs.
- The county or city will submit quarterly reports to CDFW documenting the number of permits issued under this authority, photographs and other evidence demonstrating that take and other impacts were avoided and minimized to the maximum extent practicable, the number and size class of western Joshua trees authorized to be taken, the number of western Joshua trees relocated, the amount of fees collected, and other information required by CDFW.

- The county or city will conduct annual assessments, pursuant to guidance developed by CDFW, of the status of the local western Joshua tree population within the county or city and will submit the assessments to CDFW.

CDFW may also enter into an agreement with any county or city to delegate the ability to authorize, by permit, the removal or trimming of dead western Joshua trees or the trimming of live western Joshua trees that pose a risk to structures or public health and safety, provided certain conditions are met (Fish & G. Code, § 1927.4, subd. (b)). To receive this limited delegation of authority, counties and cities must ensure the requirements of Fish and Game Code section 1927.4, subdivision (a) are met and must comply with specific reporting requirements (Fish & G. Code, § 1927.4, subd. (b)).

6.5.2 California Endangered Species Act Permitting

SCIENTIFIC, EDUCATIONAL, AND MANAGEMENT PERMITS ISSUED UNDER FISH AND GAME CODE SECTION 2081, SUBDIVISION (A)

CDFW may, through permits or written MOUs, authorize import, export, take, or possession of species protected under CESA, including candidate species, such as western Joshua tree, for scientific, educational, or management purposes pursuant to Fish and Game Code section 2081, subdivision (a). These permits may also be issued to California Native American tribes for certain cultural purposes. CDFW may issue these permits for research and recovery actions for state-listed plant species, including seed banking, reintroduction efforts, and habitat restoration projects.

INCIDENTAL TAKE PERMITS ISSUED UNDER FISH AND GAME CODE SECTION 2081, SUBDIVISION (b)

Authorization for take of state-listed or candidate species can also be obtained through a Fish and Game Code section 2081, subdivision (b) permit, commonly referred to as a "CESA Incidental Take Permit or ITP." These permits may be issued to applicants whose projects will take state-listed or candidate species, including western Joshua trees that need to be removed, trimmed, or relocated incidental to the purpose of completing a project. Such take must be incidental to an otherwise lawful activity, rather than the purpose of the project. These permits are most commonly issued for residential and renewable energy development, utility, transportation, and other infrastructure-related projects.

CDFW may only issue a CESA ITP if (1) the take is incidental to an otherwise lawful activity; (2) the impacts of the authorized take are minimized and fully mitigated; (3) the applicant ensures adequate funding to implement the permit measures, monitor compliance with those measures, and monitor the effectiveness of the measures; and (4) issuance of the permit will

not jeopardize the continued existence of the species. The "fully mitigated" standard may be met through the purchase of conservation bank credits (when available) or through the conservation of habitat management lands. Minimization measures could include, but are not limited to, tree relocation, seed collection, limits on pesticide use, use of designated biologists, and reporting.

6.5.3 Natural Community Conservation Planning Act

As discussed in Section 2.3.1, "Natural Community Conservation Planning Program," NCCPs provide a framework to protect, enhance, and restore the natural resources in a specific area while streamlining incidental take permitting for CESA-listed and other covered species for activities covered under the NCCP. Priority conservation and mitigation areas are identified during plan development, prior to impacts occurring. Mitigation for activities covered under an NCCP is typically achieved through establishment of habitat reserves. Working with landowners, environmental organizations, and other interested parties, an implementing agency is responsible for implementing activities under an NCCP. CDFW is the state agency overseeing the NCCP program.

6.5.4 Restoration Management Permit Act

The Restoration Management Permit Act (Fish & G. Code, § 1670 et seq.) was enacted in September 2024 (AB 1581, Statutes of 2024). It authorizes CDFW to issue a Restoration Management Permit to allow the take, possession, import, or export of any species or subspecies of fish, wildlife, or plants, including western Joshua tree, in association with a management or propagation project that, among other things, has the primary purpose of restoring native fish, wildlife, plants, or their habitat. A qualifying project must also result in a substantial net benefit to native fish, wildlife, or plants, or their habitats.

6.6 CONSERVATION FUND AND IN-LIEU FEES

Pursuant to WJTCA, monies in the Conservation Fund are continuously appropriated to CDFW for the purpose of acquiring, conserving, and managing western Joshua tree conservation lands and completing other activities to conserve the species (Fish & G. Code, § 1927.5). Expenditures from the Conservation Fund may include but are not limited to, land acquisition or conservation easement costs, monitoring costs, restoration costs, transaction costs, and costs of endowments for land management or easement stewardship. All fees remitted to CDFW in lieu of completing mitigation activities under WJTCA ITPs will be deposited into the Conservation Fund. The Conservation Fund may also receive monies from other sources, such as donations, fines imposed as a penalty for unauthorized take of western Joshua tree (a

violation of the Fish and Game Code), and additional revenue from the Legislature or other programs to support the conservation of western Joshua tree.

CDFW will oversee all expenditures from the Conservation Fund and ensure funding is only allocated to eligible activities and entities. CDFW will prioritize expenditures and mitigation activities on properties with the highest conservation value to western Joshua tree, determined using a model-based land prioritization framework and mapping tool developed primarily by CDFW and NFWF. The tool will evaluate land conservation opportunities by assigning weighted values to criteria discussed in Section 5.2.2, Action LC&M 1, "Identify Priority Conservation Lands." Once CDFW has determined a proposed expenditure is eligible for monies from the Conservation Fund, NFWF, as the administrator of the Conservation Fund, will enter into a funding agreement with the entity receiving the monies. The funding agreement will require regular reporting on monies spent.

Annual reporting on the in-lieu fee program and status of mitigation activities funded with monies from the Conservation Fund, includes the number, location, and quality of the acres conserved; the amount of fees paid; the amount of all expenditures from the Conservation Fund; the projects and actions funded by expenditures from the Conservation Fund; and the adequacy of the in-lieu fees to conserve western Joshua tree. Reports will be submitted to the Commission and the Legislature for review.

WJTCA requires annual adjustments of in-lieu fees for the issuance of WJTCA ITPs (Fish & G. Code, § 1927.8, subd. (b)). Fees must be adjusted using the implicit price deflator, which is a price index that measures changes in the prices of goods and services produced in the United States. In addition, by December 31, 2026, and every 3 years thereafter, CDFW is required to adopt and subsequently amend regulations adjusting the in-lieu fees imposed under WJTCA, as necessary to ensure the conservation of the species. CDFW will use total cost accounting when determining the adequacy of the fees for ensuring conservation of the species.

6.7 LAND ACQUISITION PROTOCOLS

WJTCA requires CDFW to prioritize actions and the acquisition and management of lands as appropriate for western Joshua tree conservation (Fish & G. Code, § 1927.6, subd. (c)). Land acquisitions will occur in stages so CDFW can approve each stage before the land acquisition moves forward. CDFW will identify western Joshua tree lands that are available from willing sellers for fee title or conservation easement acquisition (Fish & G. Code, § 1927.6, subd. (d)(1)). Lands meeting the criteria listed in Section 5.2.2 will be prioritized for acquisition. Fee title and conservation easement acquisitions will only occur from willing sellers.

If CDFW determines land proposed for acquisition or conservation contains habitat for western Joshua tree, then reports, including preliminary title reports, a Phase I environmental site assessment report, and a mineral risk opinion, will be prepared or obtained to allow CDFW to identify any issues with the property (e.g., easements, access, litigation, liens, leases, mineral rights) and any potential conflicts with conservation goals, as described in Chapter 5.

Source: Bill Bjornstad, National Park Service.

If CDFW determines land is eligible for acquisition or protection, CDFW will work with the landowner to prepare a lands package consisting of real estate documents and land surveyor products (e.g., boundary, improvements or encumbrances maps, deed, preliminary title report). For lands requiring conservation easement acquisitions, CDFW will evaluate and approve an easement holder (grantee), land manager, and endowment holder to ensure compliance with Civil Code sections 815–816 and Government Code sections 65965–65968.

In the final stage of the land acquisition process, the real estate transaction will be completed (e.g., coordinate escrow, title, closing). The transaction will be funded with monies from the Conservation Fund, as directed by CDFW.

If the conservation easement or land acquisition includes restoration, enhancement, translocation, interim management, long-term land management, or monitoring, CDFW must review and approve a plan outlining these activities to ensure they are completed. For western Joshua tree habitat that is already legally protected and would benefit from enhancement, restoration, management, or monitoring, CDFW will review potential

enhancement and restoration projects for those lands, in accordance with the process shown in the CDFW Western Joshua Tree Conservation Act Enhancement and Restoration Projects Assessment (see Appendix H, "Enhancement and Restoration Prioritization Assessment").

Long-term management and monitoring will be funded through the Conservation Fund, as directed by CDFW (see Appendix I, "Land Acquisition Flow Chart").

6.8 MONITORING, SPECIES STATUS REVIEWS, PLAN AMENDMENT, AND ADAPTIVE MANAGEMENT

As mentioned in Section 1.5, "Western Joshua Tree Conservation Adaptive Management Framework," and consistent with WJTCA, the Conservation Plan is designed to be a living document to be updated and amended at regular intervals, as needed (Fish & G. Code, § 1927.8). As conditions evolve, this document may be amended to respond to changes and incorporate new information so that it can continue to provide effective guidance. The framework for monitoring, reviews, amendments, and adaptive management is described below.

6.8.1 Monitoring and Reporting

MONITORING

Monitoring of the effectiveness criteria, as detailed in Section 5.3, is essential to evaluate whether management actions are achieving their desired result over time, and if not, to determine if and how the measures should be modified. This will involve collection of western Joshua tree data to monitor and assess the species' population status. CDFW will also evaluate metrics that measure the effectiveness of the management actions and assist with developing new or more refined effectiveness criteria as new information (e.g., biological data collected as a result of Management Action R&I 1, "Continue Research and Information Development" [see Section 5.2.4]) is gathered.

ANNUAL REPORTING

CDFW is required by WJTCA (Fish & G. Code, § 1927.7, subd. (a)) to provide annual reports to the Commission and the Legislature. These annual reports will document metrics related to the performance of the permitting and mitigation framework included in WJTCA and described above in Section 6.5, as well as metrics related to the conservation status of western Joshua tree, including the following information:

- Number of permits and the size-class and number of trees taken.
- Number and location of trees relocated.

- Acreage and location of Joshua tree woodland (dominated by western Joshua tree) developed.
- Type, scope, and scale of mitigation measures undertaken by permittees.
- Acreage, quality, and location of Joshua tree woodland (dominated by western Joshua tree) conserved.
- The amount of fees paid, the amount of all expenditures from the Conservation Fund, and the adequacy of the fees to conserve western Joshua tree.
- A summary of the information provided by counties and cities pursuant to written delegation agreements.

Data from annual reporting can be used to evaluate how mitigation is compensating for permitted take of western Joshua trees, participation and compliance levels with permit conditions and written delegation agreements, and progress toward reaching conservation goals.

6.8.2 Species Status Review

CDFW will prepare an updated status review report for western Joshua tree and submit it to the Commission no later than January 1, 2033. The Commission will then determine whether western Joshua tree should be listed as endangered or threatened pursuant to CESA. The status review report will incorporate scientific information relevant to the status of the species developed or acquired by CDFW after it conducted the last status review in 2022. The report will also include an evaluation of the effectiveness of the conservation and management efforts to date (Fish & G. Code, § 1927.9). In determining whether listing western Joshua tree under CESA is warranted, the Commission will consider all of the following:

- The effectiveness of conservation measures for western Joshua tree funded through expenditures of in-lieu fees.
- The Conservation Plan.
- Annual reports submitted to the Commission since adoption of the Conservation Plan.
- Any recommendations submitted by CDFW to the Commission for western Joshua tree.
- Fee adjustments, if any.
- The updated status review report described above (Fish & G. Code, § 1927.2, subd. (c)) (see Chapter 5 for more detail).

6.8.3 Plan Amendments and Adaptive Management

In accordance with WJTCA, starting in 2026 and at least every 2 years thereafter, the Commission will review the effectiveness of the Conservation Plan in conserving the species (Fish & G. Code, § 1927.8). CDFW will make recommendations to the Commission concurrent with the Commission's review of the status of western Joshua tree. As part of this review, CDFW will recommend proposed amendments to the Conservation Plan, if needed. Any Conservation Plan amendments must be reviewed and adopted by the Commission.

CDFW developed the Conservation Plan based on the best available information at the time of preparation, consisting of "credible science" as defined in the California Fish and Game Code section 33; TEK; collaboration with Tribes; collaboration with federal, state, and local government agencies; and public feedback. New information from ongoing research, monitoring, and other sources will become available over time, and adjustments will be required to keep the Conservation Plan up to date. Data will be collected at various scales, from site-specific to range-wide within California. As described in Chapter 1, "Introduction," an adaptive management approach allows for implementing management actions, closely monitoring and evaluating outcomes of management, and reevaluating and adjusting decisions as more information is learned. The Conservation Plan anticipates that CDFW, in collaboration with Tribes, governmental agencies, and other entities, will continue to monitor the outcomes of management actions and will adjust future actions accordingly. CDFW will also continue to seek input from the general public regarding implementation of the Conservation Plan and its effectiveness in conserving western Joshua tree.

Source: Alessandra Puig-Santana, National Park Service.

7 PLAN PREPARERS

The Western Joshua Tree Conservation Plan was prepared through the collaborative efforts of staff listed below from the California Department of Fish and Wildlife, the Native American Land Conservancy, Ascent Environmental, Inc. dba Ascent, ASM Affiliates, Piñon Heritage Solutions, and California Native American tribes listed in Chapter 3, Section 3.1 "California Native American Tribes Collaborating on the Conservation Plan" and Appendix C, "Tribal Input Summary Memo."

7.1 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Contributors

Drew Kaiser ..... Senior Environmental Scientist (Specialist)/Project Manager
Jeb Bjerke ..... Senior Environmental Scientist (Specialist)
Mariel Boldis ..... Environmental Scientist
Isabel Baer ..... Environmental Program Manager
Cristin Walters ..... Senior Environmental Scientist Supervisor

Reviewers

Kelley Barker ..... Environmental Program Manager
Sarah Fonseca ..... Department Tribal Liaison
Steven Ingram ..... Assistant Chief Counsel
Lani Maher ..... Attorney
Jasen Yee ..... Supervising Right-of-Way Agent
Mika Samoy ..... Environmental Scientist

7.2 NATIVE AMERICAN LAND CONSERVANCY

T. Robert Przeklasa, PhD ..... Executive Director
Desirae Najares-Jordan, MSS ..... Tribal Outreach Specialist
Nicole Johnson, MA, JD ..... Secretary

7.3 CONSULTANT TEAM

7.3.1 Ascent

Contributors

Linda Leeman, CWB ..... Principal
Jessie Quinn, PhD ..... Project Manager/Senior Natural Resources Planner
Hannah Weinberger ..... Assistant Project Manager/Biologist
Curtis E. Alling, AICP ..... Principal Planner
Tammie Beyerl ..... Senior Biologist
Nicole Greenfield ..... Environmental Planner
Molly Nagel ..... Environmental Planner
Stephanie Rassmussen ..... Senior Environmental Planner
Allison Fuller ..... Senior Wildlife Biologist
Grace Mannell ..... Biologist
Taelor Whittington ..... Biologist
Sara Violett ..... Biologist
Nick Kryshak ..... Biologist
Lisa Merry ..... Senior GIS Specialist
Matthew Watson ..... GIS Administrator
Corey Alling ..... Senior Graphics and Communication Specialist
Gretel Hakanson ..... Environmental Technical Editor/Publication Specialist
Riley Smith ..... Publication Specialist
Michele Mattei ..... Publishing Manager

Reviewers

Erik de Kok, AICP ..... Director of Interdisciplinary Planning
Adam Lewandowski, AICP ..... Conservation and Recreation Planning Manager

7.3.2 ASM Affiliates

Brian Williams, MMA, RPA ..... Chief Executive Officer
Dustin Merrick, MA, RPA ..... Senior Archaeologist

7.3.3 Piñon Heritage Solutions

Elizabeth Bagwell, PhD, RPA ..... Owner and Principal
Diana T. Dyste, MA, RPA ..... Principal Investigator, Senior Archaeologist, Ethnographer
Kanya Yoshihiro MA, RPA ..... Senior Cultural Resource Specialist/Senior Archaeologist
Rick Ralls ..... Associate Archaeologist

8 GLOSSARY OF TERMS

A

abiotic factors. Nonliving parts of an ecosystem.

acquisition. The term "acquisition" as used in the Western Joshua Tree Conservation Plan (Conservation Plan) is the process of obtaining land dedicated to a specific use or uses by purchase, exchange, donation, or condemnation.

adaptive genetic variation. Genetic variation within a species that allows it to adapt to changes in environmental conditions.

adaptive management. A structured process that allows for implementing management actions, that is based on closely monitoring and evaluating outcomes, and reevaluating and adjusting decisions as more information is learned.

arbuscular mycorrhizal fungi. Soil microorganisms that can form mutualistic relationships with most terrestrial plants.

assisted migration. Human-assisted movement of species in response to climate change.

B

bajadas. A broad slope of alluvial material at the foot of an escarpment or mountain.

basal sprouts. New vegetative growth that sprouts from buds on the base of a tree.

biological soil crusts. Soil surface layers that include bacteria, cyanobacteria, algae, mosses, liverworts, fungi, or lichens and that can be major components of undisturbed desert ecosystems. These are also known as "biotic soil crusts" or "biocrusts."

biotic factors. Living parts of an ecosystem.

C

California Native American tribes. Collective reference to federally recognized Native American tribes and any non-federally recognized tribes located in California that are on the contact list maintained by the California Native American Heritage Commission for the purposes of cultural resources assessment and protection.

candidate species. A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the California Fish and Game Commission (Commission) has formally noticed as being under review by the California Department of Fish and Wildlife (CDFW) for addition to either the list of endangered species or the list of threatened species, or a species for which the Commission has published a notice of proposed regulation to add the species to either list (Fish & G. Code, § 2068).

climate refugia. Areas that remain relatively buffered from contemporary climate change over time enabling persistence of valued physical, ecological, and sociocultural resources.

conservation easement. A legal agreement that protects land by permanently limiting some uses that would compromise the conservation values of the property.

Conservation Fund. The Western Joshua Tree Conservation Fund as described in Section 1927.5 (Fish & G. Code, § 1927.1, subd. (g)), which states in part, that any moneys in the fund are continuously appropriated to the department solely for the purposes of acquiring, conserving, and managing western Joshua tree conservation lands and completing other activities to conserve the western Joshua tree (Fish & G. Code, § 1927.5, subd. (a)).

conservation land. Land that is identified as appropriate for western Joshua tree conservation by CDFW.

conserve. The terms "conserve" and "conservation" as stated in WJTCA and used in this Conservation Plan apply to the use of methods and procedures that are necessary to bring species listed pursuant to the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.) to the point at which the measures provided pursuant to CESA are no longer necessary, and for species that are not listed to maintain or enhance the condition of the species so that listing will not become necessary (Fish & G. Code, § 1927.1, subd. (c)).

D

dead western Joshua tree. a dead western Joshua tree is one that meets at least one of the following criteria: (1) has not burned and has no green leaves, no new growth on the main stem, and no basal sprouts; (2) has partially or fully burned at least 18 months prior and

otherwise satisfies criteria 1; (3) has fallen and is completely detached from its roots or has fallen, and its roots are no longer in contact with the soil (Fish & G. Code, § 1927.1, subd. (d))).

delegation agreements. An agreement with any city or county delegating to the local agency the ability to authorize take of western Joshua tree associated with developing single-family residences, multifamily residences, accessory structures, and public works projects or to authorize the removal or trimming of dead western Joshua trees or trimming of live western Joshua trees that have fallen over and are within 30 feet of a structure, are leaning against an existing structure, or creating an imminent threat to public health or safety (Fish & G. Code, §§ 1927.3, subd. (c), 1927.4, subd. (b)).

desert native plant specialist. An arborist certified by the International Society of Arborists, or an individual with at least 5 years of professional experience with relocation or restoration of native California desert vegetation (Fish & G. Code, § 1927.1, subd. (e)).

direct effects. Actions or changes in an organism's environment that occur as a direct result of human activity and that have a physical effect on the organism. Examples may include dust from equipment landing on leaves; damage to stems, roots, or seeds; or killing and removal of trees.

distribution. The actual sites where individuals and populations of the species occur within the species' range. It is often impossible to have the perfect knowledge necessary to know the true distribution of individuals of a species, and this term is therefore often used conceptually.

E

ecoregion. Ecoregions are delineated based on associations of biotic factors (i.e., living parts of an ecosystem) and environmental factors that affect energy, moisture, and nutrient gradients, which regulate the structure and function of ecosystems, and environmental factors, including climate, physiography, water, soils, air, hydrology, and potential natural communities.

endangered species. A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (Fish & G. Code, § 2062).

endowment. Financial assets that are structured so the initial amount invested (i.e., the principal, capital, or corpus) remains intact, and only the interest or investment gains are withdrawn.

enhancement. Habitat enhancement involves the modification of certain characteristics of a site with the goal of increasing specific habitat functions based on management objectives, such as increasing habitat suitability for a particular species.

environmental justice. The fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (Gov. Code § 65040.12, subd. (e)).

F

fee. The elective fee described in subdivisions (d) and (e) of Section 1927.3, which is to be deposited into the Western Joshua Tree Conservation Fund (Fish & G. Code, § 1927.1, subd. (f)).

fire return interval. Time between fires.

G

generation length. Time from seedling establishment to reproductive maturity.

geographic focus area. The general location of current and potential future suitable western Joshua tree habitat referenced in the Western Joshua Tree Conservation Plan.

H

habitat. An area that provides the necessary resources for a species or population to survive and reproduce. Habitat for a species may be occupied or unoccupied by the species.

herbivory. The consumption of plant material by animals. Herbivory is a key ecosystem process that reduces biomass and density of plants or plant materials, transfers mass and nutrients to the soil or water column, and affects habitat and resource conditions for other organisms.

I

implicit price deflator. The ratio of current dollar value of a series, such as gross domestic product (GDP), to a constant dollar value. It is used as a measure of inflation.

in-lieu fee. A payment of a specified fee by a project proponent to an agency in place of implementing mitigation for environmental impacts.

indirect effects. Actions or changes in an organism's environment that occur as an indirect result of human activity and that do not necessarily have an immediate physical effect on the organism. Examples may include changes in hydrology from human activities elsewhere, removal of unoccupied habitat, spread of invasive species or creation of conditions that are

favorable for their spread, pollution, greenhouse gas emissions, or effects to other organisms on which a species relies.

inflorescence. Group or cluster of flowers on one main stem on a plant.

J

Joshua tree. Western Joshua tree (*Yucca brevifolia*) or eastern Joshua tree (*Yucca jaegeriana*). This term shall be used to mean both western Joshua tree and eastern Joshua tree collectively, or it may be used when the information presented is not known to be specific to one of the two species.

K

xxx

L

xxx

M

masting. Mast seeding is the intermittent production of many seeds by many individuals of a species at the same time in the same region.

memorandum of understanding. A memorandum of understanding (MOU) is an agreement between two or more parties/institutions/governments. MOUs serve to document each collaborator's expectations or intentions.

mutualism. An ecological relationship in which two different species benefit one another.

N

natural community conservation plan. A plan that identifies and provides for the measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible and appropriate economic development, growth, and other human uses (Fish & G. Code, § 2805, subd. (h)).

nurse plant. A plant that facilitates the growth and development of other plant species beneath its canopy.

O

xxx

P

pollinator. An animal that moves pollen from the anther (male part) of one flower to the stamen (female part) of another flower to allow fertilization and seed and fruit production.

population resiliency. A population's ability to recover from impacts.

public works project. A project involving the erection, construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind. (Fish & G. Code, § 1927.1, subd. (i)).

prescribed herbivory. Intentional use of domestic livestock to remove, rearrange, or convert vegetation.

Q

xxx

R

range. The general geographic area in which individuals of a species occur during their lifetime. For purposes of this Conservation Plan, the range of western Joshua tree is considered to be approximately 13,088 square kilometers (5,053.3 square miles) and is illustrated in Figure 4-1.

reburns. Fires burning in a recent fire scar.

recruitment. The process by which new individuals are added to a species' population

relocate. The terms "relocate" and "relocation" mean the removal of a living western Joshua tree and a sufficient portion of its root mass from the ground and transplanting it (Fish & G. Code, § 1927.1, subd. (j)).

restoration. Habitat restoration is the act of recreating characteristics of a site to bring it back to a condition that existed under the stewardship of California Native American tribes or before it was damaged or degraded by natural or human disturbances post-colonization.

S

xxx

T

take. Hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. (Fish & G. Code, § 86).

threatened species. A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts (Fish & G. Code, § 2067).

tribal lands. Tribal lands include lands meeting the definition of "Indian country" in 18 US Code Section 1151 held in trust by Tribes (rancherias/reservations) or tribal members (individual allotments usually within rancherias/reservations); fee lands held by Tribes (land purchased and owned by a Tribe typically outside of rancherias/reservations); or fee lands held by tribally-led nonprofits (e.g., Native American Land Conservancy) or nonprofits formed by non-Federally recognized Tribes to act on the Tribe's behalf as a vehicle to hold land.

Traditional Ecological Knowledge. Also known as TEK, Traditional Ecological Knowledge refers to the evolving knowledge acquired by Native and indigenous peoples over hundreds or thousands of years through direct contact with the environment. Traditional Ecological Knowledge is an accumulating body of knowledge, practices, and beliefs, evolving by adaptive processes and handed down through generations by cultural transmission, about the interconnected relationships of living beings (human and non-human) with one another and the environment. Traditional Ecological Knowledge encompasses the world view of Native people, which includes ecology, spirituality, human and animal relationships, and more.

U

xxx

V

vegetation communities. Groups of plant species that tend to co-occur and repeat across the landscape (e.g., Joshua tree woodland alliance).

W

western Joshua tree. The common name for *Yucca brevifolia*; an evergreen, tree-like plant that has been treated as a member of the asparagus family (Asparagaceae) (Fish & G. Code, § 1927.1, subd. (l)).

wildland fire. Wildland fire is an environmental and human health and safety hazard where unplanned and uncontrolled fire burns on the landscape.

wildland-urban interface. Zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

X

xxx

Y

yucca moth. One of many moth species in the genera *Tegeticula* or *Parategeticula*, which are specialized pollinators for yucca plant species. The obligate pollinator for western Joshua tree is *Tegeticula synthetica*.

Z

xxx

9 REFERENCES

CHAPTER 1 INTRODUCTION

California Department of Fish and Wildlife (CDFW). 2022. Status review of Western Joshua tree (*Yucca brevifolia*). A report to the Fish and Game Commission, California Natural Resources Agency, Sacramento, CA, USA. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=201995&inline (Accessed: 15 January 2024).

Center for Biological Diversity. 2019. A petition to list the Western Joshua tree (*Yucca brevifolia*) as threatened under the California Endangered Species Act (CESA). A petition before the California Fish and Game Commission, Joshua Tree, CA, USA. Available from: https://www.biologicaldiversity.org/species/plants/pdfs/CESA-petition-Western-Joshua-Tree-10-15-19.pdf (Accessed: 25 January 2024).

Esque, T. C., D. F. Shyrock, G. A. Berry, F. C. Chen, L. A. DeFalco, S. M. Lewicki, B. L. Cunningham, E. J. Gaylord, C. S. Poage, G. E. Gantz, R. A. Van Gaalen, B. O. Gottsacker, A. M. McDonald, J. B. Yoder, C. I. Smith, and K. E. Nussear. 2023. Unprecedented distribution data for Joshua trees (*Yucca brevifolia* and *Y. jaegeriana*) reveal contemporary climate associations of a Mojave Desert icon. Frontiers in Ecology and Evolution 11:1–20. https://www.doi.org/10.3389/fevo.2023.1266892.

Fernandeño Tataviam Band of Mission Indians (FTBMI). May 2024—meetings in San Fernando, CA, with Fernandeño Tataviam Band of Mission Indians representatives and Native American Land Conservancy (NALC) regarding the Western Joshua Tree Conservation Plan project.

Louderback, L. A., B. M. Pavlik, and A. M. Spurling. 2013. Ethnographic and archaeological evidence corroborating *yucca* as a food source, Mojave Desert, USA. Journal of Ethnobiology 33(2):281–297. https://doi.org/10.2993/0278-0771-33.2.281.

Sutton, M. Q., and D. D. Earle. 2017. The Desert Serrano of the Mojave River. Pacific Coast Archaeological Society Quarterly 53(2 and 3):1–61.

Yoder, J. B., A. K. Andrade, L. A. DeFalco, T. C. Esque, C. J. Carlson, D. F. Shryock, R. Yeager, and C. I. Smith. 2024. Reconstructing 120 years of climate change impacts on Joshua tree flowering. Ecology Letters. http://doi.org/10.1111/ele.14478.

CHAPTER 2 PLANNING INFLUENCES

Advisory Council on Historic Preservation (ACHP). 2024. ACHP Policy Statement on Indigenous Knowledge and Historic Preservation, March 2024. Available from: https://www.achp.gov/digital-library-section-106-landing/achp-policy-statement-indigenous-knowledge-and-historic (Accessed: 9 July 2024).

Bengston, A., A. Cudmore, B. Fadie, and D. Markowitz. 2016. Working at the Landscape Scale: Lessons from the Desert Renewable Energy Conservation Planning Process. Available from: https://deepblue.lib.umich.edu/bitstream/handle/2027.42/134686/SNRE_DRECP_Final_081816.pdf?sequence=1 (Accessed: 21 May 2024).

California Department of Fish and Wildlife (CDFW). 2014. Tribal communication and consultation policy. Departmental bulletin. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=122905&inline (Accessed: 25 January 2024).

California Department of Fish and Wildlife (CDFW). 2015. State Wildlife Action Plan (SWAP). Available from: https://wildlife.ca.gov/SWAP/Final (Accessed: 19 June 2024).

California Department of Fish and Wildlife (CDFW). 2022. Status review of Western Joshua tree (*Yucca brevifolia*). Report to the Fish and Game Commission. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=201995&inline (Accessed: 15 January 2024).

California Department of Fish and Wildlife (CDFW). 2023. California Natural Community List. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline (Accessed: 23 October 2024).

California Department of Fish and Wildlife (CDFW). 2024. Natural Communities. Available from: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities (Accessed: 23 October 2024).

California Fish and Game Commission (Commission). 2017. California Fish and Game Commission Tribal Committee Co-management Vision and Definition Statements, October 10, 2017. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150187&inline (Accessed: 24 June 2024).

California Fish and Game Commission (Commission). 2020. California Fish and Game Commission Co-Management Vision Statement and Definition, February 2020. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=184474 (Accessed: 24 June 2024).

California Natural Resources Agency (CNRA). 2012. California Natural Resources Agency adoption of final tribal consultation policy. Available from: https://resources.ca.gov/-/media/CNRA-Website/Files/Tribal-Policy/Final_Tribal_Policy.pdf (Accessed: 25 January 2024).

California Natural Resources Agency (CNRA). 2023. Lands Inventory Fact Sheet. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=160405&inline (Accessed: 16 July 2024).

California Natural Resources Agency (CNRA). 2024. Tribal Stewardship Strategy and Toolkit. Available from: https://resources.ca.gov/Initiatives/Tribalaffairs/TribalStewardshipStrategy (Accessed: 21 October 2024).

California State Lands Commission (CSLC). 1975. Inventory of unconveyed state school lands & tide & submerged lands possessing significant environmental values. Available from: https://www.slc.ca.gov/wp-content/uploads/2018/11/1975-InvUnconveyedLands.pdf (Accessed: 21 May 2024).

California State Lands Commission (CSLC). 2008. Resolution by the California State Lands Commission supporting the environmentally responsible development of school lands under the Commission's jurisdiction for renewable energy related projects. Available from: https://www.slc.ca.gov/wp-content/uploads/2018/10/Resolution.pdf (Accessed: 7 February 2024).

California State Lands Commission (CSLC). 2012. Report to the California State Legislature on the status of school land consolidation efforts in the California desert. Available from: https://www.slc.ca.gov/wp-content/uploads/2018/07/SL_RpttoLeg_2012.pdf (Accessed: 7 February 2024).

California State Lands Commission (CSLC). 2023. Staff report 85. Available from: https://slcprdwordpressstorage.blob.core.windows.net/wordpressdata/2023/02/02-28-23_85.pdf (Accessed: 7 February 2024).

California State Lands Commission (CSLC). 2024. About California State Lands Commission. Available from: https://www.slc.ca.gov/about/ (Accessed: 7 February 2024).

California State Parks (CSP). 2004. DPR Operations Manual. Available from: https://www.parks.ca.gov/pages/21299/files/DOM%200300%20Natural%20Resources.pdf (Accessed: 24 October 2024).

California State Parks (CSP). 2020. 2020 Soil conservation standard and guidelines. Available from: https://ohv.parks.ca.gov/pages/1140/files/Final_2020Soil_Conservation_Standard_Guidelines.pdf (Accessed: 26 June 2024).

California State Parks (CSP). 2021. 2021 Wildlife habitat protection plan framework. Available from: https://ohv.parks.ca.gov/pages/1140/files/07-28-2021-5D-Wildlife%20Habitat%20Protection%20Plan%20(WHPP)%20Framework.pdf (Accessed: 26 June 2024).

California State Parks (CSP). 2022. Update on tree shelters for Joshua tree restoration, Arthur B Ripley Desert Woodland State Park.

California State Parks (CSP). 2023. Red Rock Canyon State Park Draft General Plan.

California State Parks (CSP). 2024. 2024 Wildlife Habitat Protection Plan, Hungry Valley State Vehicular Recreation Area. Available from: https://demo2.parks.ca.gov/pages/1140/files/Hungry%20Valley%20SVRA_WHPP%20Public_Draft_20240605_Optmz.pdf (Accessed: 21 June 2024).

California State Parks (CSP). n.d. Purpose statements. Available from: https://www.parks.ca.gov/pages/712/files/purpose%20statements%20report.pdf (Accessed: 5 February 2024).

California Wildlife Conservation Board (WCB). n.d. Desert Conservation Program. Available from: https://wcb.ca.gov/Programs/Desert (Accessed: 5 February 2024).

Clark, Joseph. 2024. DOD, Interagency Partners Designate 5 New Sentinel Landscapes. Available: https://www.defense.gov/News/News-Stories/Article/Article/3776193/ (Accessed 22 October 2024).

Cole, K. L., K. Ironside, J. Eischeid, G. Garfin, P. B. Duffy, and C. Toney. 2011. Past and ongoing shifts in Joshua tree distribution support future modeled range contraction. Ecological Applications 2(1):137–149. https://doi.org/10.1890/09-1800.1.

Esque, T. C., D. F. Shyrock, G. A. Berry, F. C. Chen, L. A. DeFalco, S. M. Lewicki, B. L. Cunningham, E. J. Gaylord, C. S. Poage, G. E. Gantz, R. A. Van Gaalen, B. O. Gottsacker, A. M. McDonald, J. B. Yoder, C. I. Smith, and K. E. Nussear. 2023. Unprecedented distribution data for Joshua trees (*Yucca brevifolia* and *Y. jaegeriana*) reveal contemporary climate associations of a Mojave Desert icon. Frontiers in Ecology and Evolution 11:1–20. https://www.doi.org/10.3389/fevo.2023.1266892.

Fort Independence Indian Community of Paiute Indians (FIICPI). July 2, 2024—meeting on Teams, with Fort Independence Indian Community of Paiute Indians regarding the Western Joshua Tree Conservation Plan project.

412th Civil Engineer Group, Environmental Management Division (412 CEG/CEVA). 2017. Joshua Tree Historical Status on Edwards Air Force Base, CA. Cited in US Air Force 2020.

ICF. 2021. Antelope Valley Regional Conservation investment strategy. Prepared for Desert Mountains Conservation Authority, Quartz Hill, CA, USA. Available from: https://wildlife.ca.gov/Conservation/Planning/Regional-Conservation/RCIS (Accessed: 30 January 2024).

Inyo County. 2001 (December). *Goals and Policies Report for the Inyo County General Plan*. Retrieved from: https://www.inyocounty.us/services/planning-department/inyo-county-general-plan. Accessed: 19 January 2024.

Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC MCAGCC). 2024. Integrated natural resources management plan. Available from: https://www.29palms.marines.mil/Portals/56/Docs/Environmental-Affairs/IntegratedNaturalResourcesPlan-FY2024-2028.pdf (Accessed: 21 May 2024).

National Aeronautics and Space Administration (NASA). 2024. Endangered and Threatened Species. Available from: https://www.nasa.gov/emd/natural-resource-management/endangered-and-threatened-species/ (Accessed: 12 February 2024).

National Park Service (NPS). 1995. General management plan: development concept plans: environmental impact statement. Available from: https://ia801600.us.archive.org/29/items/generaljoshuatree00nati/generaljoshuatree00nati.pdf (Accessed: 5 February 2024).

National Park Service (NPS). 2000. Backcountry and wilderness management plan. Available from: http://npshistory.com/publications/jotr/bwmp-2000.pdf (Accessed: 5 February 2024).

National Park Service (NPS). 2006. Management Policies 2006. Available from: https://www.nps.gov/subjects/policy/upload/MP_2006.pdf (Accessed: 5 February 2024).

National Park Service (NPS). 2012. Death Valley National Park wilderness and backcountry stewardship plan and environmental assessment. Available from: https://parkplanning.nps.gov/document.cfm?documentID=478020 (Accessed: 5 February 2024).

National Park Service (NPS). 2017a. Foundation document. Available from: https://www.nps.gov/jotr/learn/management/foundation-document.htm (Accessed: 30 January 2024).

National Park Service (NPS). 2017b. Foundation document, Death Valley National Park, California, Nevada. Available from: https://www.nps.gov/deva/getinvolved/upload/DEVA_FD_2017_508.pdf. Accessed: February 5, 2024.

National Park Service (NPS). 2021a. Resource stewardship strategy summary, Joshua Tree National Park, California. Available from: https://www.nps.gov/jotr/learn/management/upload/JOTR_RSS_508_2021-0301.pdf (Accessed: 5 February 2024).

National Park Service (NPS). 2021b. General management plan. Available from: https://www.nps.gov/deva/general-management-plan.htm (Accessed: 5 February 2024).

National Park Service (NPS). 2021c. Dome fire restoration plan.

National Park Service (NPS). 2022. Superintendent's compendium. Available from: https://www.nps.gov/jotr/learn/management/superintendents-compendium.htm (Accessed: 5 February 2023).

National Park Service (NPS). 2023. Joshua Tree National Park announces historic agreement with Twenty-Nine Palms Band of Mission Indians. Available from: https://www.nps.gov/jotr/learn/news/historic-agreement-with-twenty-nine-palms-band.htm (Accessed: 2 February 2024).

National Park Service (NPS). 2024. Fire safety, history, and regime. Available from: https://www.nps.gov/jotr/learn/nature/fireregime.htm#:~:text=The%20key%20to%20managing%20fire,treatments%20designed%20to%20hasten%20recovery. (Accessed: 20 June 2024).

Parker, S. S., B. S. Cohen, and J. Moore. 2018. Impact of solar and wind development on conservation values in the Mojave Desert. PLOS ONE 13(12):1–16. https://doi.org/10.1371/journal.pone.0207678.

Randall, J. M., S. S. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer, and S. Morrison. 2010. Mojave Desert ecoregional assessment. Unpublished report. The Nature Conservancy. San Francisco, CA, USA. Available from: https://www.scienceforconservation.org/assets/downloads/Mojave_Desert_Ecoregional_Assessment_2010.pdf (Accessed: 2 April 2024).

San Bernardino Council of Governments (SBCOG). 2023. Public draft San Bernardino County regional conservation investment strategy. Available from: https://wildlife.ca.gov/Conservation/Planning/Regional-Conservation/RCIS (Accessed: 30 January 2024).

Smith, C. I., L. C. Sweet, J. Yoder, M. R. McKain, K. Heyduk, and C. Barrows. 2023. Dust storms ahead: climate change, green energy development and endangered species in the Mojave Desert. Biological Conservation 277. https://doi.org/10.1016/j.biocon.2022.109819.

US Air Force. 1994. Edwards Air Force Base Revegetation Plan. Edwards Air Force Base, CA, USA. Cited in US Air Force 2020.

US Air Force. 2020. Edwards Air Force Base integrated natural resources management plan 2020-2025. Available from: https://www.edwards.af.mil/About/Environment/ (Accessed: 30 January 2024).

US Army. 2006. National Training Center and Fort Irwin integrated natural resources management plan and environmental assessment 2006–2011. National Training Center and Fort Irwin, CA, USA.

US Bureau of Land Management (BLM). 1999. The California desert conservation area plan, 1980 as amended. Available from: https://eplanning.blm.gov/public_projects/lup/66949/82080/96344/CDCA_Plan.pdf (Accessed: 2 February 2024).

US Bureau of Land Management (BLM). 2015. DRECP proposed LUPA and final EIS, Chapter III.11. Land use and policies. Available from: https://eplanning.blm.gov/public_projects/lup/66459/20012405/250016910/III.11_Land_Use_and_Policies.pdf (Accessed: 7 February 2024).

US Bureau of Land Management (BLM). 2016. Land use plan amendment. Desert renewable energy conservation plan. Available from: https://eplanning.blm.gov/public_projects/lup/66459/133474/163144/DRECP_BLM_LUPA.pdf (Accessed: 29 January 2024).

US Bureau of Land Management (BLM). 2020. Re: Receipt of Donation Letter for Rudnick Common Allotment #05008.

US Bureau of Land Management (BLM). n.d. BLM fire program. Available from: https://www.blm.gov/programs/fire (Accessed: 25 June 2024).

US Bureau of Land Management (BLM) and California Department of Fish and Wildlife (CDFW). November 27, 2012. Memorandum of Understanding by and between the Bureau of Land Management and the California Department of Fish and Wildlife. Available from: https://www.blm.gov/sites/default/files/docs/2022-06/2015%20Durability%20Agreement%20BLM.CAFW_10.2.15_%20508%20compliant%20final.pdf. Accessed: 24 October 2024.

US Bureau of Land Management (BLM) and California Department of Fish and Wildlife (CDFW). October 2, 2015. Agreement by and between the United States Bureau of Land Management and the California Department of Fish and Wildlife. Available from: https://www.blm.gov/sites/default/files/docs/2022-06/2015%20Durability%20Agreement%20BLM.CAFW_10.2.15_%20508%20compliant%20final.pdf. Accessed 16 August 2024.Bureau of Land Management (BLM). June 4, 2020. Receipt of Donation Letter for Rudnick Common Allotment #05008. Letter to ReNu Resources LLC from Carl Symons, Field Office Manager at BLM Ridgecrest Field Office.

US Bureau of Land Management (BLM) and California Department of Fish and Wildlife (CDFW). 2022 (March). Addendum No. 5 to the Master Memorandum of Understanding Between the California Department of Fish And Wildlife and the Bureau of Land Management U.S. Department of the Interior California State Office for Sikes Act Implementation of the Portion of the Rudnick Common Allotment Relinquished Pursuant to Public Law 112-74. Available from: https://www.blm.gov/sites/blm.gov/files/docs/2022-06/Durability_Agreement_508.pdf. Accessed: 3 September 2024.

US Department of Defense (DOD). 2022. Army wildland fire. Available from: https://www.denix.osd.mil/army-nr/army-wildland-fire/ (Accessed: 25 June 2024).

US Department of Defense (DOD). 2023. DoD natural resources program. Available from: https://www.denix.osd.mil/nr/ (Accessed: 30 January 2024).

US Forest Service. 2005a. Angeles National Forest land management plan. Available from: https://www.fs.usda.gov/main/angeles/landmanagement/planning (Accessed: 5 February 2024).

US Forest Service. 2005b. San Bernardino National Forest land management plan. Available from: https://www.fs.usda.gov/main/sbnf/landmanagement/planning (Accessed: 5 February 2024).

US Fish and Wildlife Service (USFWS). 2018. Joshua tree species status assessment. Available from: https://ecos.fws.gov/ecp/species/10407 (Accessed: 26 January 2024).

US Fish and Wildlife Service (USFWS). 2023. Species status assessment report for the Joshua trees (*Yucca brevifolia and Yucca jaegeriana*). Available from: https://ecos.fws.gov/ecp/species/10407 (Accessed: 26 January 2024).

US Fish and Wildlife Service (USFWS). n.d. Joshua tree. Available from: https://www.fws.gov/species/joshua-tree-yucca-brevifolia (Accessed: 24 June 2024).

US Navy. n.d. Integrated natural resources management plan Naval Air Weapons Station China Lake.

WildEarth Guardians. 2015. Petition to list the Joshua tree (*Yucca brevifolia*) under the Endangered Species Act. Available from: https://pdf.wildearthguardians.org/site/DocServer/Joshua_tree_petition.pdf?docID=16684 (Accessed: 26 January 2024).

Wilder Ecological Consulting 2024. NASA Jet Propulsion Labs GDSCC DSS-23 Antenna site survey and clearance. Available from: https://www.wilderecological.com/projects-wilder-ecological-consulting-biological-surveys-tortoise-monitoring-environmental-compliance-marine/nasa-jet-propulsion-laboratories-goldstone-deep-space-communications-complex-deep-space-antenna-site-survey-and-clearance-wilder-ecological-consulting/ (Accessed: 12 February 2024).

CHAPTER 3 TRADITIONAL VALUES AND USES OF WESTERN JOSHUA TREE BY CALIFORNIA NATIVE AMERICAN TRIBES

Agua Caliente Tribe of Cupeño Indians (ACTCI). May 15, 2024—meeting at Kelso Depot Visitor Center, Kelso Dunes, CA, with Agua Caliente Tribe of Cupeño Indians regarding the Western Joshua Tree Conservation Plan project.

Anderson, M. K. 2005. Tending the Wild: Native American Knowledge and the Management of California's Natural Resources. University of California Press. Berkeley, CA, USA.

Anderson, M. K. 2018. The use of fire by Native Americans in California. In Fire in California Ecosystems. Neil Sugihara, editor. University of California Press: Berkeley and Los Angeles, CA, USA.

Anderson, M. K., M. G. Barbour, and V. Whitworth. 1997. A world of balance and plenty: land, plants, animals, and humans in a pre-European California. California History. 76(2/3):12–47. Available from: https://doi.org/10.2307/25161661 (Accessed: 24 April 2024).

Barrows, D. P. 1900. The Ethno-Botany of Coahuilla Indians of Southern California. University of Chicago Press, Chicago, IL, USA. Available from: https://archive.org/details/ethnobotany00barrrich/page/6/mode/2up (Accessed: 24 April 2024).

Bean, L. J., and K. S. Saubel. 1972. Temalpakh: Cahuilla Indian Knowledge and Usage of Plants. Malki Museum Press. Banning, CA, USA.

Bell, W. H., and E. F. Castetter. 1941. The utilization of yucca, sotol, and beargrass by the aborigines of the American Southwest. Ethnobotanical Studies in the American Southwest. No. 7. University of New Mexico. Available from: https://core.ac.uk/download/pdf/151574611.pdf (Accessed: 24 April 2024).

Blackburn, T. C., and K. Anderson. 1993. Before the wilderness: Environmental Management by Native Californians. Ballena Press. Menlo Park, CA, USA.

Braun, M., and T. Gates. 2013. Palen solar electric generating system: ethnographic report informing the final staff assessment. Sacramento, CA, USA.

Brittingham, S., and L. R. Walker. 2000. Facilitation of *Yucca Brevifolia* recruitment by Mojave desert shrubs. Western North American Naturalist 60(4):374–383. Available from: http://www.jstor.org/stable/41717054 (Accessed: 24 April 2024).

Churchill, A. S., F. Knollys, W. Thomson, J. Bradshaw, W. M. Williams, E. Chadwick, T. Routledge, V. Kullberg, G. G. Butler, and W. H. F. Traice. 1879. Paper making materials. Journal of the Society of Arts:383–384.

Collins, G. S., Brito, A., Casteel, A., Claxton, M., Hackney, O., Kershaw, J., Lubitz, A., Padilla, J., Paces, L., Pattinson, T., Spicer, K. T., Hunter, M., Vallejo Santiago, E., Blanco, D., Pereda, A. M., Neira, C., Schloss, R., Wyatt A. 2022. The Forgotten Canopy: Guidebook for Workshop 1: Ecology. UCLA William Andrews Clark Memorial Library Core Program. Florida State Open Publishing. Tallahassee, FL, USA.

Coville, F. V. 1892. The Panamint Indians of California. American Anthropologist. 5(4):351–362. Available from: https://www.jstor.org/stable/658594 (Accessed: 07 July 2024).

Diguet, L., and Poisson, J. 1896. The vegetation of lower California. Scientific American:10–11.

Eckhardt. W. T., and M. J. Hatley. 1982. Survey testing, and documentation: assembly and offense areas, live fire maneuver range, Fort Irwin, San Bernadino County, California. Cornerstone Research 8,37. Defense Technical Information Center. Belvoir, VA, USA.

Fernandeño Tataviam Band of Mission Indians (FTBMI). May 2024—meetings in San Fernando, CA, with Fernandeño Tataviam Band of Mission Indians representatives and Native American Land Conservancy (NALC) regarding the Western Joshua Tree Conservation Plan project.

Fort Independence Indian Community of Paiute Indians (FIICPI). October 7, 2024—meeting on Teams, with Fort Independence Indian Community of Paiute Indians regarding the Western Joshua Tree Conservation Plan project.

Fortier, J. 2008. TEA21 rural roadside inventory: Native American consultation and ethnographic study, Caltrans District 7, County of Los Angeles. Prepared for California Department of Transportation. La Jolla, CA, USA.

Fort Yuma Quechan Indian Tribe (FYQIT). May 2024—meetings on Zoom, in undisclosed locations, and in Bakersfield, CA, with Fort Yuma Quechan Indian Tribe and Native American Land Conservancy (NALC) regarding the Western Joshua Tree Conservation Plan project.

Garcia, C., and J. D. Adams, Jr. 2009. Healing with medicinal plants of the West: cultural and scientific basis for their use. Second edition. Abedus Press. La Crescenta, CA, USA.

Hedges, K. 1967. Santa Ysabel Ethnobotany. San Diego Museum of Man. San Diego, CA, USA.

Keeley, J. E. 2002. Native American impacts on fire regimes of the California Coast Ranges. Journal of Biogeography 29, No. 3.

Kern Valley Indian Community (KVIC). May 9, 2024—meeting in Lancaster, CA, with Kern Valley Indian Community and Native American Land Conservancy (NALC) regarding the Western Joshua Tree Conservation Plan project.

Louderback, L. A., B. M. Pavlik, and A. M. Spurling. 2013. Ethnographic and archaeological evidence corroborating yucca as a food Source, Mojave Desert, USA. Journal of Ethnobiology 33(2):281–297.

McDaniel, E. C., A. Leventhal, D. DiGiuseppe, M. Atwood, D. Grant, R. Cambra, C. Nijmeh, M. V. Arellano, S. Guzman-Schmidt, G. E. Gomez, N. Sanchez, E. Bartelink, B. Kemp, C. Monroe, J. Geary, and O. Kaya. 2012. Final report on the archaeological field work conducted on a portion of the Kiriṭ-smin 'ayye Sokóte Tápporikmatka. [Place of Yerba Buena and Laurel trees site] CA-SCL-895 (Blauer Ranch). Located within the Evergreen Valley District, San Jose, Santa Clara County, Ca. San Jose State University. San Jose, CA, USA.

Murphey, E. V. A. 1959. Indian Uses of Plants. Meyerbooks. Glenwood, IL, USA Available from: http://naeb.brit.org/uses/search/?string=Yucca+brevifolia (Accessed: 24 April 2024).

Palmer E. 1878. Plants used by the Indians of the United States. The American Naturalist 12(10):646–655.

Price, B. A., A. G. Gold, B. S. Tejada, D. D. Earle, S. Griset, J. Lloyd, M. Baloian, N. Valente, V. S. Popper, and L. Anderson. 2009. The archaeology of CA-LAN-192: Lovejoy Springs and western Mojave desert prehistory. Prepared by Applied EarthWorks, Inc., Fresno, California for the County of Los Angeles, Alhambra, CA, USA.

Rinkevich, S., K. Greenwood, and C. Leonetti. 2011. Traditional Ecological Knowledge for the Application by Service Scientists. US Fish and Wildlife Service. Arlington, VA, USA. Available from: https://www.fws.gov/media/traditional-ecological-knowledge-application-service-scientists (Accessed: 07 July 2024).

Roos, C. I., T. W. Swetnam, T. J. Ferguson, M. J. Liebmann, R. A. Loehman, J. R. Welch, E. Q. Margolis, C. H. Guiterman, W. C. Hockaday, M. J. Aiuvalasit, J. Battillo, J. Farella, and C. A. Kiahtipes. 2021. Native American fire management at an ancient Wildland-Urban Interface in the southwest United States. PNAS 118, No. 4.

Secretariat of the Convention of Biological Diversity. 2021. Traditional Knowledge and the Convention on Biological Diversity. Montreal Quebec, Canada. Available from: https://www.cbd.int/doc/publications/8j-brochure-en.pdf (Accessed: June 7, 2024).

Schelenz, R. 2022. How the indigenous practice of 'good practice' can help our forests thrive. University of California Office of the President. Available from: https://www.universityofcalifornia.edu/news/how-indigenous-practice-good-fire-can-help-our-forests-thrive (Accessed: June 6, 2024).

Steward, J. H. 1933. Ethnography of the Owens Valley Paiute. American Archaeology and Ethnology 33(3):233-350. Available from: https://digitalassets.lib.berkeley.edu/anthpubs/ucb/text/ucp033-004.pdf (Accessed: 24 April 2024).

Stewart, O. C. 2002. Forgotten Fires: Native Americans and the Transient Wilderness, edited by H. T. Lewis and M. K. Anderson. University of Oklahoma Press. Norman, OK, USA.

Stickel, E. G., L. J. Weinman-Roberts, R. Berger, and P. Hopa. 1980. An overview of the cultural resources of the western Mojave Desert. Environmental Research Archaeologists: A Scientific Consortium. Anthropology History: 11–337.

Stoffle, R. W., R. Arnold, and K. Van Vlack. 2022. Landscape is alive: Nuwuvi [Paiute] pilgrimage and power places in Nevada." Land:1–33.

Stoffle, R. W., M. J. Evans, D. B. Halmo, W. E. Niles, and J. T. O'Farrell. 1989. Native American plant resources in the Yucca Mountain area, Nevada. Prepared for US Department of Energy, Nevada Operations Office, by Science Applications International Corporation. Las Vegas, NV, USA.

Stoffle, R. W., D. B. Halmo, M. J. Evans, and J. E. Olmsted. 1990. Calculating the cultural significance of American Indian plants: Paiute and Shoshone ethnobotany at Yucca Mountain, Nevada. American Anthropologist 92(2):416–432. Available from: http://www.jstor.org/stable/680153 (Accessed: 24 April 2024).

Tübatulabals of Kern Valley (Tübatulabals). May 10, 2024—meeting in Kern Valley, CA, with Tübatulabals of Kern Valley and Native American Land Conservancy (NALC) regarding the Western Joshua Tree Conservation Plan project.

Vale, T. R. 2002. Fire, native peoples and the natural landscape. Island Press. Washington, DC, USA.

Voegelin, E. W. 1938. Tübatulabal Ethnography. Anthropological Records. Vol. 2, No. 1 (1–90). University of California Press. Berkeley, CA, USA.

Webber, J. M. 1953. Yuccas of the Southwest. Agriculture Monograph No. 17. US Forest Service. Washington, DC, USA.

Wilken, M.A. 2012. An ethnobotany of Baja California's Kumeyaay Indians. M.A. Thesis, San Diego State University. San Diego, CA, USA.

Zigmond, M. L. 1978. Kawaiisu basketry. The Journal of California Anthropology. Malki Museum Inc., Banning, CA, USA.

Zigmond, M. L. 1981. Kawaiisu ethnobotany. University of Utah Press. Salt Lake City, UT, USA.

CHAPTER 4 SUMMARY OF RESOURCE CONDITIONS

Abella, S. R., K. H. Berry, and S. Ferrazzano. 2023. Techniques for restoring damaged Mojave and western Sonoran habitats, including those for threatened desert tortoises and Joshua trees. Desert Plants 38(2):1–52.

Barron, J. A., L. Huesser, T. Herbert, and M. Lyle. 2003. High-resolution climatic evolution of coastal northern California during the past 16,000 years. Paleoeceanography 18(1):1020–1031. https://doi.org/10.1029/2002PA000768.

Barrows, C. W., J. Hoines, K. D. Fleming, M. S. Vamstad, M. Murphy-Mariscal, K. Lalumiere, and M. Harding. 2014. Designing a sustainable monitoring framework for assessing impacts of climate change at Joshua Tree National Park, USA. Biodiversity and Conservation 23:3263–3285. https://doi.org/10.1007/s10531-014-0779-2.

Barrows, C. W., and M. L. Murphy-Mariscal. 2012. Modeling impacts of climate change on Joshua trees at their southern boundary: how scale impacts predictions. Biological Conservation 152:29–36. https://doi.org/10.1016/j.biocon.2012.03.028.

Barve, V. V., L. Brenskelle, D. Li, B. J. Stucky, N. V. Barve, M. M. Hantak, B. S. McLean, D. J. Paluh, J. A. Oswald, M. W. Belitz, R. A. Folk, and R. P. Guralnick. 2020. Methods for broad-scale plant phenology assessments using citizen scientists' photographs. Applications in Plant Sciences 8(1). https://www.doi.org/10.1002/aps3.11315.

Bedsworth, L., D. Cayan, G. Franco, L. Fisher, and S. Ziaja. 2018. California's fourth climate change assessment: statewide summary report. California Governor's Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Public Utilities Commission.

Belnap, J., J. H. Kaltnecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil crusts: ecology and management. Technical reference 1730-2. Bureau of Land Management. Denver, CO, USA. Available from: https://www.ntc.blm.gov/krc/system/files?file=legacy/uploads/2939/CrustManual.pdf (Accessed: 21 July 2024).

Birker, Cheryl. California Botanic Garden, Claremont, CA, personal communication. April 5, 2021—email sent to CDFW from Cheryl Birker regarding *Yucca brevifolia* germination study.

Blank, R. R. 2009. Intraspecific and interspecific pair-wise seedling competition between exotic annual grasses and native perennials: plant-soil relationships. Plant and Soil 326:331–343. https://doi.org/10.1007/s11104-009-0012-3.

Blankenship, K., R. Swaty, K. R. Hall, S. Hagen, K. Pohl, A. S. Hunt, J. Patton, L. Frid, and J. Smith. 2021. Vegetation dynamics models: a comprehensive set for natural resource assessment and planning in the United States. Ecosphere 12:1–22.

Bloom P. H., R. G. Barton, and M. J. Kuehn. 2023. Swainson's hawk nesting population in the Antelope Valley of the western Mojave Desert, California. Western Birds 54:32–43. Available from: https://archive.westernfieldornithologists.org/archive/V54/54(1)-p032-p043.pdf (Accessed: 25 January 2024).

Bonner, F. T., and R. P. Karrfalt, editors. 2008. The Woody Plant Seed Manual. US Forest Service. Washington, DC, USA.

Borchert, M. I. 2016. Rodent removal of fallen Joshua tree (*Yucca brevifolia*) fruits. Bulletin of the Southern California Academy of Sciences 115(3):146–155. https://doi.org/10.3160/0038-3872-115.3.146.

Borchert, M. I. 2022. Postfire seedling establishment of desert peach (*Prunus fasciculata*) and Joshua tree (*Yucca brevifolia*) from simulated seed caches in the Mojave Desert. Western North American Naturalist 82(1):107–116. https://doi.org/10.3398/064.082.0110.

Borchert, M. I., and L. A. DeFalco. 2016. *Yucca brevifolia* fruit production, predispersal seed predation, and fruit removal by rodents during two years of contrasting reproduction. American Journal of Botany 103(5):830–836. https://doi.org/10.3398/064.082.0110.

Borge, A. 2018. Alfalfa Industry. Available from: https://www.lancastermoah.org/single-post/alfalfa-industry (Accessed: 16 January 2024).

Bowker, M. A. 2007. Biological soil crust rehabilitation in theory and practice: an underexploited opportunity. Restoration Ecology 15:13–23. https://doi.org/10.1111/j.1526-100X.2006.00185.x.

Bowns, J. E. 1973. An autecological study of blackbrush (*Coleogyne ramosissima* torr.) in southwestern Utah. Dissertation, Utah State University, Logan, UT, USA.

Brenskelle, L., V. Barve, L. Majure, R. P. Guralnick, and D. Li. 2021. Predicting phenological anomaly: a case study of *Yucca* in the southwestern United States. Preprint in review. Available from: https://www.researchsquare.com/article/rs-548860/v1 (Accessed: 7 February 2024).

Brittingham, S., and L. R. Walker. 2000. Facilitation of *Yucca brevifolia* recruitment by Mojave Desert shrubs. Western North American Naturalist 60(4):374–383. https://www.jstor.org/stable/41717054.

Brooks, M. L. 2000. Competition between alien annual grasses and native annual plants in the Mojave Desert. The American Midland Naturalist 144(1):92–108. https://doi.org/10.1674/0003-0031(2000)144[0092:CBAAGA]2.0.CO;2.

Brooks, M. L., and K. H. Berry. 2006. Dominance and environmental correlates of alien annual plants in the Mojave Desert, USA. Journal of Arid Environments 67:100–124. https://doi.org/10.1016/j.jaridenv.2006.09.021.

Brooks, M. L., R. A. Minnich, and J. R. Matchett. 2018. Southeastern deserts bioregion. Pages 353–378 in J. W. van Wagtendonk, N. G. Sugihara, S. L. Stephens, A. E. Thode, K. E. Shaffer, and J. A. Fites-Kaufman, editors. Fire in California's Ecosystems. 2nd edition. University of California Press. Berkeley, CA, USA.

Bureau of Land Management (BLM). 2016a. Desert renewable energy conservation plan. Available from: https://eplanning.blm.gov/eplanning-ui/project/66459/570 (Accessed: 9 February 2024).

Bureau of Land Management (BLM). 2016b. California 2016 DRECP ROD. Available from: https://blmsolar.anl.gov/drecp/ (Accessed: 6 Jun 2024).

Bureau of Land Management (BLM). 2024. Geospatial Program. Available from: https://www.blm.gov/services/geospatial#:~:text=This%20map%20shows%20data%20created%20and%20maintained%20by%20the%20BLM (Accessed: 16 September 2024).

Butterflies and Moths of North America. 2023. Yucca Giant-Skipper *Megathymus yuccae* (Boisduval & Leconte, [1837]). Available from: https://www.butterfliesandmoths.org/species/Megathymus-yuccae (Accessed: 25 January 2024).

California Department of Fish and Wildlife (CDFW). 2022. Report to the Fish and Wildlife Commission: status review of western Joshua tree (*Yucca brevifolia*). Sacramento, CA, USA.

California Department of Fish and Wildlife (CDFW). 2024. Wildlife Habitats – California Wildlife Habitat Relationships System. Sacramento, CA, USA. Available from: https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats (Accessed: 19 September 2024).

California Department of Forestry and Fire Protection (CAL FIRE). 2024a. GIS Mapping and Data Analytics. Available from: https://www.fire.ca.gov/Home/What-We-Do/Fire-Resource-Assessment-Program/GIS-Mapping-and-Data-Analytics (Accessed: 29 January 2024).

California Department of Forestry and Fire Protection (CAL FIRE). 2024b. Fire Perimeters. Available from: https://www.fire.ca.gov/what-we-do/fire-resource-assessment-program/fire-perimeters (Accessed: 2 February 2024).

California Department of Forestry and Fire Protection (CAL FIRE). 2024c. Bridge Fire. Available from: https://www.fire.ca.gov/incidents/2024/9/8/bridge-fire (Accessed: 25 September 2024).

California Department of Housing and Community Development (HCD). 2022. 2022 statewide housing plan. Available from: https://storymaps.arcgis.com/stories/94729ab1648d43b1811c1698a748c136 (Accessed: 22 January 2024).

California Invasive Plant Council (Cal-IPC). 2024a. About Invasive Plants. Available from: https://www.cal-ipc.org/plants/impact/#:~:text=Definition%20of%20Invasive%20Plants%20Cal-IPC%20defines%20invasive%20plants,harm%20to%20the%20environment%2C%20economy%2C%20or%20human%20health (Accessed: 26 April 2024).

California Invasive Plant Council (Cal-IPC). 2024b. CalWeedMapper. Available from: https://www.cal-ipc.org/resources/calweedmapper/ (Accessed: 2 February 2024).

California Invasive Plant Council (Cal-IPC). 2024c. About the Cal-IPC Inventory. Available from: https://www.cal-ipc.org/plants/inventory/about-the-inventory/ (Accessed: 26 April 2024).

California Invasive Plant Council (Cal-IPC). 2024d. Plant Assessment Form: *Oncosiphon pilulifer*. Available from: https://www.cal-ipc.org/plants/paf/oncosiphon-pilulifer/ (Accessed: 16 August 2024).

Charlton, D., and P. Rundel. 2017. The vegetation and flora of Edwards Air Force Base, western Mojave Desert, California. Aliso 35(2):51–68. https://doi.org/10.5642/aliso.20173502.02.

Clark, J. S., B. Beckage, P. Camill, B. Cleveland, J. HilleRisLambers, J. Lichter, J. McLachlan, J. Mohan, and P. Wyckoff. 1999. Interpreting recruitment limitation in forests. American Journal of Botany 86(1):1–16. https://doi.org/10.2307/2656950.

Clark, C. J., J. R. Poulsen, D. J. Levey, and C. W. Osenberg. 2007. Are plant populations seed limited? A critique and meta-analysis of seed addition experiments. The American Naturalist 170(1):128–142. https://doi.org/10.1086/518565.

Cole, K. L., and S. T. Arundel. 2005. Carbon isotopes from fossil packrat pellets and elevational movements of Utah agave reveal younger dryas cold period in Grand Canyon, Arizona. Geology 33(9):713–716. https://doi.org/10.1130/G21769.1.

Cole, K. L., K. Ironside, J. Eischeid, G. Garfin, P. B. Duffy, and C. Toney. 2011. Past and ongoing shifts in Joshua tree distribution support future modeled range contraction. Ecological Applications 2(1):137–149. https://doi.org/10.1890/09-1800.1.

Comanor, P. L., and W. H. Clark. 2000. Preliminary growth rates and a proposed age-form classification for the Joshua tree, *Yucca brevifolia* (Agavaceae). Haseltonia 7(7):37–46.

Cornett, J. 1997. Giant Joshua trees. Abstracts from proceedings on the 1997 desert research symposium. San Bernardino County Museum Association Quarterly.

Cornett, J. W. 2006. Rapid demise of giant Joshua trees. 72–73 Making Tracks Across the Southwest.

Cornett, J. W. 2022. Joshua tree mortality and recovery after the Dome Fire, Mojave National Preserve. JWC Ecological Consultants. Field Guide and Proceedings of the Desert Symposium 185–189.

County of Los Angeles. 2024. Enhancing enforcement and response to illegal mulch dumping and fires. A motion by the County Supervisor, Kathryn Barker on behalf of the Board of Supervisors. Los Angeles County, CA, USA.

Crabb, B. A., and O. Pellmyr. 2006. Impact of the third trophic level in an obligate mutualism: do yucca plants benefit from parasitoids of yucca moths? International Journal of Plant Sciences 167:119–124. https://doi.org/10.1086/497844.

Crosswhite, F. S., and C. D. Crosswhite. 1984. A classification of life forms of the Sonoran Desert, with emphasis on the seed plants and their survival strategies. Desert Plants 5:131–136. https://repository.arizona.edu/handle/10150/552239.

DeFalco, L. A., D. R. Bryla, V. Smith-Longozo, and R. S. Nowak. 2003. Are Mojave Desert annual species equal? Resource acquisition and allocation for the invasive grass *Bromus madritensis* subsp. *rubens* (Poaceae) and two native species. American Journal of Botany 90(7):1045–1053. https://doi.org/10.3732/ajb.90.7.1045.

DeFalco, L. A., and T. C. Esque. 2014. Soil seed banks: preserving native biodiversity and repairing damaged desert shrublands. Fremontia 42(2):20–23.

DeFalco, L. A., T. C. Esque, S. J. Scoles-Sciulla, and J. Rodgers. 2010. Desert wildfire and severe drought diminish survivorship of the long-lived Joshua tree (*Yucca brevifolia*; Agavaceae). American Journal of Botany 97(2):243–250. https://doi.org/10.3732/ajb.0900032.

DeFalco, L. A., G. C. J. Fernandez, and R. S. Nowak. 2007. Variation in the establishment of a non-native annual grass influences competitive interactions with Mojave Desert perennials. Biological Invasions 9:293–307. https://doi.org/10.1007/s10530-006-9033-5.

De Vera, L. 2022. Update on tree shelters for Joshua tree restoration: Arthur B. Ripley Desert Woodland State Park. California State Parks. Lancaster, CA, USA.

Dole, K. P., M. E. Loik, and L. C. Sloan. 2003. The relative importance of climate change and the physiological effects of CO_2 on freezing tolerance for the future distribution of *Yucca brevifolia*. Global and Planetary Change 36:137–146. https://doi.org/10.1016/S0921-8181(02)00179-0.

Ecological Classification and Mapping Task Team (ECOMAP). 1993. National hierarchical framework of ecological units. Unpublished administrative paper. Ecoregions of the United States. 1994. US Forest Service. Washington, DC, USA. Cited in USFS 1994.

Eriksson, O, and J. Ehrlén. 2012. Seedling recruitment and population ecology. In Seedling Ecology and Evolution. Mary Allessio Leck, V. Thomas Parker, and Robert L. Simpson, editors. Cambridge University Press: Cambridge, England; New York, NY, USA; Melbourne, Australia; Madrid, Spain; Cape Town, South Africa; Singapore São Paulo, Brazil; Delhi, India.

Esque, Todd., US Geological Society, personal communication. 2022—Teams call between J. Simonsen, US Fish and Wildlife Service Biologist, and T. Esque, US Geological Society Researcher, regarding Joshua trees' distribution, ecology, and threats for the draft revision of the Joshua tree SSA. Multiple calls between February 7, 2022, and April 22, 2022, including Bradd Bridges, CFWO Listing and Recovery Division Supervisor, and J. Che-Castaldo, Headquarters Branch of SSA Science Support. Cited in USFWS 2023.

Esque, T. C., D. F. Haines, L. A. DeFalco, J. E. Rodgers, K. A. Goodwin, and S. J. Scoles. 2003. Mortality of adult Joshua trees (Yucca brevifolia) due to small mammal herbivory at Joshua Tree National Park, California. US Geological Survey, Western Ecological Research Center.

Esque, T. C., P. A. Medica, D. F. Shryock, L. A. DeFalco, R. H. Webb, and R. B. Hunter. 2015. Direct and indirect effects on environmental variability on growth and survivorship of pre-reproductive Joshua trees, *Yucca brevifolia* Engelm. (Agavaceae). American Journal of Botany 102(1):85–91. https://doi.org/10.3732/ajb.1400257.

Esque, T. C., B. Reynolds, L. A. DeFalco, and B. A. Waitman. 2010. Demographic studies of Joshua trees in Mojave Desert National Parks: demography with emphasis on germination and recruitment. Mojave National Preserve Science Newsletter 1:9–12.

Esque, T. C., D. F. Shyrock, G. A. Berry, F. C. Chen, L. A. DeFalco, S. M. Lewicki, B. L. Cunningham, E. J. Gaylord, C. S. Poage, G. E. Gantz, R. A. Van Gaalen, B. O. Gottsacker, A. M. McDonald, J. B. Yoder, C. I. Smith, and K. E. Nussear. 2023. Unprecedented distribution data for Joshua trees (*Yucca brevifolia* and *Y. jaegeriana*) reveal contemporary climate associations of a Mojave Desert icon. Frontiers in Ecology and Evolution 11:1–20. https://doi.org/10.3389/fevo.2023.1266892.

Flood, N. J. 2020. Scott's oriole (*Icterus parisorum*), version 1.0. In A. F. Poole and F. B. Gill, editors. Birds of the World. Cornell Lab of Ornithology. Ithaca, NY, USA.

Frakes, Neil, Vegetation Manager, Joshua Tree National Park, CA, personal communication. January 20, 2021—discussion with Neil Frakes on conditions in Joshua Tree National Park including invasive species infestations. Cited in CDFW 2022.

Fujita, K. S., Z. H. Ancona, L. A. Kramer, M. Straka, T. E. Gautreau, C. P. Garrity, D. Robson, J. E. Diffendorfer, and B. Hoen. 2023. United States Large-Scale Solar Photovoltaic Database v. 10, data release. US Geological Survey and Lawrence Berkeley National Laboratory. Available from: https://eerscmap.usgs.gov/uspvdb/ (Accessed: 8 July 2024).

Garfin, G., A. Jardine, R. Merideth, M. Black, and S. Leroy, editors. 2013. Assessment of climate change in the southwest United States: a report prepared for the National Climate Assessment. Center for Resource Economics. Island Press. Washington, DC, USA. Available from: https://swccar.arizona.edu/sites/default/files/2022-05/SW-NCA-color-FINALweb.pdf (Accessed: 15 February 2024).

Gilliland, K. D., N. J. Huntly, and J. E. Anderson. 2006. Age and population structure of Joshua trees (*Yucca brevifolia*) in the northwestern Mojave Desert. Western North American Naturalist 66:202–208. https://doi.org/10.3398/1527-0904(2006)66[202:AAPSOJ]2.0.CO;2.

Grubb, P. J. 1977. The maintenance of species-richness in plant communities: the importance of the regeneration niche. Biological Reviews 52:107–145.

Gucker, C. L. 2006. *Yucca brevifolia.* Fire Effects Information System. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available from: https://www.fs.usda.gov/database/feis/plants/tree/yucbre/all.html (Accessed: 24 January 2024).

Haddad, N. M., L. A. Brudvig, J. Clobert, K. F. Davies, A. Gonzalez, R. D. Holt, T. E. Lovejoy, J. O. Sexton, M. P. Austin, C. D. Collins, W. M. Cook, E. I. Damschen, R. M. Ewers, B. L. Foster, C. N. Jenkins, A. J. King, W. F. Laurance, D. J. Levey, C. R. Margules, B. A. Melbourne, A. O. Nicholls, J. L. Orrock, D.-X. Song, and J. R. Townshend. 2015. Habitat fragmentation and its lasting impact on Earth's ecosystems. Applied Ecology 2(1):1–9. https://doi.org/10.1126/sciadv.1500052.

Harrower, J., and G. S. Gilbert. 2018. Context-dependent mutualisms in the Joshua tree–yucca moth system shift along a climate gradient. Ecosphere 9(9):1–17. https://doi.org/10.1002/ecs2.2439.

Harrower, J. T., and G. S. Gilbert. 2021. Parasitism to mutualism continuum for Joshua trees inoculated with different communities of arbuscular mycorrhizal fungi from a desert elevation gradient. PLOS ONE 16(8). https://doi.org/10.1371/journal.pone.0256068.

Heacox, Scott. Field Biologist (focus is entomology), Center for Conservation Biology Department, University of Riverside, Riverside, CA. 2024—meeting with Andrew Kaiser and Jo Hearty of California Department of Fish and Wildlife on April 19, 2024, to provide information on the yucca weevil.

Hereford, R., R. H. Webb, and C. I. Longpre. 2004. Precipitation history of the Mojave Desert region, 1893–2001. US Geological Survey. Flagstaff, AZ, USA.

Hess, W. J., and B. G. Baldwin. 2022. *Yucca brevifolia*, in Jepson Flora Project. Jepson eFlora, Revision 10. Available from: https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=48766 (Accessed: 27 May 2024).

Hoen, B.D., J.E. Diffendorfer, J.T. Rand, L.A. Kramer, C.P. Garrity, and H.E. Hunt. 2018. United States wind turbine database v7.1 (August 14, 2024). US Geological Survey, American Clean Power Association, and Lawrence Berkeley National Laboratory data release. e, https://doi.org/10.5066/F7TX3DN0.

Hoffman, A. A., and C. M. Sgrò. 2011. Climate change and evolutionary adaptation. Nature 470:479–485. https://doi.org/10.1038/nature09670.

Holmgren, C. A., J. L. Betancourt, and K. A. Rylander. 2010. A long-term vegetation history of the Mojave–Colorado Desert ecotone at Joshua Tree National Park. Journal of Quaternary Science 25(2):222–236. https://doi.org/10.1002/jqs.1313.

Huning, J. R., and R. M. Petersen. 1973. Use of *Yucca brevifolia* as a surrogate for detection of near-surface moisture retention. University of California technical report N-73-1. University of California.

Intergovernmental Panel on Climate Change (IPCC). 2023. Summary for pPolicymakers. In H. Lee and J. Romero, editors. Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland.

Jaeger, E. C. 1965. The California Deserts. Stanford University Press. Stanford, CA, USA.

Joshua Tree National Park (JTNP). 2017. Memorandum to field supervisor, Carlsbad Fish and Wildlife Office, subject: FWS-L&R 2017-07-031, request for information on the Joshua tree. Carlsbad, CA, USA.

Kaiser, Andrew. California Department of Fish and Wildlife, personal communication. 2024—comment in Conservation Plan from A. Kaiser, Senior Environmental Scientist (Specialist)/Project Manager of Western Joshua Tree Conservation Plan, providing estimate he made for eastern Joshua tree burned in the Dome Fire.

Keeley, J. E., W. J. Bond, R. A. Bradstock, J. G. Pausas, and P. W. Rundel. 2012. Fire in Mediterranean Ecosystems: Ecology, Evolution and Management. Cambridge University Press. New York, NY, USA.

Kelly, D., and V. L. Sork. 2002. Mast seeding in perennial plants: Why, how, where? Annual Review of Ecology and Systematics 33:427–447. https://doi.org/10.1146/annurev.ecolsys.33.020602.095433

Kidron, G. J., B. Xiao, and I. Benenson. 2020. Data variability or paradigm shift? Slow versus fast recovery of biological soil crusts-a review. Science of the Total Environment 721:137683. https://doi.org/10.1016/j.scitotenv.2020.137683.

Krantz, Timothy. Professor and Chair, Environmental Studies Program, University of Redlands, Redlands, CA. 2021—email from Timothy Krantz sent to California Department of Fish and Wildlife on September 16, 2021, to provide comments on the Western Joshua tree species status review. Cited in CDFW 2022.

LANDFIRE. 2024a. Historical Fire Regime. Available from: https://landfire.gov/fire-regime (Retrieved: 21 May 2024).

LANDFIRE. 2024b. Vegetation Condition Class. Available from: https://landfire.gov/vegetation/vcc (Retrieved: 21 May 2024).

Legras, E. C., S. B. Vander Wall, and D. I. Board. 2010. The role of germination microsite in the establishment of sugar pine and Jeffrey pine seedlings. Forest Ecology and Management 260:806–813. https://doi.org/10.1016/j.foreco.2010.05.039.

Lenz, L. W. 2001. Seed dispersal in *Yucca brevifolia* (Agavaceae) - present and past, with consideration of the future of the species. Aliso 20(2):61–74. https://doi.org/10.5642/aliso.20012002.03.

Loik, M. E., C. D. St. Onge, and J. Rogers. 2000. Post-fire recruitment of *Yucca brevifolia* and *Yucca schidigera* in Joshua Tree National Park, California. Pages 79–84 in J. E. Keeley, M. Baer-Keeley, and C. J. Fotheringham, editors. 2nd Interface Between Ecology and Land Development in California. US Geological Survey Open-File Report 00-62. Sacramento, CA, USA.

Lovich, J. E., and J. R. Ennen. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61(12):982–992. https://doi.org/10.1525/bio.2011.61.12.8.

Lowther, P. E., P. Pyle, and M. A. Patten. 2020. Ladder-backed woodpecker (*Dryobates scalaris*), version 1.0. In P. G. Rodewald, editor. Birds of the World. Cornell Lab of Ornithology. Ithaca, NY, USA.

McCleary, J. A. 1973. Comparative germination and early growth studies of six species of the genus *Yucca*. American Midland Naturalist 90(2):503–508. https://doi.org/10.2307/2424480.

McNeill, Rick. Death Valley National Park, personal communication. 2024—email from Rick McNeill providing mapping for grazing permit at Death Valley National Park.

Miller, A. H., and R. C. Stebbins. 1973. The lives of desert animals in Joshua Tree National Monument. University of California Press, Berkeley and Los Angeles, CA, USA, and University of California Press, London, England.

Morelli, T. L., C. Daly, S. Z. Dobrowski, D. M. Dulen, J. L. Ebersole, S. T. Jackson, J. D. Lundquist, C. I. Millar, S. P. Maher, W. B. Monahan, K. R. Nydick, K. T. Redmond, S. C. Sawyer, S. Stock, and S. R. Beissinger. 2016. Managing climate change refugia for climate adaptation. PLOS ONE 11(8). https://doi.org/10.1371/journal.pone.0159909.

Natural Resources Group. 2021. West Mojave Conservation Bank 2021 western Joshua tree census report. Technical Memorandum.

O'Grady, J. J., D. H. Reed, B. W. Brook, and R. Frankham. 2004. What are the best correlates of predicted extinction risk? Biological Conservation 118:513–520. https://doi.org/10.1016/j.biocon.2003.10.002.

Parker, S. S., B. S. Cohen, and J. Moore. 2018. Impact of solar and wind development on conservation values in the Mojave Desert. PLOS ONE 13(12):1–16. https://doi.org/10.1371/journal.pone.0207678.

Pellmyr, O. 2003. *Yuccas*, yucca moths, and coevolution: a review. Annals of the Missouri Botanical Garden 90:35–55. https://doi.org/10.2307/3298524.

Pellmyr, O., F. Kjellberg, E. A. Herre, A. Kawakita, and D. H. Hembry. 2020. Active pollination drives selection for reduced pollen-ovule ratios. American Journal of Botany 107(1):164–170. https://doi.org/10.1002/ajb2.1412.

Perkins, L. B., and G. Hatfield. 2014. Competition, legacy, and priority and the success of three invasive species. Biological Invasions 16:2543–2550. https://doi.org/10.1007/s10530-014-0684-3.

Randall, J. M., S. S. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer, and S. Morrison. 2010. Mojave Desert ecoregional assessment. Unpublished report. The Nature Conservancy. San Francisco, CA, USA. Available from: https://www.scienceforconservation.org/assets/downloads/Mojave_Desert_Ecoregional_Assessment_2010.pdf (Accessed: 2 April 2024).

Reynolds, M. B. J., L. A. DeFalco, and T. C. Esque. 2012. Short seed longevity, variable germination conditions, and infrequent establishment events provide a narrow window for *Yucca brevifolia* (Agavaceae) recruitment. American Journal of Botany 99(10):1647–1654. https://doi.org/10.3732/ajb.1200099.

Rodgers, J. 2023. Joshua trees. Cited in Yoder et al. 2024.

Rowlands, P. G. 1978. The vegetation dynamics of the Joshua tree (*Yucca brevifoiia* Engelm.) in the southwestern United States of America. Dissertation. University of California, Riverside, CA, USA. Available from: https://www.proquest.com/openview/b22e8657b0ba46738bcc245add9d199e/1?pq-origsite=gscholar&cbl=18750&diss=y (Accessed: 11 January 2024).

Sawyer, J. S, T. Keller-Wolf, and J. Evans. 2009. A manual of California vegetation. Second edition. California Native Plant Society. Sacramento, CA, USA.

Shryock, D.F., T. C. Esque, G. A. Berry, and L. A. DeFalco. Forthcoming. Assessing uncertainty in forecasts of climate change refugia for Joshua trees using high-density distribution data. In review.

Shafer, S. L., P. J. Bartlein, and R. S. Thompson 2001. Potential changes in the distributions of western North America tree and shrub taxa under future climate scenarios. Ecosystems 4:200–215. https://doi.org/10.1007/s10021-001-0004-5.

Silvertown, J. 2008. The evolutionary maintenance of sexual reproduction: evidence from the ecological distribution if asexual reproduction in clonal plants. International Journal of Plant Sciences 169(1):157–168. https://doi.org/10.1086/523357.

Simpson, P. G. 1975. Anatomy and morphology of the Joshua tree (*Yucca brevifolia*): an arborescent monocotyledon." PhD disseration. University of California, Santa Barbara.

Smith, Chistopher. Willamette University, personal communication. 2022—Zoom call between J. Simonsen, USFWS biologist, and C. I. Smith, Professor of Biology, Willamette University, regarding Joshua trees and the yucca moth obligate mutualism, ecology, and threats for the draft revision of the Joshua tree SSA. Cited in USFWS 2023.

Smith, Christopher. Willamette University, personal communication. 2024—presentation to the Joshua Tree Working Group by C. L. Smith, Professor of Biology, Willamette University, titled "Joshua tree reproductive ecology: from flowers to pollination; from seed to establishment, what really matters in Joshua tree conservation?"

Smith, C. I., C. S. Drummond, W. Godsoe, J. B. Yoder, and O. Pellmyr. 2009. Host specificity and reproductive success of yucca moths (*Tegeticula* spp. Lepidoptera: Prodoxidae) mirror patterns of gene flow between host plant varieties of the Joshua tree (*Yucca brevifolia*: Agavaceae). Molecular Ecology 18(24):5218–5229. https://doi.org/10.1111/j.1365-294X.2009.04428.x.

Smith, C. I., and J. H. Leebens-Mack. 2024. 150 years of coevolution research: evolution and ecology of Yucca moths (*Prodoxidae*) and their hosts. Annual Review of Entomology 69:375–391. https://doi.org/10.1146/annurev-ento-022723-104346.

Smith, C. I., L. C. Sweet, J. Yoder, M. R. McKain, K. Heyduk, and C. Barrows. 2023. Dust storms ahead: climate change, green energy development and endangered species in the Mojave Desert. Biological Conservation 277. https://doi.org/10.1016/j.biocon.2022.109819.

Smith, C. I., S. Tank, W. Godsoe, J. Levenick, E. Strand, T. Esque, and O. Pellmyr. 2011. Comparative phylogeography of a coevolved community: concerted population expansions in Joshua trees and four yucca moths. PLOS ONE 6: 1–18. https://doi.org/10.1371/journal.pone.0025628.

Smith, C. I., S. Tank, M. R. McKain, A. Guidmond, and R. Flatz. 2021. Genome-scale data resolves the timing of divergence in Joshua trees. American Journal of Botany 108(4):1–17. https://doi.org/10.1002/ajb2.1633.

St. Clair, S. B., and J. Hoines. 2018. Reproductive ecology and stand structure of Joshua tree forests across climate gradients of the Mojave Desert. PLOS ONE 13(2). https://doi.org/10.1371/journal.pone.0193248.

Sugihara, N. G., J. W. van Wagtendonk, and J. Fites-Kaufman. 2018. Fire as an ecological process. Pages 57–70 in J. W. van Wagtendonk, N. G. Sugihara, S. L. Stephens, A. E. Thode, K. E. Shaffer, and J. A. Fites-Kaufman, editors. Fire in California's Ecosystems. 2nd Edition. University of California Press. Berkeley, CA, USA.

Sweet, L. C., M. J. Davis, D. Baronia, S. Heacox, T. La Doux, and J.R. McAuliffe. 2023. Post-wildfire resprouting and survival of eastern Joshua trees and banana yucca after the 2020 Dome Fire, Mojave National Preserve. Report to Mojave National Preserve. California Cooperative Ecosystem Studies Unit Grant No. P22AC01419-00.

Sweet, L. C., T. Green, J. G. C. Heintz, N. Frakes, N. Graver, J. S. Rangitsch, J. E. Rodgers, S. Heacox, and C. W. Barrows. 2019. Congruence between future distribution models and empirical data for an iconic species at Joshua Tree National Park. Ecosphere 10. https://doi.org/10.1002/ecs2.2763.

Tagestad, J., M. Brooks, V. Cullinan, J. Downs, and R. McKinley. 2016. Precipitation regime classification for the Mojave Desert: implications for fire occurrence. Journal of Arid Environments 124:388–397. https://doi.org/10.1016/j.jaridenv.2015.09.002.

Terrill, R. S., J. M. Maley, W. L. E. Tsai, K. B. Fistanic, R. J. Freeland, A. Franceschelli, B. Lewis-Smith, and L. L. Lu. 2019. Tricolored blackbirds feeding in Joshua tree inflorescences. Western Birds 50:180–182. https://doi.org/10.21199/WB50.3.6.

Thomas, K. A., P. P. Guertin, and L. Gass. 2012. Plant Distributions in the Southwestern United States: A Scenario Assessment of the Modern-Day and Future Distribution Ranges of 166 Species. US Geological Survey. Reston, VI, USA. Available from: https://pubs.usgs.gov/of/2012/1020/of2012-1020_text.pdf (Accessed: 24 January 2024).

Thomas, K., T. Keeler-Wolf, J. Franklin, and P. Stine. 2004. Mojave Desert Ecosystem Program: Central Mojave vegetation database. Final report. US Geological Survey, Western Ecological Research Center and Southwest Biological Science Center. Sacramento, CA, USA. Available from: https://pubs.usgs.gov/publication/70200877 (Accessed: 9 February 2024).

Thomas, K., B. A. Stauffer, and C. J. Jarchow. 2023. Decoupling of species and plant communities of the U.S. Southwest: A CCSM4 climate scenario example. ECOSPHERE 14(2)e4414. https://doi.org/10.1002/ecs2.4414.

Thompson, R. S., S. W. Hostetler, P. J. Bartlein, and K. H. Anderson. 1998. A strategy for assessing potential future changes in climate, hydrology, and vegetation in the western United States. US Geological Survey Circular, United States Government Printing Office, Washington, DC, USA.

Trelease, W. 1893. Further studies of yuccas and their pollination. Missouri Botanical Garden Annual Report 1893:181–226. https://doi.org/10.2307/2992178.

University of California Integrated Pest Management Program (UC IPM). 2020. Pests in Gardens and Landscapes: Agave and yucca weevils—*Scyphophorus* species. Available from: https://ipm.ucanr.edu/PMG/GARDEN/PLANTS/INVERT/yuccaweevil.html (Accessed: 25 January 2024).

US Fish and Wildlife Service (USFWS). 2023. Species status assessment report for Joshua trees (*Yucca brevifolia* and *Yucca jaegeriana*) version 2.0. Carlsbad Fish and Wildlife Office. Carlsbad. University of California, Riverside, CA. USA.

US Forest Service (USFS). 2024. Download National Datasets. Available from: https://data.fs.usda.gov/geodata/edw/datasets.php (Accessed: February and September 2024).

Van Wagtendonk, J. W., N. G. Sugihara, S. L. Stephens, A. E. Thode, K. E. Shaffer, and J. A. Fites-Kaufman, editors. 2018. Fire in California's Ecosystems. 2nd Edition. University of California Press. Berkeley, CA, USA.

Vander Wall, S. B. 1997. Dispersal of singleleaf piñon pine (*Pinus monophylla*) by seed-caching rodents. Journal of Mammalogy Author Notes 78(1)181–191. https://doi.org/10.2307/1382651.

Vander Wall, S. B., T. Esque, D. Haines, M. Garnett, and B. A. Waitman. 2006. Joshua tree (*Yucca brevifolia*) seeds are dispersed by seed-caching rodents. Écoscience 13(4):539–543. https://doi.org/10.2980/1195-6860(2006)13[539:JTYBSA]2.0.CO;2.

Vogl, R. J. 1967. Fire adaptations of some Southern California plants. Pages 79–109 in Proceedings: 7th Tall Timbers Fire Ecology Conference. Hoberg, CA, USA.

Waitman, B. A., S. B. Vander Wall, and T. C. Esque. 2012. Seed dispersal and seed fate in Joshua tree (*Yucca brevifolia*). Journal of Arid Environments 81:1–8. https://doi.org/10.1016/j.jaridenv.2011.12.012.

Wallace, A., and E. M. Romney. 1972. Radioecology and Ecophysiology of Desert Plants at the Nevada Test Site. Rep. TID25954. Atomic Energy Commission, Office of Information Services. Washington, DC, USA.

Webber, J. M. 1953. Yuccas of the Southwest. Agriculture Monograph 17. US Department of Agriculture. Washington, DC, USA. Available from: https://books.google.com/books?hl=en&lr=&id=-tU8AAAAYAAJ&oi=fnd&pg=PA5&dq=Yuccas+of+the+southwest&ots=EAglZsicJb&sig=MUuQ8sT-hUEP3Y6RzxmsEcU5-Eo#v=onepage&q=Yuccas%20of%20the%20southwest&f=false (Accessed: 7 February 2024).

Went, F. W. 1948. Ecology of desert plants. I. Observations on germination in the Joshua Tree National Monument, California. Ecology 29(3):242–253. https://doi.org/10.2307/1930988.

Went, F. W. 1957. The experimental control of plant growth. Chronica Botanica, Waltham, MA, USA, and Ronald Press. New York, NY, USA.

Western Ecosystems Technology (WEST). 2021. Supplemental report regarding population abundance refinement and data needs for population trend for the western Joshua tree. A report prepared for 8minute Solar Energy, EDF Renewables, Longroad Energy, and Terra-Gen. Cheyenne, WY, USA.

Wilkening, J. L., S. L. Hoffman, and F. Sirchia. 2020. Examining the past, present, and future of an iconic Mojave Desert species, the Joshua tree (*Yucca brevifolia, Yucca jaegeriana*). The Southwestern Naturalist 65(3/4):216–229. https://doi.org/10.1894/0038-4909-65.3-4.216.

Winkler, E., and M. Fischer. 2002. The role of vegetative spread and seed dispersal for optimal life histories of clonal plants: a simulation study. In J. F. Stuefer, B. Erschbamer, H. Huber, and J. I. Suzuki, editors. Ecology and Evolutionary Biology of Clonal Plants. Springer, Dordrecht, Netherlands.

Xiao, Y., X. Li, Y. Cao, and M. Dong. 2016. The diverse effects of habitat fragmentation on plant–pollinator interactions. Plant Ecology 217:857–868. https://doi.org/10.1007/s11258-016-0608-7.

Yang, Y. Y., and J. G. Kim. 2016. The optimal balance between sexual and asexual reproduction in variable environments: a systematic review. Journal of Ecology and Environment 40(12):1–18. https://doi.org/10.1186/s41610-016-0013-0.

Yoder, J. B., A. K. Andrade, L. A. DeFalco, T. C. Esque, C. J. Carlson, D. F. Shryock, R. Yeager, and C. I. Smith. 2024. Reconstructing 120 years of climate change impacts on Joshua tree flowering. Ecology Letters. http://doi.org/10.1111/ele.14478.

Zembal, R., and C. Gall. 1980. Observations on Mohave ground squirrels, *Spermophilus mohavensis*, in Inyo County, California. Journal of Mammalogy 61(2):347–350. https://doi.org/10.2307/1380064.

CHAPTER 5 CONSERVATION MANAGEMENT ACTIONS AND EFFECTIVENESS CRITERIA

Abella, S. R., K. H. Berry, and S. Ferrazzano. 2023. Techniques for restoring damaged Mojave and western Sonoran habitats, including those for threatened desert tortoises and Joshua trees. Desert Plants 38(2):4–52.

Advisory Council on Historic Preservation (ACHP). 2024. ACHP Policy Statement on Indigenous Knowledge and Historic Preservation, March 2024. Available from: https://www.achp.gov/digital-library-section-106-landing/achp-policy-statement-indigenous-knowledge-and-historic (Accessed: July 9, 2024).

Agua Caliente Tribe of Cupeño Indians (ACTCI). May 15, 2024—meeting at Kelso Depot Visitor Center, Kelso Dunes, CA, with Agua Caliente Tribe of Cupeño Indians regarding the Western Joshua Tree Conservation Plan project.

California Board of Forestry and Fire Protection. 2019. California Vegetation Treatment Program Final Program Environmental Impact Report. State Clearinghouse # 2019012052. Sacramento, CA, USA.

Barrows, C. W., A. R. Ramirez, L. C. Sweet, T. L. Morelli, C. I. Millar, N. Frakes, J. Rodgers, and M. F. Mahalovich. 2020a. Validating climate-change refugia: empirical bottom-up approaches to support management actions. Frontiers in Ecology and the Environment 18:298–306. https://doi.org/10.1002/fee.2205.

Barrows, C. W., L. C. Sweet, J. Rangitsch, K. Lalumiere, T. Green, S. Heacox, M. Davis, M. Vamstad, J. Heintz, and J. E. Rodgers. 2020b. Responding to increased aridity: evidence for range shifts in lizards across a 50-year time span in Joshua Tree National Park. Biological Conservation 248:108667. https://doi.org/10.1016/j.biocon.2020.108667.

Bateman, B. L., H. T. Murphy, A. E. Reside, K. Mokany, and J. Vanderwal. 2013. Appropriateness of full-, partial- and no-dispersal scenarios in climate change impact modelling. Diversity and Distributions 19: 1224–1234. https://doi.org/10.1111/ddi.12107.

Berryman, S., S. Easley, W. Skelton, W. Walker, G. Charpentier, J. Bays. 2023. 2023 annual report: facilitation and study of western Joshua tree regeneration post-wildfire scientific, educational, or management permit no. 2081(a)-21-011-RP. Transition Habitat Conservancy. Piñon Hills, CA, USA.

Brooks, M. L., R. A. Minnich, and J. R. Matchett. 2018. Southeastern deserts bioregion. Pages 353–378 in J. W. van Wagtendonk, N. G. Sugihara, S. L. Stephens, A. E. Thode, K. E. Shaffer, and J. A. Fites-Kaufman, editors. Fire in California Ecosystems. 2nd edition. University of California Press. Berkeley, CA, USA.

Brooks, M. L. and Matchett, J. R. 2006. Spatial and temporal patterns of wildfires in the Mojave Desert, 1980-2004. Journal of Arid Environments 67(Supplement):148–164.

Buckley, L. B., M. C. Urban, M. J. Angilletta, L. G. Crozier, L. J. Rissler, and M. W. Sears. 2010. Can mechanism inform species' distribution models? Ecology Letters 13:1041–1054. https://doi.org/10.1111/j.1461-0248.2010.01479.x.

Bush, A., K. Mokany, R. Catullo, A. Hoffmann, V. Kellermann, C. Sgrò, S. McEvey, and S. Ferrier. 2016. Incorporating evolutionary adaptation in species distribution modelling reduces projected vulnerability to climate change. Ecology Letters 19:1468–1478. https://doi.org/10.1111/ele.12696.

Bussey, J., M. A. Davenport, M. R. Emery, and C. Carroll. 2016. "A lot of It comes from the heart": the nature and integration of ecological knowledge in Tribal and nontribal forest management. Journal of Forestry 114(2):97–107. http://dx.doi.org/10.5849/jof.14-130.

California Invasive Plant Council (Cal-IPC). 2012. Preventing the spread of invasive plants: best management practices for land managers. Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA.

California Invasive Plant Council (Cal-IPC). 2024. Plant Assessment Form: *Oncosiphon pilulifer*. Available from: https://www.cal-ipc.org/plants/paf/oncosiphon-pilulifer/ (Accessed: 16 August 2024).

Center for Plant Conservation (CPC). 2019. CPC best plant conservation practices to support species survival in the wild. Center for Plant Conservation. Escondido, CA, USA. Available from: https://saveplants.org/wp-content/uploads/2020/12/CPC-Best-Practices-5.22.2019.pdf. (Accessed: 29 October 2024).

Cole, K. L., K. Ironside, J. Eischeid, G. Garfin, P. B. Duffy, and C. Toney. 2011. Past and ongoing shifts in Joshua tree distribution support future modeled range contraction. Ecological Applications 2(1):137–149. https://doi.org/10.1890/09-1800.1.

Condon, L. A., D. J. Shinneman, R. Rosentreter, and P. S. Coates. 2023. Could biological soil crusts act as natural fire fuel breaks in the sagebrush steppe? Ecology 104(4):1–6. https://doi.org/10.3389/fevo.2019.00449.

Darst, C. R., P. J. Murphy, N. W. Strout, S. P. Campbell, K. J. Field, L. Allison, and R. C. Averill-Murray, R.C. 2013. A strategy for prioritizing threats and recovery actions for at-risk species. Environmental Management 51:786-800. https://doi.org/10.1007/s00267-012-0007-3.

Esque, T. C., D. F. Shyrock, G. A. Berry, F. C. Chen, L. A. DeFalco, S. M. Lewicki, B. L. Cunningham, E. J. Gaylord, C. S. Poage, G. E. Gantz, R. A. Van Gaalen, B. O. Gottsacker, A. M. McDonald, J. B. Yoder, C. I. Smith, and K. E. Nussear. 2023. Unprecedented distribution data for Joshua trees (*Yucca brevifolia* and *Y. jaegeriana*) reveal contemporary climate associations of a Mojave Desert icon. Frontiers in Ecology and Evolution 11:1–20. https://doi.org/10.3389/fevo.2023.1266892.

Evans, T. G., S. E. Diamond, and M. W. Kelly. 2015. Mechanistic species distribution modelling as a link between physiology and conservation. Conservation Physiology 3:1–16. https://doi.org/10.1093/conphys/cov056.

Fernandeño Tataviam Band of Mission Indians (FTBMI). May 15, 22, 23, 24, 2024—meetings in San Fernando, CA, with Fernandeño Tataviam Band of Mission Indians regarding the Western Joshua Tree Conservation Plan project.

Fort Independence Indian Community of Paiute Indians (FIICPI). July 2, 2024a—meeting on Teams, with Fort Independence Indian Community of Paiute Indians regarding the Western Joshua Tree Conservation Plan project.

Fort Independence Indian Community of Paiute Indians (FIICPI). October 7, 2024b—meeting on Teams, with Fort Independence Indian Community of Paiute Indians regarding the Western Joshua Tree Conservation Plan project.

Henson, P., R. White, and S. P. Thompson. 2018. Improving implementation of the endangered species act: finding common ground through common sense. Bioscience 68(11):861–872. https://doi.org/10.1093/biosci/biy093.

Hohenlohe, P. A., W. C. Funk, and O. P. Rajora. 2021. Population genomics for wildlife conservation and management. Molecular Ecology 30:62–82. https://doi.org/10.1111/mec.15720.

Intergovernmental Panel on Climate Change (IPCC). 2023. Summary for policymakers. In H. Lee and J. Romero, editors. Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland.

Jones, K. R., J. E. M.Watson, H. P. Possingham, and C. J. Klein. 2016. Incorporating climate change into spatial conservation prioritisation: a review. Biological Conservation 194:121–130. https://doi.org/10.1016/j.biocon.2015.12.008.

Lotterhos, K. E., and M. C. Whitlock. 2015. The relative power of genome scans to detect local adaptation depends on sampling design and statistical method. Molecular Ecology 24(5):1031–1046. https://doi.org/10.1111/mec.13100.

Merow, C., A. M. Latimer, A. M., Wilson, S. M. McMahon, A. G. Rebelo, and J. A. Silander, Jr. 2014. On using integral projection models to generate demographically driven predictions of species' distributions: development and validation using sparse data. Ecography (Cop.) 37:1167–1183. https://doi.org/10.1111/ecog.00839.

Morelli, T. L., C. W. Barrows, A. R. Ramirez, J. M. Cartwright, D. D. Ackerly, T. D. Eaves, J. L. Ebersole, M. A. Krawchuk, B. H. Letcher, and M. F. Mahalovich. 2020. Climate change refugia: biodiversity in the slow lane. Frontiers in Ecology and the Environment 18(5):228–234. https://doi.org/10.1002/fee.2189.

Morelli, T. L., C. Daly, S. Z. Dobrowski, D. M. Dulen, J. L. Ebersole, S. T. Jackson, J. D. Lundquist, C. I. Millar, S. P. Maher, W. B. Monahan, K. R. Nydick, K. T. Redmond, S. C. Sawyer, S. Stock, and S. R. Beissinger. 2016. Managing climate change refugia for climate adaptation. PLOS ONE 11(8). https://doi.org/10.1371/journal.pone.0159909.

National Park Service (NPS). 2022. Superintendent's compendium. Available from: https://www.nps.gov/jotr/learn/management/superintendents-compendium.htm (Accessed: 5 February 2023).

Oliveira, T. M., A. M. G. Barros, A. A. Ager, and P. M. Fernandes. 2016. Assessing the effect of a fuel break network to reduce burnt area and wildfire risk transmission. International Journal of Wildland Fire 25(6):619–632. https://doi-org.mantis.csuchico.edu/10.1071/WF15146.

Parker, S. S., B. S. Cohen, and J. Moore. 2018. Impact of solar and wind development on conservation values in the Mojave Desert. PLOS ONE 13(12): 1–16. https://doi.org/10.1371/journal.pone.0207678.

Peterson, D. L., C. I. Millar, L. A. Joyce, M. J. Furniss, J. E. Halofsky, R. P. Neilson, and T. L. Morelli. 2011. Responding to Climate Change in National Forests: A Guidebook for Developing Adaptation Options. General technical report PNW-GTR-855. US Forest Service, Pacific Northwest Research Station. Portland, OR, USA.

Randall, J. M., S. S. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer, and S. Morrison. 2010. Mojave Desert ecoregional assessment. Unpublished report. The Nature Conservancy. San Francisco, CA, USA. Available from: https://www.scienceforconservation.org/assets/downloads/Mojave_Desert_Ecoregional_Assessment_2010.pdf (Accessed: 2 April 2024).

Razgour, O., B. Forester, J. B. Taggart, M. Bekaert, J. Juste, C. Ibáñez, S. J. Puechmaille, R. Novella-Fernandez, A. Alberdi, and S. Manel. 2019. Considering adaptive genetic variation in climate change vulnerability assessment reduces species range loss projections. Proceedings of the National Academy of Sciences 116:10418–10423. https://doi.org/10.1073/pnas.1820663116.

Reed, J. M., N. Fefferman, and R. C. Averill-Murray. 2009. Vital rate sensitivity analysis as a tool for assessing management actions for the desert tortoise. Biological Conservation 142:2710–2717. https://doi.org/10.1016/j.biocon.2009.06.025.

Ricciardi, A., and D. Simberloff. 2009. Assisted colonization is not a viable conservation strategy. Trends in Ecology and Evolution 24:248–253. https://doi.org/10.1016/j.tree.2008.12.006.

Schwinning, S., C. J. Lortie, T. C. Esque, and L. A. DeFalco. 2022. What common-garden experiments tell us about climate responses in plants. Journal of Ecology 110(5):986–996. https://doi.org/10.1111/1365-2745.13887.

Shryock, D. F., T. C. Esque, G. A. Berry, and L. A. DeFalco. Forthcoming. Assessing uncertainty in forecasts of climate change refugia for Joshua trees using high-density distribution data. In review.

Smith, C. I., L. C. Sweet, J. Yoder, M. R. McKain, K. Heyduk, and C. Barrows. 2023. Dust storms ahead: climate change, green energy development and endangered species in the Mojave Desert. Biological Conservation 277. https://doi.org/10.1016/j.biocon.2022.109819.

Smith, C. I., S. Tank, M. R. McKain, A. Guidmond, and R. Flatz. 2021. Genome-scale data resolves the timing of divergence in Joshua trees. American Journal of Botany 108(4):1–17. https://doi.org/10.1002/ajb2.1633.

Swarts, K., R. M. Gutaker, B. Benz, M. Blake, R. Bukowski, J. Holland, M. Kruse-Peeples, N. Lepak, L. Prim, and M. C. Romay. 2017. Genomic estimation of complex traits reveals ancient maize adaptation to temperate North America. Science 357(6350):512–515. https://doi.org/10.1126/science.aam9425.

Sweet, L. C., M. J. Davis, D. Baronia, S. Heacox, T. La Doux, and J. R. McAuliffe. 2023. Post-wildfire resprouting and survival of eastern Joshua trees and banana yucca after the 2020 Dome Fire, Mojave National Preserve. California Cooperative Ecosystem Studies Unit Grant No. P22AC01419-00.

Sweet, L. C., T. Green, J. G. C. Heintz, N. Frakes, N. Graver, J. S. Rangitsch, J. E. Rodgers, S. Heacox, and C. W. Barrows. 2019. Congruence between future distribution models and empirical data for an iconic species at Joshua Tree National Park. Ecosphere 10. https://doi.org/10.1002/ecs2.2763.

Syphard, A. D., J. E. Keeley, and T. J. Brennan. 2011. Factors affecting fuel break effectiveness in the control of large fires on the Los Padres National Forest, California. International Journal of Wildland Fire 20(6):764–775. https://doi-org.mantis.csuchico.edu/10.1071/WF10065.

Tread Lightly! Inc (Tread Lightly). 2024. TREAD Principles. Available from: https://treadlightly.org/learn/ (Accessed: 20 February 2024).

Tuma, M. W., C. Millington, N. Schumaker, and P. Burnett. 2016. Modeling Agassiz's desert tortoise population response to anthropogenic stressors. The Journal of Wildlife Management 80(3):414–429. https://doi.org/10.1002/jwmg.1044.

US Fish and Wildlife Service (USFWS). 2023. Species status assessment report for Joshua trees (*Yucca brevifolia* and *Yucca jaegeriana*) version 2.0. Carlsbad Fish and Wildlife Office. University of California, Riverside, CA. USA.

US Forest Service (USFS). 2024. Ethnobotany. US Forest Service Office. Washington, DC, USA. Available from: https://www.fs.usda.gov/wildflowers/ethnobotany/index.shtml (Accessed: 23 July 2024).

Vaughn, K. J., L. M. Porensky, M. L. Wilkerson, J. Balachowski, E. Peffer, C. Riginos, and T. P. Young. 2010. Restoration ecology. Nature Education Knowledge 3(10):66.

Vitt, P., K. Havens, A. T. Kramer, D. Sollenberger, and E. Yates. 2010. Assisted migration of plants: changes in latitudes, changes in attitudes. Biological Conservation 143:18–27. https://doi.org/10.1016/j.biocon.2009.08.015.

Weigel, D., and M. Nordborg. 2015. Population genomics for understanding adaptation in wild plant species. Annual Review of Genetics 49:315–338. https://doi.org/10.1146/annurev-genet-120213-092110.

Williams, M. I., and R. K. Dumroese. 2013. Preparing for climate change: forestry and assisted migration. Journal of Forestry 111:287–297. https://doi.org/10.5849/jof.13-016.

CHAPTER 6 IMPLEMENTATION

Inter-Governmental Cooperative Agreement between the Tribal Nations whose representatives comprise the Bears Ears Commission, the Hopi Tribe, Navajo Nation, Ute Mountain Ute Tribe, Ute Indian Tribe of the Uintah and Ouray Reservation, and the Pueblo of Zuni and the United Stated Department of the Interior, Bureau of Land Management and the United States Department of Agriculture, Forest Service for the Cooperative Management of the Federal Lands and Resources of the Bears Ears National Monument (Bears Ears National Monument Cooperative Agreement). 2022. Available from: https://www.blm.gov/sites/default/files/docs/2022-06/Bears%20Ears%20National%20Monument%20Inter-Governmental%20Cooperative%20Agreement%202022.pdf. (Accessed: 19 August 2024).

California Department of Fish and Wildlife (CDFW). 2023. Agreement and co-management framework for reintroduction of anadromous salmonoids in the tribal cultural landscape of the Winnemem Wintu Tribe along the McCloud River Watershed. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=212724&inline (Accessed: 11 June 2024).

California Department of Fish and Wildlife (CDFW). n.d. Western Joshua Tree Conservation Permitting. Available from: https://wildlife.ca.gov/Conservation/Environmental-Review/WJT/Permitting (Accessed: 19 September 2024).

Traverso, J. 2023. Tribal, state and federal partners join to return endangered salmon to historic habitat. California Fish and Wildlife News Archive. Available from: https://wildlife.ca.gov/News/Archive/tribe-state-and-federal-partners-join-to-return-endangered-salmon-to-historic-habitat (Accessed: 26 September 2024).

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Western Joshua Tree Conservation Plan

VOLUME II: APPENDICES

Draft Presented to the California Fish and Game Commission

DECEMBER 2024

TABLE OF CONTENTS

Appendices

Appendix A.

Agency Feedback Questionnaire

Western Joshua Tree Conservation Plan – Government Agency Request for Feedback

Specific western Joshua tree (WJT) feedback could be related to any of the following items, whether applicable on lands you manage or are familiar with from other entities within your surrounding area:

1. What is your agency currently doing to manage WJT? (Can relate to vegetation in general or specific to WJT)
2. What are your agencies' best management practices for the following:
    a. Wildfire suppression/prevention in WJT habitat
    b. Invasive species control in WJT habitat
    c. Relocation of WJT (if so, do you have a relocation specialist that can provide guidance?)
    d. Soil Erosion
    e. Grazing
    f. Motor vehicle recreation
3. Have there been any WJT-specific restoration/conservation efforts in the past, present, or in future planning? (e.g., seed collection/banking, replanting WJT, replanting/seeding native nurse plants for WJT, WJT relocation, etc.)
4. CDFW is currently seeking input from agencies on acceptable parameters for a WJT conservation agreement between federal, state, and local jurisdictions. Would your agency approve of the following: (agree, disagree, agree but with conditions)
    a. Making WJT a species of management/conservation concern,
    b. Implementing special management considerations in WJT habitat, including long-term management and habitat enhancement strategies,
    c. Implementing special management considerations in WJT climate refugia once identified,
    d. Limiting ground disturbing impacts in WJT habitat,

e. Limiting vegetation removal in WJT habitat,
f. Establishing avoidance buffers around WJT based on tree size,
g. Limiting WJT removal,
h. Relocating WJT when removal is needed,
i. Restoring degraded WJT habitat,
j. Restoring degraded WJT climate refugia,
k. Enhancing WJT habitat (e.g. planting additional WJT and/or nurse plants),
l. Enhancing WJT climate refugia (e.g. science-based assisted gene flow),
m. Accepting relocated WJT from projects outside of your jurisdiction boundaries (limited to10 miles and 500 ft elevation difference), or
n. Hosting range-wide monitoring plots.

5. Would your agencies be interested in receiving and managing adjacent or privately in-held WJT land that was purchased using state mitigation funds (i.e. durability agreements)?

6. Does your agency have partnerships/agreements with local Native American tribes? If so, please describe.

7. Is there any other feedback/information you would like to provide to CDFW regarding WJT conservation? Examples could include the following:

    a. Locations of your healthiest WJT stands
    b. Locations where your WJT stands are most stressed
    c. Planning documents related to WJT
    d. Yucca moth pollinators studies/reports or management activities
    e. Criteria not mentioned in the presentation for identifying priority WJT conservation lands

Please contact Drew Kaiser, CDFW Senior Environmental Scientist and Western Joshua Tree Coordinator with feedback, comments, or additional questions:

Email: WJT@wildlife.ca.gov
Phone: (916) 224-6469

Thank you!

Appendix B.

Agency and Public Input Summary Memo

Input Summary Memo

Date: October 29, 2024

To: Andrew Kaiser, California Department of Fish and Wildlife

From: Curtis Alling, Linda Leeman, Jessie Quinn, Ascent

Subject: Summary of Input from Interagency, Researcher, and Public Outreach Meetings on the Western Joshua Tree Conservation Plan

INTRODUCTION

The California Department of Fish and Wildlife (CDFW) conducted a series of meetings to gather input from public agencies, the scientific community, and the general public to inform and guide development of the Western Joshua Tree Conservation Plan (Conservation Plan). The purpose of this memo is to summarize the key topics raised by meeting attendees to ensure that this input is captured in the Conservation Plan. The following table lists the outreach meetings focused on the development Conservation Plan that have occurred to date with federal, state, and local agencies; researchers; and the public. CDFW has held other outreach meetings related to permitting under the Western Joshua Tree Conservation Act (WJTCA). The input from any future meetings will be addressed in the Conservation Plan.

Meeting Type	Meeting Date & Time
State and Federal Agency Meeting #1	Thursday, February 29, 2024, 2-4pm
Local Agency Meeting #1	Thursday, February 29, 2024, 10-12pm
Researcher Outreach Meeting #1	Thursday, March 7, 2024, 10-12pm
California State Parks Meeting #1	Wednesday, March 27, 2024, 10-11am
Public Outreach Meeting #1	Thursday, April 4, 2024, 10-12pm
California State Parks Meeting #2	Wednesday, May 8, 2024, 10-11:45am
State and Federal Agency Meeting #2	Wednesday, May 15, 2024, 2-4pm
Local Agency Meeting #2	Wednesday, May 15, 2024, 10-12pm
California State Lands Commission Meeting #1	Wednesday, May 22, 2024, 10-11am
Public Outreach Meeting #2	Thursday, July 11, 2024, 2-4pm
California State Parks Meeting #3	Wednesday, June 12, 2024, 1-2pm
California Department of Forestry and Fire Protection Meeting #1	Monday, July 15, 2024, 9-10am

SUMMARY OF INPUT

State and Federal Agency Meeting #1

The purpose of this meeting was to solicit input about current efforts to protect western Joshua tree from state and federal agencies that manage land in the geographic focus area of the Conservation Plan. In addition, the meeting provided an opportunity for CDFW to identify opportunities for collaboration with these state and federal agencies and gather feedback on issues of concern that the agencies would like to see addressed in the Conservation Plan.

Representatives from the following agencies attended the meeting: California State Parks (CSP), National Park Service (NPS), US Department of Fish and Wildlife Service (USFWS), US Navy (Naval Air Weapons Station China Lake), US Bureau of Land Management (BLM), US Department of Defense (DOD) (Edwards Air Force Base), California Department of Transportation (Caltrans), and US Forest Service (USFS). A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics relevant to the Conservation Plan that were discussed during the meeting:

CURRENT MANAGEMENT AND RESEARCH EFFORTS

- National Park Service
  - Based on climate modeling, NPS anticipates losing approximately 80 percent of currently occupied western Joshua tree habitat in Joshua Tree National Park (JTNP) in the next 100 years. In a worst-case greenhouse gas emissions scenario, NPS anticipates that less than 1 percent of suitable habitat will remain within JTNP. NPS is exploring the suitability of higher elevation areas outside of JTNP for potential conservation of western Joshua tree.
  - NPS has focused western Joshua tree restoration efforts on climate refugia areas within JTNP. Based on preliminary data, NPS assumes that populations of western Joshua tree in the eastern extent of JTNP are better adapted to dry environmental conditions that would be similar to the future conditions of climate refugia. NPS emphasized the importance of assisted migration (either as fruit, seeds, or trees) to locations that will be suitable for western Joshua tree in the future because climate change will occur quicker than the species can migrate on its own.
  - NPS implements aggressive fire control measures and full fire suppression in JTNP to prevent the loss of western Joshua trees. NPS implements fuel breaks around larger expanses of western Joshua tree that have not burned and around unburnt islands within woodland areas in climate refugia. NPS is currently protecting western Joshua tree populations in non-refugia to allow for collection of genetic material. NPS also replants western Joshua trees in burned areas.
- California State Parks
  - CSP manages four parks with western Joshua tree range—Red Rock Canyon State Park (SP), Arthur Ripley Desert Woodland SP, Onyx Ranch State Vehicular Recreation Area (SVRA), and Hungry Valley SVRA. (Saddleback Butte SP was not mentioned in the meeting, but also contains western Joshua trees.) Current management efforts for western Joshua tree include enhancing native stands through collecting seeds and planting.
  - CSP conducted a study of the natural post-fire regeneration of western Joshua trees with and without predator exclusion fencing at Arthur Ripley Desert Woodland SP. The findings of this study can be used to inform the Conservation Plan.

TOPICS TO ADDRESS IN THE CONSERVATION PLAN

- The Conservation Plan should discuss the indirect impact of erosion on western Joshua tree and address the protection of soil and biological soil crusts. (CSP)
- USFWS facilitates a western Joshua tree working group made up of State and federal agencies. The working group is developing standardized monitoring protocols to collect information on abundance trends across the range of the species. USFWS asked if there is potential to incorporate monitoring protocols in the Conservation Plan. A database to track western Joshua tree monitoring data may be time consuming and costly to develop and maintain. Outside support would be helpful in database efforts and would be within the scope of the working group's research and efforts. (USFWS)
- Priority areas for conservation should include climate refugia within western Joshua tree habitat and areas that do not presently support western Joshua trees but will become suitable habitat for the species in the future. (JTNP)

OPPORTUNITIES FOR COLLABORATION

- Arthur Ripley Desert Woodland SP is interested in being a receiver site for relocated western Joshua trees. (CSP)
- Coordination between researchers and agency land managers would be helpful in developing Conservation Plan goals and management strategies. (USFWS)
- USFWS works with DOD agencies on conservation activities within military installations. USFWS recommends reviewing the integrated natural resource management plans for military installations that incorporate western Joshua tree management. Need to outreach more to DOD land management divisions to understand the policies that are already in place at DOD facilities for western Joshua tree management and conservation. (USFWS)

Local Agency Meeting #1

The purpose of this meeting was to address and to gather feedback on issues of concern that local agencies would like to see addressed in the Conservation Plan. In addition, the meeting provided an opportunity for local agencies to identify how they would like to engage in the development of the Conservation Plan and how CDFW can align the plan's strategies with local agency conservation goals.

Meeting attendees included representatives from the following local agencies: City of Hesperia, City of Lancaster, City of Palmdale, City of Ridgecrest, County of San Bernardino, County of Los Angles, Town of Yucca Valley, and Kern County. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

PERMITS, DELEGATION AGREEMENTS, AND OUTREACH

- A representative from the Town of Yucca Valley (Jared Jerome) noted that many residents have western Joshua trees in their yards and will likely need WJTCA hazard management permits or incidental take permits (ITPs). Jared emphasized the importance of community outreach. Jared expressed interest in learning about protocols for delegation agreements for permit authorization and how the delegation agreements relate to the Conservation Plan. Jared also asked questions about funding mechanisms (i.e., how much property owners will be compensated for conservation easements on private property) and how conservation easements will be applied (e.g., as mitigation for development or as a strategy for protecting undeveloped properties).
- A representative from the Los Angeles County Planning Department (Caroline Chen) noted that town councils in Antelope Valley, such as Pearblossom, are interested in participating in outreach meetings and are awaiting direction for developing community standards to protect western Joshua trees.

CONSERVATION APPROACHES

- The Los Angeles County Planning Department representative (Caroline Chen) suggested that the Conservation Plan include measures to protect biological soil crust.

Researcher Outreach Meeting #1

The purpose of this meeting was to gather feedback on research topics and their potential conservation implications from researchers studying western Joshua tree. The meeting provided an opportunity for researchers to identify research to be incorporated into the Conservation Plan and opportunities for CDFW to align the plan's strategies with the best available science.

Meeting attendees included researchers affiliated with the following universities and agencies: Willamette University; California State University, Northridge (CSUN); Reed College; University of California, Riverside; University of California, Santa Cruz (UCSC); USFWS; and City of Lancaster. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

RELOCATION

- Michael Loik (UCSC) stated that there is not enough data to determine appropriate relocation distances for western Joshua trees. More information is needed on existing population genetic structures, availability of potential habitat, and land ownership of receiver sites.
- Consider developing a seed transfer zone map for western Joshua tree.
- Relocation strategies may differ between seedlings and mature trees.

ASSISTED GENE FLOW

- Jeremy Yoder (CSUN) is gathering genetic data to determine whether trees at lower elevations and in drier climates (i.e., "hot adapted") are better adapted to future conditions.
- Consider whether western Joshua trees in areas where more permit applications have been received (e.g., Town of Yucca Valley) and areas of lower elevation that are experiencing environmental stressors (e.g., Town of Apple Valley, City of Victorville) are more appropriate for assisted gene flow.

SOIL MICROBE RESEARCH

- Based on an environmental DNA (eDNA) study for an endangered lupine (*Lupinus* sp.), a researcher in Michael Loik's lab (UCSC) found a difference in microbial communities in plants grown in native habitats and plants grown in nurseries. Research on western Joshua tree microbial communities can help inform how plants are grown for restoration.
- Juniper Harrower (Reed College) is interested in the effects of microbial communities on restoration success in burned areas. Juniper noted that survival rates of out-planted western Joshua trees are low due to predation. She is conducting research that involves adding microbial communities from existing western Joshua trees and noted that it would be important to use locally adapted mycorrhizae associated with nurse plants. She found that seedlings can be inoculated with a teaspoon of soil and the same mycorrhizal communities will form.

CLIMATE REFUGIA

- Lynn Sweet (UC Riverside) noted that JTNP has implemented fuel treatments (e.g., fuel breaks) to protect western Joshua tree at higher elevations. Lynn is currently developing a Refugia Management Plan for JTNP which includes mapping areas where western Joshua trees are most vulnerable and identifying priority areas for fuel treatments (draft plan expected in June 2024). However, fuel treatments can have negative effects of increasing invasive species cover and disturbing existing western Joshua trees and its obligate pollinator, the yucca moth (*Tegeticula synthetica*).
- Lynn pointed out that the boundaries of predicted areas of future climate refugia should be regularly assessed and revised if they are being used to enact fine-scale conservation efforts based on established management units represented in GIS shapefiles, given the uncertainty associated with modeled projections of those boundaries. Also, the planning team should consider whether the model timescales align with management timescales.
- Lynn published a study in Ecosphere in 2019 that modeled future habitat within JTNP under one future climate scenario. The study found higher seedling survival in upper elevations.
- USGS is conducting a 12-year resurvey on JTNP plots.

POLLINATORS

- Jeremy Yoder's lab (CSUN) is working on a distribution model of western Joshua tree's obligate pollinator, the yucca moth, independent of the tree's distribution and is looking to identify the specific environmental conditions that the moths use to transition from larvae to adults. The researcher is planning to collect data on the temperature profile of soil where western Joshua tree populations are found. Based on the literature, low winter temperatures may be a cue for the moths to transition out of diapause and begin pollination. The research is attempting to understand how climate drives the moth's activities and how the moth's distribution may align with western Joshua tree's modeled climate refugia. This research would not be available for incorporation in the initial draft of the Conservation Plan, but distribution models may be available in August.

NURSE PLANTS AND RECRUITMENT

- Based on surveys at Covington Flats in JTNP, Michael Loik (UCSC) observed that the shrub blackbrush (*Coleogyne ramosissima*) was important for western Joshua tree recruitment.
- Michael noted that Viceroy gold mine in Searchlight, Nevada had a restoration program for eastern Joshua tree, which may provide useful information that can be applied to western Joshua tree.
- Nurse plants may be an important aspect of ensuring western Joshua tree survival in assisted migration or gene flow efforts. Research was conducted on eastern Joshua tree at Mojave National Preserve. The experiment evaluated the effects of different treatments (caged/non-caged and shaded/non-shaded) on the initial survival of small seedlings in a post-fire environment. Caging showed a significant benefit to survival of small seedlings, but shading showed a negative impact on small seedlings (potentially related to competition).
- Lynn Sweet (UC Riverside) intends to research nurse plants for eastern Joshua trees.

ADAPTIVE MANAGEMENT

- Consider adaptive management as an aspect of the Conservation Plan because science will continue to evolve beyond the deadline for the Conservation Plan. Consider strategies employed at JTNP.
- A poll of researchers could be used to assess whether research supports the proposed management actions and avoidance and minimization measures.

OTHER RESEARCH TOPICS

- Michael Loik (UCSC) has unpublished baseline spectral data for western Joshua trees used in assessing plant health.

California State Parks Meeting #1

The purpose of this meeting was to solicit input about current efforts by CSP to protect western Joshua tree and CSP's approach to co-management with California Native American Tribes. In addition, the meeting provided an opportunity for CDFW to identify opportunities for collaboration with CSP, with the ultimate goal of developing a cooperative agreement. Meeting attendees included CSP staff from Headquarters, Great Basin District, Hungry Valley SVRA, and Onyx Ranch SVRA. A full list of attendees is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

LAND MANAGEMENT

- CSP has a high standard of resource stewardship; however, western Joshua tree may experience different levels of protection on CSP land depending on the use (e.g., off-highway vehicle recreation areas receive less protection than ecological reserves).
- CSP may be interested in acquiring land purchased next to State Parks using the WJTCA Conservation Fund.
- CSP typically does not receive mitigation because of the potential to degrade conserved landscape. Land reclassification for receiver sites may occur at CSP discretion based on the General Plan goals and guidelines for each park.
- Grant funding can potentially be used to implement invasive species control at Arthur Ripley Desert Woodland SP.
- CSP will share policies, best management practices, and restoration activities relevant to western Joshua tree conservation.

CONSERVATION APPROACHES

- Conservation approaches for western Joshua tree should include establishing reserves, addressing stressors, restoring habitat, responding to climate change, and protecting/restoring populations at higher elevations.
- CSP is interested in opportunities to be part of the Conservation Plan implementation (e.g., being part of a reserve system, acquiring land, developing collaborations, sharing protocols, using park land as receiver sites, and hosting long-term monitoring plots).

RESEARCH

- CSP is conducting post-fire research on western Joshua tree regeneration at Arthur Ripley Desert Woodland SP. The study is investigating impacts on western Joshua tree from high severity fire using basal sprouts. The study is attempting to determine the protocols that should be implemented when a stand of western Joshua tree burns.

TRIBAL CO-MANAGEMENT

- CSP recently developed an MOU with a local Tribe and will share the document if it can be made publicly available.
- CSP indicated that western Joshua tree conservation has not been a high priority for Tribes in the area.

Public Outreach Meeting #1

The purpose of this meeting was to solicit input from the public on the elements, content, and issues to be addressed in the Conservation Plan. Meeting attendees included land/property owners, real estate brokers, trade association representatives, non-profit land conservancy and conservation association representatives, town council association representatives, regulatory consultants, biologists, local agency staff, and legislative office representatives.

The following sections summarize the key topics that were discussed during the meeting:

MITIGATION APPROACHES

- Commenters expressed concerns that current mitigation approaches still result in the net loss of western Joshua tree. A researcher stated that a 1:1 tree replacement ratio is not sufficient because approximately 10 seeds and 100 years are needed to produce one mature western Joshua tree.
- One commenter requested consideration for mitigation of western Joshua trees that colonize fallowed agricultural land.
- One commenter (regulatory consultant) asked how management approaches will differ in reduced fee areas.

TRANSPLANTING STRATEGIES

- Commenters recommended that CDFW establish guidelines for transplanting trees to ensure survival. Commenters suggested that transplanted trees be relocated near their points of origin to areas with similar altitude and soil conditions. However, another commenter recommended assisted migration and moving trees to cooler sites that serve as climate refugia.
- Commenters suggested that CDFW consider the efficacy of transplant methods. One commenter stated that using spades for relocation is 6 to 8 times more successful than bare rooting for western Joshua trees over 8 feet tall.
- Commenters recommended that CDFW develop a system of tracking trees to monitor survivability.
- One commenter asked for clarification on whether relocation is considered an impact or a conservation strategy.

CONSERVATION STRATEGIES

- Commenters stated that the Conservation Plan should place higher emphasis on in situ preservation of western Joshua tree over habitat creation and restoration due to the length of time it takes for the species to mature and provide functioning habitat. Subsequently, a commenter suggested that the fee structure favor preservation.
- One commenter expressed concerns that western Joshua trees are being transplanted to landscaped areas rather than conservation lands. The commenter suggested that the Conservation Plan treat western Joshua tree as a keystone species with habitat value rather than a landscape plant.
- One commenter suggested that the Conservation Plan ensure habitat connectivity for species that use western Joshua tree habitat (e.g., LeConte's thrasher, loggerhead shrike) to prevent these species from declining and becoming listed.
- Commenters suggested that the Conservation Plan incorporate measures to maintain existing soil mycorrhizae and protect western Joshua tree's obligate pollinator.
- One commenter recommended that the Conservation Plan establish a baseline, describe long-term management opportunities, and consider uncertainties.

- Commenters expressed concerns that mitigation and conservation lands are located outside the current distribution of western Joshua tree.
- Commenters suggested that the Conservation Plan should deter development and solar and wind projects from high density populations of western Joshua tree and encourage developers to build in disturbed areas.

PERMITTING

- Commenters expressed concerns about how permit requirements will be enforced at the local level. Commenters recommended that CDFW develop a mechanism and funding for oversight to ensure that applicants adhere to permit requirements.
- Commenters (particularly landowners/developers, real estate brokers, regulatory consultants, and government representatives) expressed concern about balancing western Joshua tree conservation with housing needs and impacts on property owners. Commenters expressed concerns about permitting costs and diminished property values due to these costs. One commenter suggested fee waivers for single-family homeowners. One commenter expressed support for placing limits on tree removal, but noted that sprouts on a single tree make it too easy to exceed these limits.
- Commenters asked whether the WJTCA allows landowners to collect seeds and reproduce, plant, or relocate western Joshua trees within their private property without risk of take.
- A representative from San Bernardino County requested permitting streamlining for public works safety projects (e.g., emergency repairs).
- One commenter asked how conservation efforts will be funded if the money received from permitting fees is not sufficient.

OTHER TOPICS

- One commenter suggested that environmental justice be a consideration in the Conservation Plan.
- One commenter expressed interest in reviewing input from Tribes.

California State Parks Meeting #2

The purpose of this meeting was to solicit input from CSP on their Tribal memorandum of understanding (MOU) program. A full list of attendees is provided in the "List of Attendees" section below.

During the meeting, CSP discussed lessons learned from their prior experience establishing agreements with California Native American Tribes. CSP also provided recommendations related to the following:

- Collaborations and funding sources;
- Protocols and procedures for communication and information sharing, including tailored approaches to the unique needs of each Tribe;
- MOU content, including the importance of defining the regulatory framework and legal obligations and identifying priorities and mutually beneficial activities for the agreements;
- Importance of including all relevant staff and leadership;
- Strategies for decision-making; and
- Suggestions on the format for discussions and process of incorporating input from Tribes.

State and Federal Agency Meeting #2

The purpose of this meeting was to solicit additional input about current efforts to protect western Joshua tree from state and federal agencies that manage land in the geographic focus area of the Conservation Plan. In addition, the meeting provided a second opportunity for CDFW to provide updates to the proposed management actions, identify opportunities for collaboration with these state and federal agencies, and gather feedback on issues of concern that the agencies would like to see addressed in the Conservation Plan.

Representatives from the following agencies attended the meeting: CSP, California State Lands Commission (CSLC), California Department of Forestry and Fire Protection (CAL FIRE), DOD, NPS, USFWS, US Navy, BLM, Caltrans, and USFS. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following topics relevant to the Conservation Plan were discussed during the meeting:

- CSP (Leah Gardner) indicated that off-highway vehicle (OHV) use is more impactful to western Joshua trees in open riding areas than on designated trails within State Parks. Accordingly, the Conservation Plan should clarify that negative impacts related to OHV use refer to unrestricted off-trail use.
- CSP (Leah Gardner) noted that land use categories in State Parks include natural and cultural preserves, which have more restricted use than recreation areas.
- CSP (Leah Gardner) recommended expanding on the management actions to include actions that minimize erosion and minimize impacts on biological soil crusts.
- CSP (Chris Hon) recommended clarifying what is meant by grazing in the Conservation Plan, since there is a difference in the effects from grazing by livestock and by native mammals.

Local Agency Meeting #2

The purpose of this meeting was to provide updates to the proposed management actions and address and gather additional feedback on issues of concern that local agencies would like to see addressed in the Conservation Plan. In addition, the meeting provided a second opportunity for local agencies to identify how they would like to engage in the development of the Conservation Plan and how CDFW can align the plan's strategies with local agency conservation goals.

Meeting attendees included representatives from the following local agencies: Los Angeles County, San Bernardino County, Riverside County, City of Adelanto, City of Palmdale, California City, City of Victorville, and City of Hesperia. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

- A representative from the Los Angeles County Planning Department (Caroline Chen) raised concern with using mulch to cover exposed soils during the creation of fire lines because of the potential for mulch to catch on fire.
- A representative from the Los Angeles County Planning Department (Mark Herwick) asked about the likelihood of developing preserves, whether there is a minimum size requirement for preserves, and if the Conservation Plan considers connectivity between preserves.
- Local jurisdictions expressed concerns related to permitting and requested clarification about the types of impacts that would occur within certain distances of trees. Representatives from the Los Angeles County Planning Department (Lorraine Acuna) and City of Hesperia (Andrew Lemke) expressed concerns about how single family homeowners would be affected by impact buffers around trees and noted that different jurisdictions use different buffers. A representative from the City of Victorville (Alex Jauregui) requested clarification on the requirements for triggering an incidental take permit and asked if different requirements would apply depending on the ecological value of the land. A representative from the County of San Bernardino (Karen Carter) expressed concerns about maintaining existing roads that are within the avoidance buffers of trees.

California State Lands Commission Meeting #1

The purpose of this meeting was to solicit input from the CSLC about current efforts to protect western Joshua tree. In addition, the meeting provided an opportunity for CDFW to identify opportunities for collaboration with CSLC and gather feedback on issues of concern that CSLC would like to see addressed in the Conservation Plan. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics relevant to the Conservation Plan that were discussed during the meeting:

- CSLC has jurisdiction over State Lands, which include School Lands and Sovereign Lands.
- On School Lands, CSLC issues leases for various project types, including electrical transmission infrastructure, grazing, guzzlers, state highway improvements, mineral extraction, and renewable energy development. All leases on School Lands must undergo the CEQA process, which evaluates impacts on western Joshua tree. CSLC is typically the lead agency under CEQA and is open to receiving guidance from CDFW on recommended protections for western Joshua tree. Fees are required for leases on School Lands. CSLC has been seeking to consolidate School Lands for conservation, but the Federal government has not made progress on implementation. CSLC generally does not sell School Lands parcels.
- Sovereign lands include navigable lakes, rivers, the area from the shore to three miles into the ocean, and other larger natural water bodies. CSLC has jurisdiction on lands where these resources were located on the date of California statehood. Fees for leases on Sovereign Lands can be waived.
- Projects on State Lands must consider the historic lands inventory as part of the CEQA analysis. One wind energy project on State Lands involved evaluation of a historic Joshua tree display and incorporated mitigation to locate infrastructure away from this population of trees.
- CSLC has issued leases on State Lands to CSP and CDFW for conservation and preservation purposes. These types of leases are typically long-term (10-20 years). CSLC can issue long-term leases to CDFW for preservation of land in modeled climate refugia. However, leases are not exclusive and applicants may apply for leases on parcels held under long-term leases for conservation and preservation. CSLC would be required to review any applications, but is unlikely to approve the application if the new project conflicts with the conservation and preservation of western Joshua tree.
- CSLC is amenable to disclosing a collaboration between CDFW and CSLC to preserve western Joshua tree on State Lands in the Conservation Plan.

Public Outreach Meeting #2

The purpose of this meeting was to solicit additional input from the public on the elements, content, and issues to be addressed in the Conservation Plan. Meeting attendees included regulatory consultants, government agency and special district representatives, private landowners, attorneys, construction and landscaping companies, non-profit land conservancy and conservation association representatives, university affiliates, utility and solar companies, and news reporters.

The following topics relevant to the Conservation Plan were discussed during the meeting:

- Commenters expressed concerns related to permitting. Commenters opposed the permitting of certain solar projects and expressed concerns that permitting will pose a higher financial burden for individual property owners and disadvantaged communities compared to large-scale developers. Commenters also expressed concern about enforcement of permit conditions when delegating permitting authority to local governments. In addition, commenters asked whether mitigation fee levels would correspond with habitat quality.

- Commenters recommended conducting additional research on seed dispersers and the effects of grazing animals on western Joshua trees.
- Commenters suggested that translocation success rates are overstated and expressed a preference for preservation over relocation, particularly for clonal trees.
- Commenters raised questions about the types of activities covered under the WJTCA.
- Commenters raised questions about how conservation funds would be sourced, managed, spent, and made transparent to the public.
- Commenters raised questions about the enforceability of management actions in the Conservation Plan.
- A representative from the Town of Yucca Valley (Jared Jerome) raised questions about impacts from fire breaks and the reasoning behind fire break recommendations.

California State Parks Meeting #3

The purpose of this meeting was to solicit input from CSP on the management actions that are being developed for the Conservation Plan and potential implementation on State Parks with western Joshua trees. A full list of attendees is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

OFF-HIGHWAY VEHICLE USE

- CSP requires each State Vehicular Recreation Area to follow a Wildlife Habitat Protection Plan and a Soil Conservation Plan. These plans are in development and are expected to be released to the public by the end of 2024. CSP recommends referencing these plans in the Conservation Plan.
- CSP requires park visitors and employees to stay on designated trails and roads. CSP manages off-trail riding by repairing and replacing fences and erecting barriers (e.g., straw bales or permanent fences).

CONSERVATION AGREEMENTS

- CSP staff expressed that they need to understand more specifics about the Conservation Plan before making commitments. They suggested that the Conservation Plan should allow for flexibility and should identify the commitment to maintain ongoing collaboration, restoration opportunities that could be funded by the Western Joshua Tree Conservation Fund, and guidance for relocating western Joshua trees.

MANAGEMENT PRACTICES

- CSP typically manages habitat rather than individual species. CSP staff indicated that they would not agree to blanket avoidance buffers (e.g., 1 meter buffer around western Joshua tree).
- CSP does not deal with mitigation or conservation easements.
- The Natural Resources Department of CSP does not deal with acquiring land for management; however, this topic can be discussed with another division of CSP.

WESTERN JOSHUA TREE RELOCATION

- CSP staff wants to understand their responsibilities if they were to accept relocated western Joshua trees on State Park lands.
- There was disagreement among CSP staff about whether a 10-mile limit on relocation distances would be acceptable.
- CSP indicated that they cannot participate in gene flow management activities.
- CSP raised questions related to success rates of relocating trees and the length of time for maintenance activities, such as watering.
- CSP identified challenges with relocating trees to Onyx Ranch State Vehicular Recreation Area because much of the land is inaccessible (e.g., bringing water trucks to relocation sites, liabilities). CSP indicated that Arthur B. Ripley Desert Woodland State Park is more accessible.

PROJECT EVALUATION

- CSP is required to fill out a Project Evaluation Form for any project involving ground disturbance, including tree relocation and habitat enhancement. The review period for form approval is 3 to 6 months. Tribes may request to consult during this process.

LONG-TERM MONITORING

- CSP encourages scientific research and issues permits for research activities. Science permits typically take a few months to process. CSP would accept establishment of long-term monitoring plots and recommends that are clearly marked.

California Department of Forestry and Fire Protection Meeting #1

The purpose of this meeting was to solicit input from the CAL FIRE San Bernardino Unit about potential fire and fuel treatment strategies. In addition, the meeting provided an opportunity for CDFW to identify opportunities for collaboration with CAL FIRE and gather feedback on issues of concern that CAL FIRE would like to see addressed in the Conservation Plan. A full list of attendees and their affiliations is provided in the "List of Attendees" section below.

The following sections summarize the key topics that were discussed during the meeting:

FUEL TREATMENT STRATEGIES

- CAL FIRE's approach to fuel reduction in western Joshua tree habitat is implementing manual treatments, with mechanical treatments where possible. CAL FIRE has had issues with grazing in the past and noted that herbicide application may become more limited due to the listing of bumble bees. CAL FIRE has not implemented prescribed fire because western Joshua tree is not a fire-adapted species. CAL FIRE recommends including manual and mechanical treatments in the Conservation Plan.
- The San Bernardino Unit implements treatments within the State Responsibility Area. Treatments typically occur on state and private land, but CAL FIRE is interested in cooperating more with federal agencies. Western Joshua trees are also present in Los Angeles County (contracted with CAL FIRE) and the Riverside Unit.
- CAL FIRE has implemented one treatment project in an area with a large population of western Joshua trees. The treatment area encompassed approximately 60-80 acres in Piñon Hills, a transition zone with pinyon pine. Manual treatments were implemented within buffers around western Joshua trees and mechanical treatments

were implemented outside of buffers. CAL FIRE noted that treatments may not be feasible if typical buffers (e.g., 50 feet) are required around trees.

- The Conservation Plan can include fire management strategies. CAL FIRE can implement treatments to protect climate refugia if they receive input on design elements. Fire prevention strategies (e.g., implementing fuel treatments) are more likely to be followed than strategies implemented during an active fire.

OPPORTUNITIES FOR COLLABORATION

- CAL FIRE is primarily concerned with implementing fuel treatments to protect health and safety (e.g., evacuation routes) and infrastructure. CAL FIRE is already working with CDFW to ensure that they are adequately protecting western Joshua tree during implementation of projects. CAL FIRE has funding for collaboration with CDFW. Edith Martinez is CDFW's current point of contact with CAL FIRE.
- CDFW would like to work with CAL FIRE to develop mitigation measures to protect western Joshua tree for projects that benefit ingress/egress and infrastructure. Fuel treatment projects may be funded through the WJTCA Conservation Fund.
- The Conservation Plan could describe the process for collaboration between CDFW and CAL FIRE, as follows: (1) CAL FIRE develops a project; (2) CAL FIRE submits the project to CDFW fire staff (currently Edith Martinez); and (3) CDFW fire staff connects with the western Joshua tree team for review.
- CAL FIRE is interested in participating in the fire fuels and invasive species subgroup of the interagency biological working group for Joshua tree.

LIST OF ATTENDEES

State and Federal Agency Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Sara Kern	California Department of Fish and Wildlife
Kelley Barker	California Department of Fish and Wildlife
Jeff Drongesen	California Department of Fish and Wildlife
Steve Ingram	California Department of Fish and Wildlife
Josh Grover	California Department of Fish and Wildlife
Kevin Thomas	California Department of Fish and Wildlife
Julie Vance	California Department of Fish and Wildlife
Laura Petersen-Diaz	California Department of Fish and Wildlife
Alisa Ellsworth	California Department of Fish and Wildlife
Lani Maher	California Department of Fish and Wildlife
Jessie Quinn	Ascent
Linda Leeman	Ascent
Curtis Alling	Ascent

Name	Organization
Tracy Prybyla	Ascent
Hannah Weinberger	Ascent
Leah Gardner	California State Parks
Kathryn Tobias	California State Parks
Jay Goodwin	National Park Service (Joshua Tree National Park)
Julie Simonsen	US Department of Fish and Wildlife Service
Felicia Sirchia	US Department of Fish and Wildlife Service
Cynthia Hopkins	US Navy, Naval Air Weapons Station China Lake
Julia Hendrix	US Navy, Naval Air Weapons Station China Lake
Kim Marsden	US Bureau of Land Management
LaReina Van Sant	US Bureau of Land Management
Judy Perkins	US Bureau of Land Management
Frank Giles	US Bureau of Land Management
Misty Hailstone	US Department of Defense, Edwards Air Force Base
Larry Zimmerman	US Department of Defense, Edwards Air Force Base
William Hunt	California Department of Transportation
Beau Tindall	California Department of Transportation
Laura Ashfield	US Forest Service

Local Agency Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Sara Kern	California Department of Fish and Wildlife
Kelley Barker	California Department of Fish and Wildlife
Jeff Drongesen	California Department of Fish and Wildlife
Steve Ingram	California Department of Fish and Wildlife
Kevin Thomas	California Department of Fish and Wildlife
Julie Vance	California Department of Fish and Wildlife
Alisa Ellsworth	California Department of Fish and Wildlife
Lani Maher	California Department of Fish and Wildlife
Jessie Quinn	Ascent
Linda Leeman	Ascent
Curtis Alling	Ascent
Tracy Prybyla	Ascent
Hannah Weinberger	Ascent

Name	Organization
John Moreno	Bowman Group
Casey Brooksher	City of Hesperia
Tammy Pelayes	City of Hesperia
Corrie Kates	City of Hesperia
Daniel Aguilar	City of Hesperia
Jocelyn Swain	City of Lancaster
Megan Taggart	City of Palmdale
Heather Spurlock	City of Ridgecrest
Greg Griffith	County of San Bernadino
Ayida Smith	County of San Bernadino
Lacy Blackwell	County of San Bernadino
Julia Addison	County of San Bernadino
Linda Mawby	County of San Bernadino
Jai Cheng	County of San Bernadino
Mark Herwick	County of San Bernadino
Mark Wardlaw	County of San Bernadino
Karen Carter	County of San Bernadino
Nancy Sansonetti	County of San Bernadino
Manie Cruz	County of San Bernadino
Thuy Hua	County of Los Angeles
Amy Bodek	County of Los Angeles
Joseph Decruyenaere	County of Los Angeles
Caroline Chen	County of Los Angeles
Evan Willoughby	Town of Yucca Valley
Markus Spielgelberg	ICF
Craig Murphy	Kern County

Researcher Outreach Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Benjamin Waitman	California Department of Fish and Wildlife
Linda Leeman	Ascent
Curtis Alling	Ascent
Hannah Weinberger	Ascent

Name	Organization
Christopher Smith	Willamette University
Jeremy Yoder	California State University, Northridge
Julie Simonsen	U.S. Department of Fish and Wildlife Service
Juniper Harrower	Reed College
Lauren Lien	City of Lancaster
Lynn Sweet	University of California, Riverside
Michael Loik	University of California, Santa Cruz

California State Parks Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Isabel Baer	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Ben Waitman	California Department of Fish and Wildlife
Curtis Alling	Ascent
Hannah Weinberger	Ascent
Luis DeVera	California State Parks
Leah Gardener	California State Parks
Arthur Heredia	California State Parks
Christopher Hon	California State Parks
Ron Melcer	California State Parks
Melissa Patten	California State Parks
Scott Soars	California State Parks
Jessica Vannatta	California State Parks
Tricia	California State Parks
Poya Kouchesfahani	California State Parks

California State Parks Meeting #2 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Sarah Fonseca	California Department of Fish and Wildlife
Curtis Alling	Ascent
Jessie Quinn	Ascent

Name	Organization
Leslie Hartzell	California State Parks
Patricia Garcia	California State Parks
Dena Mitchell	California State Parks

State and Federal Agency Meeting #2 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Lani Maher	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Isabel Baer	California Department of Fish and Wildlife
Margaret Mantor	California Department of Fish and Wildlife
Harvest Vieira	California Department of Fish and Wildlife
Hannah Weinberger	Ascent
Jessie Quinn	Ascent
Curtis Alling	Ascent
Tracy Prybyla	Ascent
Laura Ashfield	US Forest Service
Judy Perkins	US Bureau of Land Management
Emma Lynch	US Bureau of Land Management
Jessi Vannatta	California State Parks
Joseph Esparza	US Forest Service (San Bernardino National Forest)
Misty Hailstone	Edwards Air Force Base (412th Civil Engineer Group Environmental Management Division)
Christina MacDonald	California Department of Transportation, District 9 (Mono, Inyo, and Eastern Kern County)
Julie Sage	California Department of Transportation
Katie Rodriguez	California Department of Transportation
Matt Hoffman	California Department of Transportation, District 9
Leah Gardner	California State Parks
Jennifer Blake	California Department of Transportation
Tricia Farmer	California State Parks
Sam Daley	California Department of Transportation
Laurel Zickler-Martin	California Department of Transportation, District 9
Michelle Gilmore	California Department of Transportation
Amber Stoerp	California Department of Transportation
Scott Soares	California State Parks
David Haas	California Department of Forestry and Fire Protection
Ian McBride	California Department of Forestry and Fire Protection

Name	Organization
Felicia Sirchia	US Fish and Wildlife Service
Elizabeth Freed	California State Parks
Luis De Vera	California State Parks
Cynthia Hopkins	US Navy
Dylan Layfield	US Navy (Naval Air Weapons Station China Lake)
Meghan Branson	US Navy (Naval Facilities Engineering Systems Command Southwest)
Martin Oliver	US Bureau of Land Management
Arthur Heredia	California State Parks
Anna Bonnette	US Forest Service
Rick McNeill	National Park Service
Carol Snow	California Department of Forestry and Fire Protection
Sarah Mongano	California State Lands Commission
Scott Eliason	US Forest Service
Alex Estrella	California State Parks
Chris Hon	California State Parks

Local Agency Meeting #2 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Lani Maher	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Isabel Baer	California Department of Fish and Wildlife
Kelley Barker	California Department of Fish and Wildlife
Hannah Weinberger	Ascent
Jessie Quinn	Ascent
Tracy Prybyla	Ascent
Caroline Chen	Los Angeles County Planning
Fabian Villenas	San Bernardino County
Markus Spiegelberg	ICF
Clark Blanchard	California Department of Fish and Wildlife
Lorraine Acuna	Los Angeles County
Nyeka Allen	City of Adelanto
Nancy Sansonetti	San Bernardino County
Karen Carter	San Bernardino County Department of Public Works
Megan Taggart	City of Palmdale
Casey Escutia	Riverside County

Name	Organization
Lacy Blackwell	San Bernardino County (EMD)
Anu Doravari	California City
Alex Jauregui	City of Victorville
Ayida Smith	San Bernardino County Department of Public Works
Harry Sandoval	Riverside County
Andrew Lemke	City of Hesperia
Manie Cruz	San Bernardino County Department of Public Works
AJ Gerber	San Bernardino County
Jai Cheng	San Bernardino County
Tammy Pelayes	City of Hesperia
Mark Herwick	Los Angeles County (Regional Planning)

California State Lands Commission Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Curtis Alling	Ascent
Jessie Quinn	Ascent
Hannah Weinberger	Ascent
Sarah Mongano	California State Lands Commission
Drew Simpkin	California State Lands Commission

California State Parks Meeting #3 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Isabel Baer	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Curtis Alling	Ascent
Jessie Quinn	Ascent
Hannah Weinberger	Ascent
Leah Gardner	California State Parks
Arthur Heredia	California State Parks
Ron Melcer	California State Parks

Name	Organization
Melissa Patten	California State Parks
Russ Bradley	California State Parks
Luis DeVera	California State Parks
Poya Kouchesfahani	California State Parks
Madison Eklund	California State Parks
Christopher Hon	California State Parks
Scott Soars	California State Parks
Patricia Farmer	California State Parks
Jessica Vannatta	California State Parks

California Department of Forestry and Fire Protection Meeting #1 Attendees

Name	Organization
Drew Kaiser	California Department of Fish and Wildlife
Cristin Walters	California Department of Fish and Wildlife
Jeb Bjerke	California Department of Fish and Wildlife
Mariel Boldis	California Department of Fish and Wildlife
Mika Samoy	California Department of Fish and Wildlife
Elliot Chasin	California Department of Fish and Wildlife
Curtis Alling	Ascent
Hannah Weinberger	Ascent
Carol Snow	California Department of Forestry and Fire Protection (San Bernardino Unit)
Davis Haas	California Department of Forestry and Fire Protection (San Bernardino Unit)

Appendix C.

Tribal Input Summary Memo

Memo

Piñon Heritage Solutions LLC
3733 E. Pacific Avenue
Sacramento, CA 95820
916.926.2736

ASM Affiliates
2034 Corte Del Nogal
Carlsbad, CA 92011
760.804.5757

Date: October 30, 2024

To: Drew Kaiser, Isabel Baer, Cristin Walters, Jeb Bjerke, Mariel Boldis, Mika Samoy, CDFW

From: Diana T. Dyste, MA, RPA and Dr. Elizabeth Bagwell, RPA, Piñon Heritage Resources LLC and Brian Williams, MMA, RPA, ASM Affiliates

Subject: Tribal Input Summary, Western Joshua Tree Conservation Plan

Piñon Heritage Solutions LLC (Piñon) and ASM Affiliates (ASM) respectfully submit the Tribal input summary presented herein as part of the Western Joshua Tree Conservation Plan (Conservation Plan) preparation. This summary includes information about the California Department of Fish and Wildlife (CDFW) outreach process to California Native American tribes (Tribes) who are identified as being culturally affiliated with Joshua tree habitat in California, and a list of Tribes who have responded in the affirmative that they are interested in participating in government-to-government consultation with CDFW or non-governmental collaborative tribal meetings with the Native American Land Conservancy (NALC). CDFW and NALC are engaged in an ongoing process of consultation, communication, and collaboration with Tribes, and as such, a summary of preliminary ideas from Tribes and broad ideas about potential Tribal co-management strategies is included.

This memorandum (memo) has been prepared in partial fulfillment of CDFW's Tribal Communication and Consultation Policy and is considered a living document. Forthcoming 2024 meeting notes from CDFW and NALC, as well as future meetings and associated co-management principles, methods, and strategies for Joshua tree co-management will be incorporated in updated memoranda. A central purpose of this memo is to document California Native American Tribal outreach efforts completed by CDFW and NALC during early-stage development of the Conservation Plan Tribal Co-Management sections occurring from October 2023 to December 2024 (see Section 1.3.2, California Native American Tribes, and Section 5.3.3, Tribal Co-Management).

CDFW OUTREACH PROCESS

CDFW began the outreach process with the goal of identifying California Native American Tribes who may have an interest in Tribal co-management of western Joshua trees and its

habitat. To accomplish this, CDFW requested a general contact list of Tribes that are culturally or traditionally affiliated with the geographic area of the western Joshua tree and a search of the Sacred Lands File for the region encompassing the proposed California western Joshua tree habitat from the Native American Heritage Commission (NAHC). As the NAHC contact lists were in preparation, the consulting firms (Piñon and ASM) hired by Ascent Environmental to assist CDFW with Tribal engagement, provided their current lists of Native American contacts for Tribes within the western Joshua tree habitat, or who were thought to have potential cultural traditions that involve use of western Joshua tree. The contact list from NAHC was received on December 4, 2023 and added to the ASM/Piñon Native American contact list to create a single master tribal contacts list.

The CDFW engaged with Tribes through the following events and forms of communication:

- Initial outreach to Tribes
  - CDFW emailed information about the Western Joshua Tree Conservation Act and Tribal Co-Management coordination, to the initial contacts provided by Piñon and ASM on 10/12/2023 and invited them to view an online recorded CDFW video presentation about the Conservation Plan (see Attachment 1 to this Memorandum).
  - ASM mailed hardcopy letters to the initial contact list provided by Piñon and ASM on 10/18/2023.
  - Piñon and ASM made follow up calls between 10/23/2023 and 10/27/2023.
- Invitation to participate in a live, online tribal listening session
  - CDFW emailed informational letters on 11/27/2023. The letters included details about the prerecorded CDFW video (e.g., under initial outreach) and the tribal listening session. The emails were sent by CDFW to the list of contacts provided by Piñon and ASM.
  - ASM mailed hardcopy letters to the initial contacts provided by Piñon and ASM on 12/1/23.
  - CDFW emailed informational letters to the additional contacts provided by the NAHC on 12/5/2023.
  - ASM mailed hardcopy letters to the additional NAHC contacts on 12/7/2023.
  - Piñon and ASM made follow up calls to the master tribal contact list between 12/5/2023 and 12/12/2023.
  - CDFW sent a reminder email about the online tribal listening session on 12/14/2023.
- CDFW held a live, online tribal listening session on 12/14/2023.

- Written Letters "Notification of the Development of a western Joshua tree conservation plan pursuant to the Western Joshua Tree Conservation Act" were sent to all listed in the master tribal contacts list.
    - CDFW emailed Notification Letters on 2/22/2024.
    - ASM mailed hardcopy Notification Letters on 3/4/2024.
    - Piñon and ASM made follow-up calls to all Tribes on the master tribal contact list from 3/19/24 to 4/12/24.
- The NALC began facilitating in-person, virtual, and telephone non-governmental collaborative meetings with Tribes on 5/9/2024. These are ongoing.
- CDFW began meeting with interested Tribes for one-on-one informational meetings or government-to-government consultation on 5/24/2024. These are ongoing.
- Emails labeled, "WJT Community Workshop – October 26, 2024," were sent to select Tribes included in the master tribal contacts list.
    - NALC emailed Notification Letters between 9/20/2024 and 10/15/24.
    - NALC followed up with an email to Tribal members who had RSVP'd on 10/22/24.
- The CDFW, NALC, and interested Tribes met in person for a site visit to western Joshua tree habitat in the town of Lone Pine on 10/26/2024. Topics discussed at this meeting included installation of interpretative signage in areas populated with western Joshua tree; establishing an intertribal coalition to integrate Tribes' voices in contributing to the Conservation Plan; land opportunities and land prioritization for Tribes such as co-management, nursery establishment, and involvement of Tribal monitors to assist with western Joshua tree protection during development; and western Joshua tree ecology, biology, horticulture, Tribal Environmental Knowledge or Tribal Ecological Knowledge, and Tribal Ecological Practices. Representatives from the following Tribes attended the meeting.
    - Chemehuevi Indian Tribe
    - Kern Valley Indian Community
    - San Gabriel Band of Mission Indians
    - Fernandeno Tataviam Band of Mission Indians
    - San Manuel Band of Mission Indians
    - Big Pine Paiute Tribe of the Owens Valley
    - Gabrielino-Tongva Tribe/Pit River
    - Lone Pine Paiute Shoshone Reservation
    - Fort Yuma Quechan Indian Tribe

CALIFORNIA NATIVE AMERICAN TRIBES AND INDIVIDUALS PARTICIPATING IN JOSHUA TREE CO-MANAGEMENT DISCUSSIONS

The following eighteen (18) Tribes are participating in co-developing the principles, approach, and elements of Tribal Co-Management of western Joshua tree conservation in consultation with CDFW at various stages of the Conservation Plan preparation:

- Agua Caliente Band of Cahuilla Indians
- Agua Caliente Tribe of Cupeño Indians
- Cahuilla Band of Indians
- Carmen Lucas, Native American individual
- Chemehuevi Indian Tribe
- Fernandeño Tataviam Band of Mission Indians
- Fort Independence Indian Community of Paiute Shoshone
- Fort Mojave Indian Tribe
- Fort Yuma Quechan Indian Tribe
- Gabrieleno San Gabriel Band of Mission Indians
- Kern Valley Indian Community
- Kwaaymii Laguna Band of Mission Indians
- Lone Pine Paiute-Shoshone Tribe
- Pala Band of Mission Indians
- Rincon Band of Luiseño Indians
- Tejon Indian Tribe
- Tübatulabals of Kern Valley
- Tule River Indian Tribe
- Twenty-Nine Palms Band of Mission Indians

PRELIMINARY CDFW/TRIBAL CO-MANAGEMENT IDEAS

CDFW, NALC, and eighteen Tribes identified above are actively engaged in ongoing discussions about the Western Joshua Tree Conservation Act and Conservation Plan. Discussions are focused on defining the best approach to planning and implementing feasible Conservation Plan Tribal Co-Management strategies. These may include, but are not limited to, Tribal programming, funding, co-developing western Joshua tree conservation policies, and exploring ways to gather culturally significant data. The bulleted list below summarizes the conversational topics that emerged during the initial meetings between Tribes and CDFW or the NALC. This list is not exhaustive and is expected to become more detailed and refined as additional meetings are held between Tribes and CDFW or NALC. Topics include:

- Strategies for more effective controlled burning and reduction of fuel loads to help regeneration in post-fire conditions.
- Strategies for acquiring additional land across the western Joshua tree habitat for mitigation purposes with a focus on preserving genetically diverse stands.

- Funding a co-equal partnership between CDFW and Tribes, including Tribal facilities for mitigation efforts, funding for Tribal members to co-manage lands on an ongoing basis, and providing training for Tribal members interested in becoming co-managers.
- Setting permit fees to cover costs associated with mitigation or establishing a mitigation fund to buy land for mitigation, with developers or other sources contributing to the fund.
- Providing Tribes with funding and staff capacity support to grow western Joshua trees for mitigation, and to receive trees during relocation/transplanting.
- Providing Tribal members with training in western Joshua tree monitoring and desert native plant specialist certification.
- Develop, fund, and administer western Joshua tree conservation-focused Tribal youth programs or activities.
- Including project provisions to have tribal cultural monitors on site for ground disturbing activities involving take of western Joshua trees, and to provide prayer rituals for the removal and relocation of western Joshua trees.
- Thinking more broadly about mitigation to include high country habitat and modification of development plans to account for preserving western Joshua trees in situ.
- Thinking holistically about supporting plants, insects, and animals that help ensure western Joshua trees' survival or enhance a suitable habitat.
- Conducting a habitat-wide ethnographic study of Tribes values, use, and management of western Joshua tree habitat.
- Funding additional cooperative research on western Joshua tree growth patterns and habitat needs in various conditions, including fire impacts in various landscapes, germinating western Joshua tree in post-fire soil conditions, and understanding better the thresholds for wind and water exposure.
- Completing a review of spring development and sustainability of water sources within western Joshua tree habitat and conservation lands, including consideration of Tribal water rights and access to water within lands they are being asked to hold in trust for mitigation.
- Supporting restoration of Tribal knowledge through funding and programming related to western Joshua tree and traditional use of the plant.
- Working towards adopting and implementing foundational commitments adapted from the state-applicable Policy Principles outlined in the March 2024 "Advisory Council on Historic Preservation's Policy Statement on Indigenous Knowledge and Historic Preservation" (Available at: https://www.achp.gov/sites/default/files/policies/2024-03/PolicyStatementonIndigenousKnowledgeandHistoricPreservation21March2024.pdf).

While Tribes are interested in holding additional conservation lands, the Tribes encourage balance and restraint in developing an approach that adequately provides funding to manage the newly acquired lands through new/additional hires.

CONCLUSION

CDFW's Tribal outreach and consultation efforts will be ongoing throughout the duration of the Western Joshua Tree Conservation Plan. The Conservation Plan has a process for amending future drafts with Traditional Ecological Knowledge that may come forward after the Plan is put into effect. CDFW is committed to continuing this engagement with Tribes and that commitment will be codified in the Co-Management strategies and communication processes being developed. As more Tribes confirm participation in the Conservation Plan, their names will be added to this Memorandum.

Attachment 1. Tribes Contacted to participate in the Conservation Plan development

Agua Caliente Band of Cahuilla Indians
Agua Caliente Tribe of Cupeño Indians
Augustine Band of Cahuilla Indians
Barbareño Band of Chumash Indians
Barbareño/Ventureño Band of Mission Indians
Barona Band of Mission Indians
Bear River Band of Rohnerville Rancheria
Big Pine Paiute Tribe of the Owens Valley
Big Sandy Rancheria of Western Mono Indians
Big Valley Band of Pomo Indians
Bishop Paiute Tribe
Blue Lake Rancheria Tribe of Indians
Bridgeport Paiute Indian Colony
Buena Vista Rancheria of Me-Wuk Indians
Cabazon Band of Mission Indians
Cahuilla Band of Indians
Calaveras Band of Mi-Wuk Indians
Calaveras Band of Mi-Wuk Indians - Grimes
California Valley Miwok Tribe
Campo Band of Kumeyaay Indians
Chemehuevi Indian Tribe
Cher-Ae Heights Indian Community of the Trinidad Rancheria
Chicken Ranch Rancheria of Me-Wuk Indians of California
Chumash Council of Bakersfield
Coastal Band of the Chumash Nation
Cocopah Indian Tribe
Cold Springs Rancheria of Mono Indians of California
Colorado River Indian Tribes
Death Valley Timbisha Shoshone Tribe
Dry Creek Rancheria Band of Pomo Indians
Dumna Wo-Wah Tribal Government
Dunlap Band of Mono Indians
Elem Indian Colony
Elk Valley Rancheria
Enterprise Rancheria of Maidu Indians
Ewiiaapaayp Band of Kumeyaay Indians
Federated Indians of Graton Rancheria
Fernandeño Tataviam Band of Mission Indians
Fort Independence Indian Community of Paiute Indians
Fort Mojave Indian Tribe
Fort Yuma Quechan Indian Tribe
Gabrieleño Band of Mission Indians - KIZH Nation
Gabrieleno/Tongva San Gabriel Band of Mission Indians
Gabrielino/Tongva Nation
Gabrielino-Tongva Indian Tribe
Gabrieleno Tongva Indians of California Tribal Council
Habematolel Pomo of Upper Lake
Hoopa Valley Tribe
Hopland Band of Pomo Indians
Iipay Nation of Santa Ysabel
Inaja-Cosmit Band of Indians
Jamul Indian Village
Juaneño Band of Mission Indians
Juaneño Band of Mission Indians Acjachemen Nation - Belardes
Juaneño Band of Mission Indians Acjachemen Nation 84A
Karuk Tribe
Kashia Band of Pomo Indians of Stewart's Point Rancheria
Kern River Paiute Council
Kern Valley Indian Community
Kitanemuk & Yowlumne Tejon Indians
Kwaaymii Laguna Band of Mission Indians
La Jolla Band of Luiseño Indians
La Posta Band of Diegueño Mission Indians
Lone Pine Paiute-Shoshone Tribe

Los Coyotes Band of Cahuilla and Cupeño Indians
Manzanita Band of Kumeyaay Nation
Mechoopda Band of Chico Rancheria
Mesa Grande Band of Diegueño Mission Indians
Middletown Rancheria of Pomo Indians
Mission Creek Band of Mission Indians
Monache Intertribal Association
Mono Lake Kootzaduka'a Tribe
Mooretown Rancheria of Maidu Indians
Morongo Band of Mission Indians
Nashville-Enterprise Miwok-Maidu-Nishinam Tribe
North Fork Mono Tribe
North Fork Rancheria of Mono Indians of California
Northern Chumash Tribal Council
Northern Valley Yokut / Ohlone Tribe
Owens Valley Career Development Center
Pala Band of Mission Indians
Paskenta Band of Nomlaki Indians
Pauma Band of Luiseño Indians
Pechanga Band of Indians
Picayune Rancheria of the Chukchansi Indians
Pinoleville Pomo Nation
Pit River Tribe
Ramona Band of Cahuilla
Rincon Band of Luiseño Indians
Round Valley Indian Tribe
Salinan Tribe of San Luis Obispo and Monterey Counties
San Fernando Band of Mission Indians
San Luis Rey Band of Mission Indians
San Manuel Band of Mission Indians
San Pasqual Band of Mission Indians
Santa Rosa Band of Cahuilla Indians
Santa Rosa Rancheria Tachi Yokut Tribe
Santa Ysabel Band of the Iipay Nation
Santa Ynez Band of Chumash Indians
Serrano Nation of Mission Indians
Sherwood Valley Band of Pomo Indians of California
Shingle Springs Band of Miwok Indians
Soboba Band of Luiseño Indians
Southern Sierra Miwuk Nation
Susanville Indian Rancheria
Sycuan Band of the Kumeyaay Nation
Table Mountain Rancheria
Tejon Indian Tribe
Timbisha Shoshone Tribe
Tolowa Dee-ni' Nation
Tongva Ancestral Territorial Tribal Nation
Torres-Martinez Desert Cahuilla Indians
Traditional Choinumni Tribe
Tübatulabals of Kern Valley
Tule River Indian Tribe
Tuolumne Band of Me-Wuk Indians
Twenty-Nine Palms Band of Mission Indians
United Auburn Indian Community of the Auburn Rancheria
Utu Utu Gwaitu Tribe of the Benton Paiute Reservation
Viejas Band of Kumeyaay Indians
Walker River Paiute Tribe
Washoe Tribe of Nevada and California
Wilton Rancheria
Wiyot Tribe - Table Bluff Reservation
Wuksache Indian Tribe/Eshom Valley Band
Xolon Salinan Tribe
yak tityu tityu yak tiłhini – Northern Chumash Tribe
Yocha Dehe Wintun Nation
Yuhaaviatam of San Manuel Nation
Yurok Tribe

Appendix D.

Avoidance and Minimization Best Management Practices and Guidelines

AVOIDANCE AND MINIMIZATION BEST MANAGEMENT PRACTICES AND GUIDANCE

The Avoidance and Minimization (A&M) Actions in this Appendix provide additional guidance and best management practices for several Actions in Chapters 5, "Conservation Management Actions and Effectiveness Criteria," Section 5.2.1, "Impact Avoidance and Minimization," with the corresponding A&M number and action title.

Action A&M 1.3.1: Avoid Impacts during Pesticide Application

Project proponents, landowners, land managers, and agencies should not apply pesticides on western Joshua trees and should implement best management practices that avoid pesticide drift onto western Joshua trees, nontarget vegetation (e.g., nurse plants), pollinators, or seed-dispersing rodents. Pesticides are chemicals that are used to control pests. Types of pesticides include herbicides, which aim to destroy or control unwanted vegetation, and insecticides, which aim to kill or control insects. Best management practices include:

1. Prior to pesticide treatment applications, western Joshua trees and buffer zones should be flagged or otherwise marked within treatment areas in western Joshua tree habitat.
2. No pesticide application should occur during precipitation or if precipitation is forecasted 24 hours before or after project activities, or as required by the label.
3. No ground disturbance or insecticide/larvicide use should occur within the dripline (i.e., perimeter edge of tree canopy) of a mature (i.e., reproductive) tree, which includes the tree itself, to avoid impacts on yucca moth pollinators.

However, pesticide application may be useful for the conservation and recovery of western Joshua tree (see Action LC&M 4.4, "Develop and Implement Restoration/Enhancement Plans").

Action A&M 2.5.1: Minimize Impacts from Invasive Plants

Project proponents, landowners, land managers, and agencies should implement best management practices to prevent the spread of invasive plants (Cal-IPC 2012) for all activities that have the potential to spread invasive species in western Joshua tree habitat (e.g., construction and resource extraction, off-highway vehicle (OHV) use, outdoor recreation, fire control and suppression, fuel treatment implementation, and grazing). Invasive plant management includes the following best management practices:

1. A pre-activity assessment should be conducted to determine which activities could spread invasive species and which best management practices are applicable to the site.
2. Vehicles, equipment, and personnel should be inspected and cleaned if they have propagules (i.e., plant parts that can become detached and give rise to a new plant) or materials that may contain propagules (e.g., mud).
3. Inspections should be done when vehicles first arrive at a site and periodically during the activity (e.g., fire suppression, development, restoration project).
4. All clothing, boots, and equipment should be inspected for soil and invasive plant material and should be cleaned before arriving in western Joshua tree habitat.
5. Invasive plant material should be disposed of appropriately outside of western Joshua tree habitat.
6. Vegetation and soil disturbance should be minimized.
7. Weed-free feed for stock animals should be used in western Joshua tree habitat.
8. Local personnel should be contacted to gather information on the locations of high priority invasive plants or to survey sites for their presence.
9. Awareness training should be provided to project personnel about avoiding known areas infested with invasive plants at the beginning of each day.
10. Establishing staging areas (e.g., fire camps, landings for helicopters, camps, laydown yards) in areas infested by high priority invasive plants should be avoided.
11. If infestations of high priority invasive plants occur within or near staging areas, their perimeters should be identified so vehicle and foot traffic can avoid them.
12. Using water from impoundments infested with invasive plants should be avoided, such as when watering western Joshua tree plantings or conducting fire suppression activities.

Action A&M 2.6.1: Minimize Impacts during Pesticide Application

Project proponents, landowners, land managers, and agencies should implement best management practices that minimize pesticide drifting onto western Joshua trees and other nontarget vegetation (e.g., nurse plants). Best practices include:

1. Pesticide use should be limited to targeted ground application (e.g., backpack/hand sprayed application, down-directed ground spray from small vehicles) within western Joshua tree avoidance buffer zones using the minimum amount required to be effective (Figure 5-1 in Chapter 5).

2. Broadcast or aerial spray of pesticides will not occur.
3. Western Joshua tree and nontarget plant species should be physically avoided during pesticide application by methods such as physically avoiding the plant and nurse plants, avoiding application on high heat or windy days to avoid volatilization (i.e., liquid converting to gas), and adjusting the nozzle and pressure to make bigger droplets to avoid pesticide drift.
4. A spill kit and safety plan should be on-site during herbicide treatments in western Joshua tree habitat. Immediate control, containment, and cleanup of fluids and pesticides due to spills or equipment failure (e.g., broken hose, punctured tank) should be implemented.
5. Cleaning and disposal of pesticide containers should be done in compliance with federal, state, and local laws, regulations, directives, and should avoid Western Joshua tree, nurse plants, and pollinators.
6. Pesticide applicators should be certified and should comply with all label instructions and restrictions for use.
7. The use of pesticides for the conservation and recovery of western Joshua tree should be considered and applied according to product labels. For example, indaziflam is labeled for use in natural areas, including parks, open spaces, wildlife management areas, recreational areas, fire rehabilitation areas, and fuel breaks. This treatment method is being implemented at Joshua Tree National Park where treatment has not significantly affected established perennial vegetation and successfully controls annual grasses for up to 3 years after application (NPS 2022).

Action A&M 3.2.1: Minimize Impacts from Fire Suppression

While land managers and fire agencies should aggressively fight active wildland fires in or near western Joshua tree habitat to minimize loss of western Joshua trees, such activities can also cause direct and indirect impacts on western Joshua trees and their habitats. Land managers and fire agencies should minimize direct and indirect impacts on western Joshua tree during fire suppression and control activities when safe and feasible. Minimum Impact Suppression Techniques (MIST) and Best Management Practices are only to be considered when it does not threaten the safety of firefighters and can include:

1. Implementation of fire lines and staging areas should occur away from mature western Joshua trees when safe and feasible. Preference should be given, when safe and feasible, to the installation of smaller handlines and wet lines (i.e., control line installed by spraying water in the unburned areas surrounding the fire) as opposed to black lines (i.e., burned line) or dozer lines (i.e., lines constructed with bulldozers). Firefighters should seek to minimize amount of retardant drop, if safe, feasible, and in alignment with the tactical

suppression plan. Furthermore, when safe and feasible, all clothing and equipment of firefighter personnel should be cleaned before going into the field to reduce the spread of invasive species.

2. Off-road driving or heavy equipment use may be justified to avoid much greater total damage to habitat burned. Resource Advisors or Agency Administrators, or other appropriate CDFW or California Department of Forestry and Fire Protection (CAL FIRE) staff, should always be consulted before using heavy equipment or off-road driving in western Joshua tree habitat. All heavy equipment use or off-road driving should have a ground guide walking in front of the vehicles to watch for Joshua tree juveniles and seedlings.
3. Fire lines should utilize preexisting fuel breaks (e.g., bare rock and managed fuel zones), roads, or fire lines from past fire suppression, when feasible and present on the landscape.
4. Stop all habitat damaging tactics as soon as they are no longer required to prevent a larger or more severe fire. Constantly assess the fire situation and priorities for 1) ensuring firefighter and human safety, 2) minimizing acres burned through fire suppression, and 3) minimizing damage to western Joshua tree and their habitat from suppression as they relate to the operation. Document actions taken during suppression activities to facilitate postfire rehabilitation of suppression actions.
5. Vehicles, equipment, and personnel should be inspected and cleaned to reduce the potential for them to disperse invasive species into burned areas (see Action A&M 2.5, "Minimize Impacts from Invasive Plants," [in Chapter 5] and Action A&M 2.5.1, above, for guidance).

Action A&M 3.3.1: Minimize Impacts from Postfire Rehabilitation

In consultation with CDFW, land managers should develop and implement measures to minimize direct impacts on western Joshua trees when rehabilitating burned areas after a wildland fire. This could include the following elements:

1. A postfire monitoring plan for invasive plants, focusing on populations of high priority invasive plants known to exist before the fire and on areas of significant fire management activity during the fire (e.g., fire camps, dozer lines) should be implemented.
2. Invasive plant control:
    a. New populations of invasive species should be identified and eradicated or contained to prevent spread across the postfire landscape.
    b. A monitoring and re-treatment plan for invasive plants should be implemented after the initial treatments are applied.

3. Exposed soil created during fire line construction should be covered with a thin layer of organic mulch (e.g., chipped fuels, hydromulch) less than 3 cm (1.2 inch) in height to promote microbial activity that will use nitrogen and phosphorus, thus reducing their availability to invading plants (Brooks 2008).
4. Revegetation:
    a. Avoid use of nitrogen-fixing plants in landscapes where increased nitrogen may create conditions for invasive plant colonization.
    b. Revegetating with native species should be prioritized, if feasible. Revegetating with fast-growing but noninvasive species should be considered to increase the uptake of resources that would otherwise be utilized by invasive species (Brooks 2008).
    c. Seed mixes or other types of revegetation materials should be tested to ensure that they are not contaminated by invasive species.
5. Postfire land uses that may reduce vigor of western Joshua tree resprouting or establishment of native plants (e.g., livestock grazing) while the ecosystem recovers from the disturbance should be minimized. Ecosystem recovery postfire can vary even within geographically similar vegetation communities (Engel and Abella 2011), so recovery should be determined on a site-by-site basis.
6. Public access to burned areas should be closed to minimize damage to western Joshua tree and nurse plant propagules already stressed by fire.
7. Vehicles, equipment, and personnel should be prevented from dispersing invasive species into burned areas (see Action A&M 2.5, "Minimize Impacts from Invasive Plants," [in Chapter 5] and Action 2.5.1, above, for guidance).

Action A&M 3.4.1: Minimize Accidental Ignition of Fires

Best practices should be implemented during construction and outdoor recreation activities to reduce the potential for accidental ignition of wildland fires. When construction activities occur in western Joshua tree habitat, fire extinguishers, backpack sprayers, water trailers, or water tenders equipped with hoses should be available to suppress accidental ignitions during hot, dry, or windy conditions. Additionally, best practices should be implemented to reduce the potential for construction and outdoor recreation activities to result in accidental ignition of vegetation:

1. Staging areas should be limited to areas that are naturally void of vegetation or that are cleared prior to use, to reduce the risk of hot equipment and vehicles causing accidental ignitions.

2. To the extent feasible, vehicles and heavy equipment should be limited to already cleared access roads. If heavy equipment must exit access roads to perform construction activities, a designated monitor should be onsite with appropriate resources to quickly extinguish any accidental ignitions.
3. Land managers and regulating agencies should enforce campfire restrictions both outside of and within developed campgrounds in western Joshua tree habitat during hot, dry, and windy conditions or certain portions of the year (e.g., fire season).
4. Land managers and regulating agencies should encourage OHV recreationists to carry fire extinguishing devices when traveling in and around western Joshua tree habitat.

Action A&M 3.5.1: Implement Fuel Treatments

Guidance for best management practices to avoid impacts on western Joshua tree and its habitat during fuel treatments include:

1. Fuel break construction in or adjacent to western Joshua tree habitat can take or damage trees. If feasible, fuel breaks should not be installed within 56.7 meters (186 feet) of western Joshua tree individuals in order to protect nurse plants, seedlings, and the seedbank.
2. If feasible, wildland-urban interface (WUI) fuel reduction treatments should be focused on removing vegetation outside of a 56.7-meter (186-foot) buffer zone around western Joshua tree individuals to reduce fuel continuity and reestablish the composition and structure of the ecosystem in western Joshua tree habitat.
3. Biological staff working with fuel treatment crews should survey treatment areas and flag western Joshua trees prior to fuel treatment implementation. Biological staff should train crews to identify western Joshua trees at different life stages (e.g., seedling, juvenile, adult, resprouts) and likely places to find them (i.e., under nurse plants). Additionally, specific measures should be implemented to avoid potential impacts on the root system and seedbank of individual western Joshua trees such as avoiding soil disturbance, use of manual treatment methods (i.e., use of hand tools both motorized and nonmotorized including chainsaws, but no use of heavy equipment such as dozers or masticators) to remove dead, woody debris, and use of manual or chemical treatment methods to remove or control invasive species.

Guidance to minimize impacts on western Joshua tree and its habitat during fuel treatment implementation includes:

1. Herbicide application should be conducted according to Actions A&M 1.3.1 and 2.6.1 above, and Actions A&M 1.3, "Avoid Impacts during Pesticide Application," and A&M 2.6, "Minimize Impacts during Pesticide Application" in Chapter 5.

2. Prescribed herbivory (i.e., intentional use of domestic livestock to remove, rearrange, or convert vegetation) may be considered to reduce fuel loads in some situations. However, grazing in western Joshua tree habitat should be guided by the minimization measures for grazing described in Action A&M 2.7, "Minimize Impacts from Grazing Activities."
3. Existing dirt roads in western Joshua tree habitat should be maintained and cleared of vegetation within their existing footprint so they may act as effective fuel breaks and allow access if a fire were to occur.
4. If a fuel break is installed, it should use and connect with existing fuel breaks, roads, or old fire lines from past fire events when present on the landscape, to the extent feasible.
5. If western Joshua tree removal is necessary to maintain defensible space or implement WUI fuel reduction treatments, project proponents must obtain take authorization. Organizations implementing fuel treatments should consult with CDFW or other agency administrators to determine the most appropriate type of take authorization and how best to protect western Joshua tree individuals and populations within the project area while still meeting project objectives.
6. If WUI fuel reduction treatments require removal of vegetation other than western Joshua tree within the western Joshua tree avoidance buffer zone to successfully reduce fuel continuity, only manual treatment methods should be used. Additionally, specific measures should be implemented to reduce potential impacts on the root system and seedbank of individual western Joshua trees such as limiting soil disturbance, limiting removal of vegetation to a certain percentage of the vegetation, or avoiding removal of certain nurse plant species such as blackbrush (*Coleogyne ramosissima*) or creosote bush (*Larrea tridentata*).
7. If ecological restoration treatments require removal of vegetation within the western Joshua tree avoidance buffer zone to protect individual western Joshua trees from increased fuel loads and fuel depths, only invasive species or dead, woody debris should be removed. Additionally, specific measures should be implemented to reduce potential impacts on the root system and seedbank of individual western Joshua trees such as limiting soil disturbance, using manual treatment methods to remove dead, woody debris, and use of manual or chemical treatment methods to remove or control invasive species.
8. To minimize the spread of invasive species during fuel treatment implementation, vehicles, equipment, and personnel should be inspected and cleaned to prevent dispersal of invasive species into burned areas (see Action A&M 2.5, "Minimize Impacts from Invasive Plants," [in Chapter 5] and Action 2.5.1, above, for guidance).
9. Land managers should work with local fire departments in the geographic focus area, the CAL FIRE, and the federal agencies to implement Action A&M 3.5.1 guidance.

References

Brooks, M. L. 2008. Effects of fire suppression and postfire management activities on plant invasions. General technical report RMRS-GTR-42-vol. 6, Chapter 14. US Forest Service.

California Invasive Plant Council (Cal-IPC). 2012. Preventing the spread of invasive plants: best management practices for land managers. Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA. Available from: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd559586.pdf (Accessed: 28 October 2024).

Engel, E. C., and S. R. Abella. 2011. Vegetation recovery in a desert landscape after wildfires: influences of community type, time since fire and contingency effects. Journal of Applied Ecology 42:1401–1410. https://doi.org/10.1111/j.1365-2664.2011.02057.x.

Interagency Joshua Tree Biological Working Group. 2023. Managing wildfires in Joshua tree woodlands - priorities and guidance for incident commanders. U.S. Fish and Wildlife Service, Washington, D.C., USA.

National Park Service (NPS). 2022. Superintendent's compendium. Available from: https://www.nps.gov/jotr/learn/management/superintendents-compendium.htm (Accessed: 28 October 2024).

Appendix E.

Relocation Guidelines and Protocols

Western Joshua Tree Relocation Guidelines and Protocols

California Department of Fish and Wildlife
July 2024

Contents

Introduction

The California Department of Fish and Wildlife (CDFW) developed this document to provide guidance on how and when to relocate western Joshua trees (*Yucca brevifolia*) in order to minimize impacts to populations, prevent habitat fragmentation, and preserve connectivity corridors for gene flow and pollinator migration.

The Guidelines section of this document discusses the circumstances in which CDFW would consider including permit conditions requiring relocation of one or more western Joshua trees under the Western Joshua Tree Conservation Act (WJTCA). The Protocol section of this document provides a summary of best practices for relocating western Joshua trees and increasing the survival rate of relocated (salvage) western Joshua trees. Information on post-relocation maintenance, monitoring, and reporting is also provided. This document will be updated as needed based on the best scientific information available.

Western Joshua Tree Conservation Act Relocation Provisions

Section 1927.3, subdivision (a)(4)(A) of the California Fish and Game Code gives CDFW authority to require WJTCA incidental take permittees to relocate one or more western Joshua trees. Furthermore, pursuant to that subdivision, where relocation is required, permittees must implement reasonable measures required by CDFW to facilitate the successful relocation and survival of salvage trees. Relocation is deemed successful where the health of a salvaged western Joshua tree is stable or improving without any supplemental care after the post-relocation maintenance period. The relocation measures shall include but are not limited to:

1. A requirement that the salvage trees are placed in locations and with proper orientation to improve their chances of survival.
2. A requirement that salvage trees are relocated at a time that maximizes their chances of survival when feasible.
3. A requirement that a desert native plant specialist be onsite to oversee relocation.

Fish and Game Code section 1927.3, subdivision (a)(4)(B) states that CDFW may limit relocation requirements to certain size classes of trees.

This document is intended to fulfill the requirement of Fish and Game Code section 1927.3, subdivision (a)(4)(C) that by July 1, 2024, CDFW adopt guidelines and relocation protocols, developed in consultation with desert native plant specialists, based on the best available science, to relocate western Joshua trees successfully. Pursuant to Fish and Game Code section 1927.3, subdivision (g)(1), the permittee shall be legally responsible for ensuring the measures included in its WJTA ITP are implemented consistent with these guidelines. The permittee may, however, contract with the landowner of the relocation site(s) to conduct the post-relocation maintenance and monitoring activities required under its WJTCA ITP.

Subdivision (g)(2) of that section further states, "[u]nless specifically required by written agreement, a landowner that agrees in writing to allow western Joshua trees to be relocated onto land it owns shall not be liable for the continued survival of the western Joshua trees, shall not be required to manage or maintain the translocated western Joshua trees, and shall not be required to change existing land use practices, provided that the land use practices do not result in the taking, possession, sale, or further translocation of the western Joshua trees." While landowners accepting salvage trees are not responsible for maintaining the trees or otherwise ensuring the trees' continued survival, it is important to note that import, export, take, possession, purchase, and sale of salvage trees or any part or product thereof, is prohibited, except as authorized pursuant to the WJTCA.

The WJTCA also requires CDFW, by December 31, 2024, to prepare a Western Joshua Tree Conservation Plan in collaboration with the Fish and Game Commission, other governmental agencies, California Native American tribes, and the public and to incorporate in the plan, among other provisions, protocols for the successful relocation of Western Joshua trees. The Commission will then consider the plan and take final action on the conservation plan by June 30, 2025. During the one-year period between implementation of the July 1, 2024, relocation standards and finalization of the Western Joshua Tree Conservation Plan by June 30, 2025, CDFW will have an opportunity to supplement the collection of best available science and recommend appropriate amendments as part of the Commission's process of considering and taking final action on the Conservation Plan. These guidelines will be incorporated by reference into the Western Joshua Tree Conservation Plan.

Definitions

The following definitions are used in this document:

Bare root relocation – method for relocating a living western Joshua tree by excavating around the root ball of the tree to dislodge the tree from the ground. Any relocation method other than tree spade relocation (defined below) is considered bare root relocation for the purposes of this document.

Containerize – to place a salvage tree into a container, such as a plastic pot or tree box, for temporary storage.

Project site – the area(s) where project activities are expected to occur (e.g., access, staging, construction, etc.)

Recipient site – a salvage tree's (defined below) final planting location.

Relocation – the removal of a living western Joshua tree from the ground and transplantation back into the ground at another location (referred to as a recipient site).

Relocation area – an area with one or several recipient sites.

Retained tree – a living western Joshua tree that is located within the project site, may be avoided or minimally impacted by the project and will therefore not be relocated.

Root ball – a mass of soil that contains concentrated roots growing from the base of the stem of a western Joshua tree.

Salvage tree – a living western Joshua tree that is being, or has been, relocated. Each western Joshua tree stem or trunk arising from the ground shall be considered an individual tree, regardless of its proximity to any other western Joshua tree stem or trunk.

Size Class A – a western Joshua tree that is less than one meter in height.

Size Class B – a western Joshua tree that is one meter or greater, but less than five meters in height.

Size Class C – a western Joshua tree that is five meters or greater in height.

Tree spade – a specialized piece of heavy equipment that consists of hydraulically controlled spade blades that can encapsulate the root ball of a salvage tree, as well as adjacent soil.

Tree spade relocation – method for relocating a living western Joshua tree by using a tree spade to dig, transport, and replant a western Joshua tree and its root ball.

Best Available Science on Relocation

There are many accounts of successful western Joshua tree relocation (i.e., stable or increasing signs of tree health without any supplemental care after a period of maintenance), but little scientific research has been done to compare the relative success rates for different relocation techniques. Rather, most relocation efforts that monitor salvage western Joshua tree survivorship evaluate only one method of relocation (i.e., using hand tools for small trees and/or excavators or tree spade for large trees) (Wagner 2018, Balogh 2019, City of Palmdale 2024). The best available scientific information on how to achieve success when relocating western Joshua trees therefore comes from the experience of experts working in the field of restoration and Joshua tree relocation. In Bainbridge (2007), the author offers advice on relocating Joshua trees and other salvaged succulents, such as cacti and shrubs, based on his expertise and knowledge. The National Park Service (NPS) (Goodwin 2024) and a tree transplanting expert (Reynolds 2024) also provided CDFW with information relevant to the development of this document.

In addition, CDFW reviewed the results of known relocation projects. Bainbridge (2007) states that "Joshua trees often transplant well but require intensive aftercare and irrigation[.]" Bainbridge suggests that relocation is best done with machinery, but hand tools can also be used. Front loaders, excavators, and hydraulic tree spades are useful.

Tree spades work best in silty or sandy soils but using them is difficult in rocky soils. Salvaged trees can be placed in containers or immediately replanted but should be protected as much as possible from drying winds, heat, and sun. Bainbridge (2007) also mentions that yucca, such as western Joshua trees, seem to survive better if replanted in the same orientation they grew. Overall, Bainbridge (2007) shows the survival rates for salvage trees can be improved if the relocation work is timed carefully, the trees are handled gently, and there is good aftercare and irrigation in a holding facility or at the recipient site. Goodwin (2024) and Reynolds (2024) suggest that minimizing disturbance to the root ball and adequate care after trees have been relocated are the most important factors for successful relocation. Tree spade relocation of western Joshua tree minimizes impacts to roots and can have a success rate of greater than 90% with sufficient aftercare (City of Palmdale 2024, Goodwin 2024, Reynolds 2024). Bare root relocation of western Joshua tree causes more damage to roots and is reported to have a success rate of approximately 50-90% even with sufficient aftercare, based on preliminary findings of a monitoring period of 1-3 years (Goodwin 2024, Reynolds 2024). Beyond the initial 3-year monitoring period, however, success rates can decline (Graver 2024). This document describes additional methods that can be used to aid long-term survival and improve chances of reproduction events. However, there is no foolproof method that guarantees relocation success, and some mortality is always expected to result. Therefore, relocation is considered a method to minimize impacts to western Joshua tree populations, rather than a substitution for mitigation through the payment of fees.

The size and growth pattern of a western Joshua tree may also present additional challenges. Small trees, especially those salvaged through the bare root method, experience higher rates of mortality even with sufficient aftercare (Goodwin 2024). And, though it may be possible to relocate western Joshua trees over 7 meters in height, tree spades may be unable to sufficiently encapsulate the root ball for trees of this size (Reynolds 2024). These trees may also be difficult to stabilize to withstand high wind speeds after being relocated. Dense, clonal reproduction can also affect relocation success. Separating smaller trees from larger, parent trees that are connected through rhizomes below ground can result in higher mortality rates for those smaller trees (Goodwin 2024, Graver 2024).

Guidelines

Relocation Requirement Considerations

CDFW will determine whether relocation will be required under a WJTCA incidental take permit (ITP) during the permit application review process. Factors that CDFW may consider in making this determination for each project site include the following:

- Number of trees to be lethally taken (greater than 20 trees removed);
- Area of impacted western Joshua tree habitat within a project site (greater than 20 acres impacted);

- Avoidance and minimization measures proposed by the applicant to reduce project impacts to western Joshua tree;
- Quality of habitat on, and adjacent to, the project site (e.g., ecologically core or intact);
- Overall population health on the project site (e.g., declining versus stable or increasing);
- Whether the project is within predicted climate refugia for western Joshua tree.
- Extent of permanent project impacts;
- Density of clonal growth; and
- Anticipated temporal impacts of a project including operation or maintenance activities, where applicable.

When CDFW staff determine that a WJTCA ITP will require relocation of western Joshua trees, the applicant will develop a Relocation Plan for CDFW approval, including the number of trees to be relocated and the method(s) for relocation. Applicants will calculate the number of trees to be relocated based on the number of trees that will be lethally taken as confirmed by the approved census. The number of trees to be relocated will be based on the expected rate of relocation success for each method used, as well as the size class of each tree proposed for relocation, as explained below:

	Bare root relocation[1]	**Tree spade relocation[2]**
Size Class A (<1 m)	30%	15%
Size Class B (≥1m and <5)	20%	10%
Size Class C (≥5m)	10%	5%

Table 1. Recommended western Joshua tree Relocation Percentages

The number of trees in each size class recommended for relocation under a WJTCA ITP should be rounded to the nearest whole number and be greater than zero, provided at least one tree in that size class will be lethally taken. Because tree spade relocation has a higher expected success rate than bare root relocation, the relocation of fewer trees is required to minimize project impacts and offset the expected mortality of salvage trees where the tree spade method is used. See "WJT Salvage Requirement Calculator spreadsheet" for assistance in calculating salvage tree numbers using a combination of methods.

[1] When conducted in accordance with this document, the expected success rate of bare root relocation is between 50 and 90 percent (Goodwin, J. 2024. Joshua Tree National Park. Discussion with J. Goodwin, Vegetation Branch Manager. *in*.; Reynolds, D. 2024. The Landscape Center. Discussion with D. Reynolds, Project Manger/ISA Certified Arborist. *in*.).

[2] When conducted in accordance with this document, the expected success rate of tree spade relocation is greater than 90 percent (Goodwin, J. 2024. Joshua Tree National Park. Discussion with J. Goodwin, Vegetation Branch Manager. *in*.; Reynolds, D. 2024. The Landscape Center. Discussion with D. Reynolds, Project Manger/ISA Certified Arborist. *in*.; City of Palmdale. 2024. Report of the City of Palmdale Joshua tree preservation program.).

Example:

Project A is expected to cause lethal take of 200 western Joshua trees: 100 Class A trees, 70 Class B trees, and 30 Class C trees.

- If the bare root relocation method is used, the Relocation Plan should propose relocating 47 trees: 30 Class A trees, 14 Class B trees, and 3 Class C trees.
- If the tree spade relocation method is used, the Relocation Plan should propose relocating 24 trees: 15 Class A trees, 7 Class B trees, and 2 Class C trees.
- If a combination of methods is used, one example of mixed methods may include:
    - Tree Spade: 10 Class A, 5 Class B, 1 Class C and,
    - Bare Root: 10 Class A, 4 Class B, 1 Class C

An approved Relocation Plan is an attachment to the WJTCA ITP and any changes after issuance of the associated WJTCA ITP will require amendment of the permit. If the permittee later wishes to relocate or remove any western Joshua tree that has been relocated on-site, the permittee must apply for a new WJTCA ITP.

Adjustments to Requirements

Upon review of a Relocation Plan, CDFW may, in its discretion, adjust the number of trees in a size class that must be relocated, including at the request of an applicant. Factors that may weigh in favor of an adjustment to the number of trees within a specific size class that must be relocated include:

- A higher number of trees in a different size class will be relocated;
- Trees that will be retained in place that will be minimally impacted;
- The size and physical characteristics of the available recipient sites, including available capacity for additional trees;
- The composition of the soil/substrate and feasibility of the proposed relocation method;
- The overall health of the western Joshua trees to be impacted; and
- The overall health of the western Joshua tree population around the project site.

Relocation Areas

The applicant should identify one or more relocation areas in the proposed Relocation Plan they submit to CDFW for approval. The permittee should first evaluate if salvage trees can be relocated on the project site and if any project design modifications can be made to accommodate salvage trees on site.

If salvage trees cannot be relocated on the project site, the permittee must propose one or more off-site relocation areas that can accept trees designated for relocation. Off-site relocation areas must be within occupied western Joshua tree habitat that has been degraded by impacts (e.g., human, wildfire). If available, priority should be given to relocation areas located within local preserves, parks, land trusts, and conservancies. Salvage trees should not be relocated where relocation activities could disrupt existing

ecosystem processes, the genetic integrity of healthy western Joshua tree populations or the natural communities upon which they depend. Each salvage tree should be relocated as close to its original location as is possible. Criteria for selecting off-site relocation areas include:

- In a natural vegetation community that supports western Joshua trees;
- Within 16 kilometers of the salvage tree's original location;
- Within 152 meters of the salvage tree's original elevation; and
- Occupied habitat that has been previously impacted by wildfire or human activities that have led to the removal or death of western Joshua trees.

Relocation areas that do not meet the criteria listed above may be approved by CDFW on a case-by-case basis.

Once an off-site relocation area has been identified, the permittee must provide CDFW with written permission from the landowner of the proposed relocation area(s) confirming that the permittee will have site access to implement the maintenance and monitoring measures required under the WJTCA ITP. The landowner must also confirm in writing that CDFW staff may access the property to conduct compliance inspections in accordance with the measures outlined in the WJTCA ITP.

This document does not provide guidance regarding how to implement or support the assisted migration of western Joshua tree. At this time there is insufficient research published on the geographic boundaries of genetically distinct populations and/or climate adaptive traits within populations that may be suited for assisted migration to expand western Joshua's tree's range or assisted geneflow to enhance a population's ability to adapt to climate change impacts. Assisted migration, assisted geneflow, and/or boundaries of genetically distinct populations may be discussed in future amendments to this document.

Relocation Plan

Where relocation is required, a Relocation Plan must be approved by CDFW prior to the issuance of an WJTCA ITP. The Relocation Plan may combine bare root and tree spade relocation methods and must include the following information:

- The contact information and qualifications of the desert native plant specialist(s) overseeing relocation;
- The date range when trees will be relocated. If salvage trees will be temporarily stored in containers, the plan must indicate when the trees will be replanted;
- The landowner's name, location name, and address or APN for each relocation area property;
- If salvage trees will be relocated outside of the project site, a signed, written statement from the owner of each relocation area granting permittee permission to relocate salvage trees to the relocation area property and access to implement any maintenance and monitoring measures;

- The unique identifier, size class, planned and contingency relocation methods, current and recipient site GPS coordinates (latitude/longitude in decimal degrees), overall health of each tree, signs of pest/human damage (if any), and a photo of each tree to be relocated, (see the census instructions for submitting photographs);
- If utilizing multiple receiver sites, the permittee must document the receiver site where each tree will be relocated using the unique identifier and recipient site coordinates;
- If tree spade relocation is proposed, additional trees must be identified for relocation as a contingency in case the tree spade relocation method is impractical due to rocky terrain or other issues. The number of additional trees that must be identified will vary on a project-by-project basis. The information described above must be provided for each additional contingency tree; and
- Any other pertinent information regarding relocation operations.

Each permittee may, but is not required to, use CDFW's Relocation Plan template and spreadsheet, so long as the permittee's proposed Relocation Plan contains all the required information set forth above. Any questions regarding the development of the Relocation Plan should be discussed with CDFW staff prior to submittal in order to avoid project delays.

Protocol

Pre-Relocation

Selecting Trees for Relocation

Western Joshua trees that are in good health should be prioritized for relocation. Indications that a tree is in good health include where 60% or more of the tree's branches are living; minimal pest damage (no or few bore holes and/or less than 25% periderm [bark] stripping); recent signs of unrestricted hard growth; recent signs of flowering events, and/or strong vigor. Where a tree is greater than 7 meters in height, its size may limit its ability to be successfully relocated. Therefore, healthy salvage trees between 5-7 meters in height should be prioritized within Size Class C.

Siting

Trees identified for relocation should be clearly flagged or marked with a unique identifier and the recipient site should be identified before tree removal begins. Preferred and contingency methods for each relocation should also be identified (e.g., bare root relocation versus tree spade relocation) in advance. Each recipient site should be compatible with the corresponding salvage tree's relocation method (see Tree Spade Relocation under Digging/Tree Removal section below). The recipient site location should also be recorded using a Global Positioning System (GPS) unit and marked with pin flags or wood stakes that are clearly labeled with the unique identifier of the corresponding salvage tree. The permittee should identify a recipient site for each salvage tree that is: accessible for relocation and irrigation equipment, such as

water trucks or trailers; provides or enhances connectivity corridors; and mimics the density of the surrounding WJT population and is located at least 4.5 meters from the nearest western Joshua tree. If possible, recipient site locations should be chosen at random and be spatially balanced throughout the relocation area. Geographic Information System (GIS) tools can assist with this process.

Timing

When feasible, western Joshua trees should be relocated at a time that maximizes their chance of survival. (Fish & G. Code, § 1927.3, subd. (a)(4)(A)(ii).) The optimal time to relocate trees occurs in the fall when heat/drought stress is low and roots have adequate time to reestablish before the onset of hot, dry summer conditions. For bare root relocation, winter is a suboptimal but acceptable time to relocate trees but provides less time for roots to re-establish and may result in lower rates of survival. For tree spade relocation, there is a wider range of suboptimal but acceptable times to relocate trees because this method results in less root exposure and potential water loss through evapotranspiration as compared to bare root relocation. Relocating when trees are exposed to hot conditions for an extended period, should be avoided.

Bare Root Relocations

Winter	Spring	Summer	Fall
OK	Avoid	Avoid	Preferred

Tree Spade Relocations

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
OK	OK	OK	OK	Avoid	Avoid	Avoid	OK	OK	Prefer	Prefer	Prefer

Pre-Relocation Watering

In preparing for relocation, both the salvage trees and the recipient sites should be watered 24-48 hours in advance. An earthen berm 4-6 inches in height should be created around the trees and recipient sites to create water basins that ensure water saturates the soil around the root ball and recipient site. For bare root relocations, the perimeter of the berm should be no less than 24 inches from the base of the trunk. For tree spade relocations, the size of the berm should be slightly wider than the width of the tree spade to be used on that individual. The water basins should be filled with water to just below the top of the berm twice and allowed to fully drain between fillings. Root stimulant additives such as vitamin B1 and rooting hormone may assist in root regeneration but are not required. Root stimulant additives should be utilized according to product label recommendations.

Orientation

Prior to relocation, using a compass set to the correct declination, mark the north side of the tree identified for relocation with a water-based tree marking paint or other CDFW-approved means in a place that will not be impacted or obscured during

relocation operations (e.g., a small paint mark on the trunk 12 inches above ground level or ribbon tape tied to one of the branches on the north side of the tree). When setting a salvage tree in a recipient site, best efforts should be made to place the tree in its original orientation; however, this may be not be possible based on the terrain of the recipient site.

Other Pre-Relocation Precautions

- Relocation operations should adhere to the American National Standards Institute Z133 Safety Requirements for Arboricultural Operations.
- Permittees should obtain all information necessary to avoid existing underground infrastructure at salvage and recipient sites prior to relocation (see Underground Service Alert of Southern California (DigAlert)).
- To prevent the spread of invasive species and pathogens, digging equipment should be clean and free from dirt and debris and sanitized with a 10% bleach solution prior to arriving at the site where trees will be salvaged.
- Depending on the method used, tree limbs may need to be trimmed to facilitate relocation. Limbs should only be trimmed as necessary to facilitate relocation.

Relocation

Digging/Tree Removal

If trees are in close proximity to each other (less than 18 inches apart at the bases of their trunks), all efforts should be attempted to relocate the trees together to avoid separation of trees that are connected through rhizomes below ground.

Bare root removal by hand – Relocations using only hand tools should only be done for trees that are less than 1 meter in height. The root ball and surrounding soil should be salvaged in a way that keeps the root ball as intact as possible. This can be accomplished by excavating a circular trench 10-12 inches deep, 1-2 feet from the base of the trunk. Once the trench is complete, hand tools should be used to undercut the root ball and sever the roots below. Only apply as much lateral pressure to the tree as necessary to expose roots for severing with hand tools. The cut surfaces on roots should be kept small to minimize root dieback and exposure to soil-borne pathogens.

Bare root removal by (non-tree spade) heavy equipment/excavator – As with bare root removal by hand, the root ball and surrounding soil should be salvaged in a way that keeps the root ball as intact as possible. There are different ways to accomplish this using an excavator, depending on the tree's size, soil conditions, and other factors. For trees that are less than 1 meter in height, an excavator with a bucket attachment at least 24 inches in width can be used to extract the tree and root ball in one scooping motion. The equipment operator should minimize incidental damage to the aboveground portion of the tree to the greatest extent possible. Root balls should be handled with care when they are unloaded from the bucket. For trees that are 1 meter or greater in height, a trench 18-24 inches deep should be excavated 2 feet from the base of the trunk. If the soil around the root ball stays intact and does not show signs of

fracturing, the tree should be firmly rigged to the rounded exterior of the bucket using nylon straps at least 4 inches in width (Figure 1). Additional cloth padding may be placed around the straps to prevent damage to the periderm. Straps should be rigged at multiple points along the main trunk of the tree to prevent excessive swinging once freed from the soil. Once firmly rigged, the root ball should be undercut using hand tools as safely as possible until all or most of the roots are severed. Snapping roots should be minimized, as much as possible.

If the soil around the root ball does not hold together and shows signs of fracturing and instability when excavating the trench, as is common in sandy soils, the excavator should be used to undercut the root ball as much as possible without causing the tree to fall freely to the ground.

The tree should then be rigged to the bucket attachment using the methods described above and gentle but increasing lateral pressure should be applied to the tree to dislodge the root ball and lay the tree down. Once the tree is resting on the ground, the straps may need to be adjusted in order for the tree to be picked up by the excavator.

Trees removed from the ground using the bare root method should be replanted or containerized within 24 hours of removal.

Figure 1 – Bare Root Removal: Removing soil around the root ball of a salvage tree using hand tools (left). Salvage tree being removed from the ground by an excavator (right). (Photo credit: National Park Service)

Tree spade relocation – Tree spades come in different sizes based on the width of the soil surface that they can encapsulate (Figure 2). Tree spades can be used to relocate

trees of most sizes. However, they are not recommended for trees over 7 meters in height due to stabilization issues during high-speed wind events after relocation.

The following steps must be carried out sequentially, in a timely manner, and thoughtfully. Each western Joshua tree and corresponding recipient site should be evaluated for tree spade acceptability prior to digging. The desert native plant specialist should evaluate soil conditions to assess whether large rocks or boulders may prevent tree spade blades from fully encapsulating the root ball. This may be apparent by scanning the surface of the surrounding area or reviewing existing soil maps (see "Shallow Excavation Ratings" on NRCS Web Soil Survey: https://websoilsurvey.nrcs.usda.gov/app). Tree limbs may be trimmed only where necessary to allow the tree spade blades to fully close around the tree. The tree spade size should be selected to ensure the blades do not come within 18 inches of the base of the trunk at ground level. Recipient sites should be dug immediately before, or no more than 4 hours prior to, tree extraction to prevent the soil from drying out and collapsing. Excavated recipient site dirt should be used to backfill the tree removal site where available. Open pits should be flagged with stakes and high-visibility ribbon tape and temporary fencing should be installed around any unattended open pits to prevent people or animals from falling in.

Figure 2. A salvage tree being removed from the ground using a tree spade (Photo credit: National Park Service).

Transporting Trees

If salvage trees are not going to be transported to recipient sites by hand or by the equipment used to extract the tree (e.g., by truck or trailer), precautions must be taken to avoid damage to the tree and root ball. Root balls should be loosely wrapped in burlap and kept moist during transport. Salvage trees should be supported at all times and not dropped or thrown. Salvage trees should be securely transported upright or at a slight angle. Salvage trees may touch other salvage trees during transport, but they should not be stacked or otherwise fully supported by other salvage trees. Salvage trees should be positioned in transport vehicles in a way that minimizes branch entanglement.

Planting Methods

Bare root relocations - The width of each recipient site hole should be approximately 12 inches greater than the width of the root ball. Root balls should fit snugly within their recipient holes to avoid stabilization issues. The depth of recipient sites holes should be 2-4 inches less than the height of the root ball to account for settling. If recipient site holes are dug too deep, they should be backfilled and compacted by foot or using hand tools. Salvage trees should be placed as close to their original orientation as the terrain will allow. Salvage trees should be supported when lowered into holes. Holes should be simultaneously backfilled with soil and water to eliminate air pockets and voids. Soil should be lightly compacted by foot or using hand tools.

Tree spade relocations - The salvage trees should be placed as close to their original orientation as the terrain will allow. If needed, soil should be backfilled and lightly compacted by foot or using hand tools to meet the grade of the surrounding soil surface.

Storage

If salvage trees need to be stored for later replanting, in-ground storage is preferred over containerizing. In-ground storage procedures should follow the pre-relocation water berm, planting, post-relocation water berm, and stabilization methods described herein. Salvage trees stored in-ground should be flagged for avoidance and/or fenced off.

If in-ground storage is not possible, each salvage tree should be placed in a container that is at least twice the size of the unrestricted root ball and includes drainage holes. The containers should be sanitized with a 10% bleach solution. The container should be filled using soil from the removal site if the salvage tree is being stored for less than 6 months or with a soil mix ratio of 100 parts organic potting soil to 160 parts course perlite to 200 parts washed concrete sand to 1 part "13-13-13" fertilizer (Goodwin 2024) if the salvage tree is being stored for longer than 6 months. The bottom one third of the container should be filled with soil mixture before placing the root ball into the container. Once the root ball is placed into the container, the remaining volume of the container should be filled with soil and water simultaneously to eliminate air pockets

and voids. Salvage trees should not be stored in containers for longer than 2 years unless approved by CDFW. Containerized salvage trees should be stored either upright or at a slight angle to improve drainage and prevent root rot. If weather forecasts predict wind gusts over 60 mph, containerized trees should be closely grouped and tied together 24 hours in advance for added stability. If containerized salvage trees are pushed over, they should be promptly righted and stabilized using the methods described below for the duration of the storage period. Containerized salvage trees should be maintained and monitored following the methods described below. If trees show signs of drought stress, watering frequency may need to be increased. Containerized soil should always be allowed to thoroughly dry out before rewatering. Containerizing a salvage tree that has been removed from the ground using the tree spade method in a container would eliminate the benefits from this relocation method; therefore, salvage trees removed from the ground using the tree spade method should always be stored in the ground.

Post-Relocation

Water Basins

An earthen berm at least 4 inches in height should be created around each salvage tree following relocation. The top of the berm should be level. For bare root relocations, the perimeter of the berm should be no less than 24 inches from the base of the trunk. For tree spade relocations, the perimeter of the berm should be the width of the tree spade.

Stabilization

Stabilization material should be installed for salvage trees that are greater than 3 meters in height and for trees that are less than 3 meters in height with a tree height to canopy width ratio that exceeds 2:1. For example, a 2-meter-tall tree with a canopy width greater than 1 meter should have stabilization material installed. Non-abrasive guying materials, such as Arbor Ties, should be attached to three equidistant lateral ground-point anchors outside of the water basin. Guys should be taut but allow for some movement so they do not cause friction in light to moderate wind conditions.

Identification

Each salvage tree should be clearly flagged with tape ribbon or a metal tree tag, and labeled with a unique identifier (e.g., #1, #2, #3) and the relocation date (or the date when first removed from the ground for containerized salvage trees) in the following format: MM/DD/YYYY. Each tree tag should be loosely secured to the main trunk of the tree, rather than nailed directly into hard growth, and should be visible from the south. Each western Joshua tree stem or trunk arising from the ground shall be considered an individual tree requiring flagging, regardless of its proximity to any other western Joshua tree stem or trunk.

Recordation

A GPS unit should be used to record the location of each salvage tree's recipient site. The relocation method (bare root – hand, bare root – excavator, or tree spade) should also be recorded, along with a color photo of each tree taken from the south of the tree facing north. The picture should include the entire tree.

Maintenance and Monitoring

Where relocation is required under a WJTCA ITP, it is the permittee's responsibility to ensure the maintenance and monitoring measures set forth below are implemented and as required in the permittee's WJTCA ITP.

Site Visits

Site visits should be conducted by desert native plant specialists to determine maintenance needs for relocated trees according to the following schedule:

Year 1

- Months 0-3, once every two weeks.
- Months 4-12, once per month.

Year 2

- Months 13-24, every other month.

Year 3

- Months 25-36, every other month only for trees showing signs of declining health. At the end of the 3-year maintenance period, all trees should receive a final site visit and be assessed according to the Completion Report section below.

During site visits, desert native plant specialists should assess and record maintenance needs for each salvage tree. They should also have a site map showing the locations of all salvage trees, a GPS device to confirm salvage tree locations, and notes and photos from previous visits, and they should be prepared to address maintenance needs during site visit or shortly thereafter.

Watering

During the months of May to September, salvage trees should only be watered during site visits if the total rainfall (or snowfall equivalent) for the region within which the recipient site is located is less than 0.4 inches within the previous 7 days. During the months of October to April, salvage trees should only be watered during site visits if the total rainfall (or snowfall equivalent) for the region within which the recipient site is located is less than 0.3 inches within the previous 7 days. Regional precipitation models may be used in determining rainfall amounts; however, rain gauges within, or adjacent to, relocation areas provide the best indicator of precipitation totals. Water basins should be filled to the top of the berm, but not allowed to overtop the berm.

Tree Health

Tree health should be assessed by a desert native plant specialist and recorded for each salvage tree during site visits. Tree health should consider signs of new leaf growth, branch loss, signs of flowering/fruiting, signs of pest/human-caused damage, leaf discoloration, restricted hard growth, overall vigor, and other indicators worth noting. If salvage trees are showing signs of increasing health after two years of maintenance, they do not need to be visited during the third year (see reporting requirements below), except for the final site visit.

Invasive Plant Removal

Invasive plants should be controlled and removed within the water basin. Removal should occur before invasive plant seeds reach maturity. Invasive plants should be removed through mechanical methods and hand pulling or with hand tools, rather than by chemical means, and appropriately disposed of. In removing invasive plants, care should be taken to not damage salvage tree roots. A list of common invasive plant species can be found on the California Invasive Plant Council Invasive Plant Inventory (Cal IPC Inventory) website at: https://www.cal-ipc.org/plants/inventory/. Native plants should be retained where possible.

Maintenance of Berms, Stabilization Supports, and Identification Markers

During site visits, berms should be checked for height and any breaks that would allow water to escape from the water basin. Stabilization supports should be checked for damage and tightness. If relocated trees are showing signs of leaning, stabilization supports should be added or adjusted. Identification markers should also be checked for intactness, legibility, and maintenance needs.

Completion Activities

During the final site visit at the end of the 3-year maintenance period, berms, stabilization supports, and identification markers must be removed from the relocation area.

Reporting

Where relocation is required under a WJTCA ITP, it is the permittee's responsibility to ensure the reporting measures set forth below are implemented. Where relocation is voluntary, CDFW requests that the permittee provide the same reporting information to CDFW to better inform updates to these guidelines and relocation protocols.

Post-Relocation Reporting

When a WJTCA ITP requires relocation of western Joshua trees, the permittee must submit a post-relocation report to CDFW no more than 30 days after relocations are completed. The post-relocation report should include the following:

- The date range when relocation operations occurred.
- For each salvage tree:

  - The unique identifier and recipient site coordinates;
  - The final recipient site, including GPS coordinates (latitude/longitude in decimal degrees);
  - The relocation method used;
  - The height and diameter of the post-relocation water basin constructed;
  - Any stabilization supports installed;
  - Any major damage, including any necessary limb trimming, that occurred during relocation;
  - Any deviation from the tree's original orientation;
  - Any root stimulant additives used in pre- or post-relocation irrigations; and
  - A photo of the tree facing north, with the unique identifier in each file name.

Maintenance Reports

When a WJTCA ITP requires relocation of western Joshua trees, the permittee must submit annual reports detailing the 1-year and 2-year maintenance periods, as appropriate, to CDFW. Maintenance reports should include the following information:

- The date(s) when site visit(s) occurred;
- The contact information and qualifications of the desert native plant specialist(s) performing tree assessments;
- Information for each salvage tree regarding the following:
  - The unique identifier and recipient site coordinates;
  - Whether the tree is alive or dead;
  - Dates of supplemental waterings;
  - Identity and estimated number of invasive plants observed/controlled and the methods used;
  - Any signs of pest/human damage;
  - Any signs of declining tree health;
  - Any maintenance conducted to repair, replace, add, or adjust berm, stabilization supports, and/or identification markers;
  - A photo of the tree facing north, with the unique identifier in each file name; and
  - At the end of the 2-year period, the reasons for discontinuing maintenance on trees showing stable or increasing health, such as new leaf growth, flowering/fruiting, good leaf color, no signs of pest/human damage, and/or unrestricted hard growth.

Completion Report

A completion report must be submitted to CDFW no more than 30 days after the end of the 3-year maintenance period. The completion report must contain the following:

- The date when the final site visit occurred;

- The date when berm/stabilization materials/identification markers were removed;
- The contact information and qualifications of the desert native plant specialist(s) performing the final assessment;
- Information for each salvage tree regarding the following:
    - Whether the tree is alive or dead;
    - Any damage that occurred during or after relocation;
    - Any signs of declining health;
    - Any signs of pest damage; and
    - A photo of the tree facing north, after berm, stabilization materials, and identification markers are removed, with the tree's unique identifier in each file name; and
- Any recommendations that may help to improve tree relocation methods.

Literature

Bainbridge, D. 2007. A guide for desert and dryland restoration: New hope for arid lands. Island Press, Washington D.C. 20009, USA.

Balogh, M. A. 2019. Mojave Desert ecosystem recovery: Potency of biotic and abiotic restoration methods in low elevation plant communities. University of Nevada, Las Vegas, Thesis, Las Vegas, Nevada, USA.

City of Palmdale. 2024. Report of the City of Palmdale Joshua tree preservation program.

Wagner, M. L. 2018. Factors influencing revegetation efforts in the Mojave Desert: Field studies and meta-analysis of the Morongo Basin and Joshua Tree National Forest. California State Polytechnic University, Thesis, Pomona, California, USA.

Personal Communications

Goodwin, J. 2024. Joshua Tree National Park. Discussion with J. Goodwin, Vegetation Branch Manager. [22 Mar 2024].

Graver, N. 2024. Joshua Tree National Park. Desert Native Plant Specialist Review of "Western Joshua Tree Relocation Protocol". [10 June 2024].

Reynolds, D. 2024. The Landscape Center. Discussion with D. Reynolds, Project Manger/ISA Certified Arborist. [1 May 2024].

Appendix F.

Conservation Lands Prioritization Assessment

CDFW CONSERVATION LANDS PRIORITZATION ASSESSMENT

BACKGROUND

The purpose of this appendix to the Western Joshua Tree Conservation Plan is to provide biological guidance for land acquisitions or other mitigation opportunities supported by the Western Joshua Tree Conservation Fund (Conservation Fund) or any successor fund. These considerations frame minimum habitat standards, identify standards for surveys/censuses/habitat evaluations, and propose an evaluation framework for potential acquisitions or mitigation opportunities.

Conservation and Mitigation opportunities with the highest conservation value should:

- have large areas occupied by western Joshua tree,
- have a high density of reproductive adult individuals,
- have high recruitment (indicating presence of small mammals, nurse plants, and pollinating moths),
- be within predicted climate refugia,
- have low risk from current and adjacent land use, and
- have good overall tree health.

To maximize the conservation value of each acquisition or mitigation opportunity, a point scoring system is provided to help identify properties with the highest conservation value. Criteria below have been weighted based on expected value for Joshua tree conservation over the term. Recommendations for surveys/censuses/habitat evaluations submitted with proposals are also provided.

OCCUPIED AREA

Properties with larger areas occupied by western Joshua may have higher conservation value. For example, a property with 50 hectares (123.6 acres) occupied by western Joshua tree would rank lower than property with 300 hectares (741.3 acres) occupied by western Joshua tree. A standard buffer of **100 meters (328.1 feet) from adult trees** is recommended to calculate occupied area at all properties. Non-suitable habitat, such as hardscapes, should not be included. CDFW will need to see which properties are available before applying areas to the large/medium/small criteria below.

- Large area occupied by western Joshua tree (30 points)
- Medium area occupied by western Joshua tree (18 Points)

- Small area occupied by western Joshua tree (6 Points)

DENSITY OF INDIVIDUAL ADULT (REPRODUCTIVE) TREES

Properties with a high density of individual reproductive adult trees should be prioritized. Density is area dependent, and therefore all density calculations should be based on the "occupied area" value determined above (density = number of individual reproductive adult trees/occupied area). For this calculation, trees with multiple clonal stems should be considered as one individual tree. Values are adapted from the condition categories in the 2023 US Fish and Wildlife species status assessment report for Joshua trees, and these density categories can be adjusted for this assessment, if needed.

- High density: greater than 20 adult trees/acre (greater that 50 trees/hectare) (5 Points)
- Moderate density: between 10 and 20 adult trees/acre (25 to 50 trees/hectare) (3 Points)
- Low density: fewer than 10 adult trees/acre (25 trees/hectare) (1 Point)

RECRUITMENT

The number of juvenile trees in a population indicates the level of recent recruitment in that population. Tree age is correlated with tree height; therefore, tree height values can be used to assess the amount of recent recruitment. Values are adapted from the condition categories in the 2023 US Fish and Wildlife species status assessment report for Joshua tree, and these recruitment categories can be adjusted, as needed.

- High Recruitment: greater than 15 percent of the number of trees attributable to juveniles (trees less than 3.3 feet (1 meter)) (5 Points)
- Moderate Recruitment: 8–15 percent of the number of trees attributable to juveniles (trees less than 3.3 feet (1 meter)) (3 Points)
- Low Recruitment: less than 8 percent of the number of trees attributable to juveniles (trees less than 3.3 feet (1 meter)) (1 Point)

WITHIN PREDICTED CLIMATE REFUGIA

Climate refugia predictions for western Joshua tree are in Shyrock et al. (forthcoming). Higher elevations and more northerly locations are generally predicted to be more likely climate refugia. Marginal cases may be difficult to assess, but this is still an important assessment.

- Yes, within refugia (40 Points)
- Maybe within refugia (24 Points)
- No, not within refugia (8 Point)

LAND USE

Conservation value is highly dependent on the habitat condition, risks of impact from land use on the property being evaluated, and on adjacent and nearby properties. Low quality habitat is less likely to support the species that western Joshua trees depend on, including pollinating moths and rodents. High risk from wildland fire ignition, land ownership and use, plant community composition, and proximity to roads and trails all affect the current and future biological value of a property, whether they are present on the property being evaluated, or on adjacent and nearby properties.

- Low risk from current and adjacent land use (e.g., adjacent to preserved wilderness, far from high-traffic roads and trails, low invasive species cover) (15 Points)
- Moderate risk from current and adjacent land use (e.g., adjacent to high-traffic roads and trails, moderate invasive species cover) (9 Points)
- High risk from current and adjacent land use (e.g., adjacent to development or unprotected habitat, off-highway-vehicle use, high invasive species cover) (3 Points)

DISEASE/PEST/MORTALITY HEALTH ASSESSMENT

Tree health is an indicator of whether the population is currently stressed. Health assessments of individual trees would contribute to assessing the health of the entire population on the property.

- Population in generally good health (e.g., few signs of damage, pests, or health problems, trees generally upright, limbs generally upright, few exposed roots at the bases of trees, nurse plants are present for recruitment) (5 Points)
- Population in average health (e.g., some signs of damage but most trees likely to persist or rebound) (3 Points)
- Population in poor health (e.g., broken/hanging limbs, yellowing or brown leaves, visible signs of damage [fire damage, bark stripping, boring (weevils, beetles)], excessive leaning of trees, fallen trees, few nurse plants for recruitment) (1 Point)

PROPOSAL SURVEY STANDARDS

- To calculate occupied area, a complete tree census with a Global Positioning System (GPS) point for each tree within the property boundary would be required. For large properties, results of remote sensing techniques via satellite imagery or other technology is acceptable. A standard buffer of **100 meters (328.1 feet) from adult trees** is recommended to calculate occupied area at all properties. The resulting buffered area should then be clipped to within the property boundary.

- The tree census should include height for each tree to the nearest tenth of a meter. Height for clonal trees should be measured based on height of the tallest tree in the clonal group.
- The tree census should indicate whether each tree has clonal growth or not, and if so, the number of stems.
- The tree census should indicate whether or not each tree is a reproductive adult (i.e., are there branches or other evidence of recent flowering).
- The tree census should assess the health of each living tree as either good, average, or poor.

CONSERVATION AND MITIGATION LANDS ASSESSMENTS SCORING SHEET

1.1.1 Name of Assessment Scorer:

1.1.2 Name of Property:

Criterion	Point Score	Notes
Occupied area		
Density of individual adult (reproductive) trees		
Recruitment		
Within predicted climate refugia		
Adjacent Land Use		
Disease/Pest/Mortality Health Assessment		

REFERENCES

Shryock, D.F., T. C. Esque, G. A. Berry, and L. A. DeFalco. Forthcoming. Assessing uncertainty in forecasts of climate change refugia for Joshua trees using high-density distribution data. In review.

Appendix G.

Foundational Commitments by CDFW for Developing Western Joshua Tree Conservation Plan Co-Management Principles with California Native American Tribes

FOUNDATIONAL COMMITMENTS BY CDFW FOR DEVELOPING WESTERN JOSHUA TREE CONSERVATION PLAN CO-MANAGEMENT PRINCIPLES BETWEEN CALIFORNIA NATIVE AMERICAN TRIBES AND CALIFORNIA AGENCIES

Foundational commitments by California agencies are important for underpinning and guiding development of co-management principles with California Native American tribes for implementing joint activities to conserve western Joshua tree. The following CDFW commitments were adapted from the Advisory Council on Historic Preservation (ACHP) 2004 Policy Statement on Indigenous Knowledge and Historic Preservation, and represent the collaborative, co-equal character of the activities state agencies will carry out in developing and implementing the co-management principles of the Western Joshua Tree Conservation Plan.

1. **Respect and Relationship Building**. Tribal knowledge, including Traditional Ecological Knowledge, will be treated with respect in all circumstances. This knowledge is frequently revered by the individual, family, clan, or community associated with it, and it may have an active role in ongoing cultural practices and ways of understanding. Disrespect, misuse, or abuse could violate cultural and ethical protocols, or may impact a Tribe in other ways, including socially, politically, or economically. Developing and maintaining a positive and mutually beneficial relationship with Tribes will help facilitate an increased understanding of what constitutes respect and how those actions lead to the proper integration of Traditional Ecological Knowledge into western Joshua tree conservation.
2. **Valid and Self-Supporting Knowledge**. The Traditional Ecological Knowledge held by a Tribe is a valid, sound, and self-supporting source of information and is an aspect of the best available science. It does not require verification by any other knowledge system to inform state decision making in western Joshua tree conservation. Designated representatives of Tribes are, and will be recognized as, subject matter experts regarding the application of their Traditional Ecological Knowledge.
3. **Cultural and Religious Significance of Traditional Ecological Knowledge**. Conservation actions affect resources and properties that may be of religious and cultural significance to Tribes. The development and implementation of conservation management actions will be guided and informed by Traditional Ecological Knowledge, where Tribes consent to share that knowledge with state agencies. For purposes of state environmental laws relevant to western Joshua tree conservation, the term "Traditional Ecological Knowledge" includes, but is not limited to, the experiences, insights, and knowledge held by Tribes that can assist state agencies in identifying, evaluating, assessing, and resolving adverse effects to resources and properties that may be of religious and cultural significance to the Tribes.

While state law directs state agencies to make the final decisions in environmental review, the WJTCA also directs agencies to consult with Tribes in carrying out conservation activities. Deference will be provided to the expertise of designated tribal representatives where Traditional Ecological Knowledge is provided to inform decision making. State agencies recognize and defer to tribal interpretation of the resource's or property's religious or cultural significance and integrity. Efforts taken to avoid or minimize adverse effects to western Joshua tree on tribal land should reflect the Traditional Ecological Knowledge and other input provided by the Tribe, recognizing they are uniquely suited to inform those decisions and can provide information to help define what may be or may not be appropriate. Efforts to reach consensus on management actions should prioritize and recognize the preferences of Tribes on tribal land including consideration of religious and cultural significance important to them.

4. **Fair Compensation**. If a state agency requests a Tribe to provide Traditional Ecological Knowledge via research, survey, monitoring, or other efforts, the Tribe should be fairly reimbursed or compensated. Traditional Ecological Knowledge is a distinct form of expertise that cannot be supplanted through other forms of knowing. Designated representatives of Tribes are the appropriate subject matter experts with the experience and qualifications to inform state agency decision making in the conservation of western Joshua tree on tribal lands. In many cases, identifying, vetting, and deciding whether and how to share Traditional Ecological Knowledge requires research, work, or additional action on the part of the Tribe.

5. **Records Reflect Tribal Involvement**. The importance of Tribal Ecological Knowledge will be documented in conservation project records. Any determination, finding, or agreement that relates to the western Joshua tree conservation on tribal lands or other properties that may be of religious and cultural significance to a Tribe will include sufficient documentation to enable any reviewing party to identify when and how consultation efforts facilitated opportunities for Traditional Ecological Knowledge to inform decision making. These records should reflect if Traditional Ecological Knowledge was incorporated into final decisions, or include detailed justifications as to why not, being cognizant to protect or withhold confidential and sensitive information, as deemed by Tribes.

6. **Consultation Timelines**. Timelines will reflect the complexity and nature of the undertaking and recognize and attempt to accommodate decision-making processes of associated Tribes. When seeking information from a Tribe regarding conservation management actions on tribal land or properties that may be of religious and cultural significance to them, the agency will initiate consultation early enough in the planning process for effective consultation. State agencies should provide as much advanced notice of consultation meetings as possible and should extend review timelines accordingly, where needed to result in effective consultation and sharing of Traditional Ecological Knowledge.

7. **Professional Qualifications of Tribal Representatives**. The State recognizes that representatives of Tribes have professional qualifications. As sovereign Nations, Tribes retain the right to determine who has the expertise and qualifications to represent them and their Traditional Ecological Knowledge in the implementation of the Conservation Plan. Consistent with state government procedures, state agencies will identify designated representatives of Tribes as subject matter experts who meet the professional standards needed to inform findings and determinations relevant to conservation management actions on tribal Lands or properties that may be of religious or cultural importance to them.

8. **Managing and Protecting Sensitive Tribal Information**. The State will prevent or limit to the maximum extent feasible any inappropriate disclosure of confidential or sensitive information through all available mechanisms. Traditional Ecological Knowledge frequently includes information that is confidential, sensitive, sacred, and/or internal to a Tribe. To the maximum extent feasible, state agencies will clearly inform Tribes of any limitations on the agencies' ability to keep Traditional Ecological Knowledge confidential before discussing Traditional Ecological Knowledge. When seeking or integrating Traditional Ecological Knowledge, state agencies will consider not only how it would influence decision making, but also how it would account for any cultural, governmental, legal, or ethical protocols the Tribe may have that dictate its application and use. If Traditional Ecological Knowledge is provided, maximum effort will be taken to live up to the state government's trust commitments to protect confidential or sensitive tribal information.

Appendix H.

Enhancement and Restoration Prioritization Assessment

ENHANCEMENT AND RESTORATION PROJECT PRIORITIZATION ASSESSMENT

Background

The purpose of this appendix to the Western Joshua Tree Conservation Plan is to provide guidance on how enhancement and restoration projects supported by the Western Joshua Tree Conservation Fund (Conservation Fund) will be evaluated and prioritized. Projects that qualify for funding should have the overall goal of reducing threats to and/or restoring resources to degraded or potential future western Joshua tree habitat. Resources that are important components of western Joshua tree habitat include, but are not limited to, reproducing adult individuals, non-reproducing juvenile individuals, seeds/seedbank, native nurse plants, suitable soils, pollinating moths, seed dispersers, and advantageous genetic traits/adaptations. Threats to western Joshua tree habitat that may be reduced by enhancement and restoration projects include but are not limited to invasive plants, wildland fire, erosion, vehicle impacts, grazing impacts (e.g., herbivory, trampling, soil compaction), and other pests or diseases (e.g., weevils, beetles).

Minimum Qualifications

- Project will be conducted by the owner or the property or their agent, unless otherwise approved by CDFW.
- Project area has been degraded by impacts that may be reduced by the project.
- Clearly written project proposal with objectives, methods, and goals.
- Commitment to maintain and monitor the project for 2 years and report results.
- Project consultation with desert restoration expert with 5 years of desert restoration experience. Resumes must be submitted for approval.

Evaluation Criteria

Projects will be evaluated based on the provided point scoring system.

- **Enhancement/ Restoration Design - (1-15 points)** The design of a project will be evaluated based on its completeness and clarity of objectives, methods, goals, and a plan to maintain and monitor the site. Proposals should be reviewed and approved by a specialist with desert restoration experience.
    - Excellent (15 points) – All aspects of enhancement/ restoration design are clear and well-defined. Goals and objectives are specific, measurable, and realistic. The proposal

includes detailed methods that outline all aspects of the project from start to finish and includes timelines for implementation. Project is "shovel ready" meaning that all necessary agreements and/or compliance (if applicable) are complete.

- Fair (9 points) – All or most aspects of the enhancement/ restoration design are included but some are unclear. Some additional steps are required before the project can be implemented. Goals are qualitative.
- Poor (3 points) – Elements of the enhancement/ restoration design are included but some are missing important details. There is no clear path or timeline towards implementation.

- **Urgency and Severity of Threat - (1-15 points)** The project should alleviate one or more threats to western Joshua tree and its habitat such as low population size, lack of important resources, invasive plants, wildland fire, erosion, vehicle impacts, grazing impacts, or other pests or diseases. Projects that alleviate more urgent and severe threats will be ranked higher than projects that alleviate less urgent and severe threats.
  - Severe and urgent threats alleviated (15 points) – Threat requires immediate action. Effects are substantial and irreversible with permanent consequences such as extirpation of a population or local genotype.
  - Moderate and semi-urgent threats alleviated (9 points) – Threats are increasing in size and magnitude and are likely to have severe consequences in the next few years, such as significant reductions in population viability. Threats are reversible but only with extensive external input.
  - Minimal and non-urgent threats alleviated (3 points) – Threats have been ongoing and are not likely to cause any significant impacts to the resource in the immediate future. Consequences of the threat may be a minor or seasonal reduction in population viability. Effects are easily reversible with little to no lasting effects.
- **Problem Resolution - (1-15 points)** Projects that alleviate threats over longer time periods will be ranked higher than projects that alleviate threats over shorter time periods.
  - Excellent (15 points) – Project will implement specific actions that will result in resolution of the issue(s) or threat(s) for long periods of time (decades or longer). There is a high likelihood that project goals will be achieved. Actions are performed on a one-time basis (although the duration of implementation may be long, such as a five-year planting project with five additional years of monitoring and supplemental watering). The project benefits are expected to be self-sustaining for a decade or more after completion of the project.
  - Fair (9 points) – Project contributes to the resolution of the problem(s) but will not fully resolve the issue(s). Some cyclic ongoing maintenance will be required to achieve

project goals. The project benefits are expected to be self-sustaining for one to several years after completion of the project.

- Poor (3 points) – Project will contribute basic information about the problem(s) but does not directly lead to resolution of the issue(s). The project benefits are not expected to be sustainable after the completion of the project.

- **Maintenance and Monitoring Plan - (1-15 points)** Regular maintenance and monitoring of the site and local conditions are needed to ensure ecological processes are heading in the intended direction, and that adjustments are made accordingly. The frequency of maintenance visits will vary based on project activities and timeframes. For example, nursery plants may need regular watering in the years after initial installation but require less frequent watering in later years after they become established. The site characteristics that are monitored, and their frequencies, will also vary based on the project activities; however, more points will be given to projects that consider a full range of factors that contribute to the success of the enhancement or restoration project. For example, monitoring invasive grasses may help detect when fuel reduction treatments are necessary. Annual reporting to CDFW and National Fish and Wildlife Foundation (NFWF) will be required for a minimum of 2 years, and projects with longer commitments will receive more points.
  - (15 points) – Project includes a detailed schedule for regular maintenance and monitoring for 10+ years. The rationale for the frequency of maintenance visits is clearly explained and cost effective. The monitoring plan considers a wide range of ecological aspects that may affect the success of the project. Quantitative trigger points for adjustments to management actions are incorporated into the plan.
  - (9 points) – Project includes a detailed schedule for regular maintenance and monitoring for 5 years. The rationale for the frequency of maintenance visits is explained but some aspects are unclear or not cost effective. The monitoring plan considers some important ecological aspects that may affect the success of the project.
  - (3 points) – Project includes minimal maintenance and monitoring for 2 years. The rationale for the frequency of maintenance visits is unclear and not cost effective. Monitoring of one ecological aspect will occur annually.
- **Collaborative Engagement - (1-10 points)** Projects that have been endorsed or supported by a diverse group of collaborators and that will be implemented by many partners will rank higher than projects that were developed by and will be implemented by few individuals.
  - High (10 points) – Project demonstrates co-management with multiple Tribes, and collaboration with multiple local/regional partners including, but not limited to, other

governmental agencies, diverse interested organizations, educational groups, and local communities.

- Moderate (6 points) – Project demonstrates co-management with a specified Tribe and/or collaboration with a local/regional partner.
- Low (2 points) – Project has potential for co-management with a Tribe and/or collaboration with other agencies, but entities are not specifically identified.

- **Cost Effectiveness - (1-10 points)** Projects that will supplement funds from the Conservation Fund with other funds and resources to implement the proposed project will rank higher than projects that rely heavily or entirely on the Conservation Fund.
  - High (10 points) - Conservation Funds represent less than 25 percent of the total project cost.
  - Moderate (6 points) - Conservation Funds represent 25-75 percent of the total project cost.
  - Low (2 points) - Conservation Funds represent greater than 75 percent of the total project cost.
- **Conservation Lands Prioritization Assessment Score - (1-10 points)** (see Appendix F, "Conservation Lands Prioritization")
  - 81-100 score (10 points)
  - 61-80 score (8 points)
  - 41-60 score (6 points)
  - 21-40 score (4 points)
  - 0-20 score (2 points)
- **Land Conservation Status - (1-10 points)**
  - High conservation status (10 points) - Primary use is land conservation. These include conservation easements, conservancy lands, preserves, parks, sovereign lands devoted to conservation practices.
  - Some conservation status (6 points) - Areas with one or more uses including federal land with alternative uses (e.g., Bureau of Land Management, US Forest Service, US Bureau of Reclamation, US Department of Energy, US Department of Defense), sovereign lands with one or more uses other than conservation.
  - No conservation status (2 points) – No official conservation status; however, an agreement may be in place with private/residential landowner.

Enhancement and Restoration Project Assessments Scoring Sheet

Name of Assessment Scorer:

NAME OF PROJECT:

Criterion	Point Score	Notes
Enhancement/ Restoration Design (1-15 points)		
Urgency and Severity of Threat (1-15 points)		
Problem Resolution (1-15 points)		
Maintenance and Monitoring Plan (1-15 points)		
Collaborative Engagement (1-10 points)		
Cost Effectiveness (1-10 points)		
Conservation Lands Prioritization Assessment Score (1-10 points)		
Land Conservation Status (1-10 points)		
TOTAL (Out of 100 points)		

Appendix I.

Land Acquisition Flow Chart

Western Joshua Tree RPF Land Acquisition Flowchart

***This is the typical workflow; however, these steps may occur out of order in some situations**

STAGE 1

Property Eligibility
Preliminary review for biological suitability and title issues

- Consultant locates mitigation opportunity, evaluates it using the Conservation Lands Assessment (Appendix F), and provides mitigation lands assessment scoring sheet to CDFW Region for biological suitability review
- CDFW Region reviews information provided by Consultant and conducts site visit. If Region agrees property meets assessment criteria in Appendix F, gives Consultant approval to proceed.
- Consultant gathers/prepares Stage 1 property documents, reviews documents for potential issues. If Consultant recommends property, they provide package and recommendations to CDFW
- CDFW Region, Right of Way Agent, and Land Surveyor performs desk review Stage 1 documents
- CDFW provides Consultant written approval or denial for "Property Eligibility." Approval signals Stage 2 can begin
- Consultant may facilitate option with willing seller as Stage 2 review begins

STAGE 2

Property Acceptance
Full land package review if property found eligible by CDFW in Stage 1

- Consultant gathers Stage 2 property documents, reviews documents for potential issues. If Consultant recommends property, they provide package and recommendations to CDFW
- CDFW Region, Right of Way Agent, and Land Surveyor performs desk review of Stage 2 documents (engage legal if necessary)
- Consultant facilitates any negotiations with entities involved in property acquisition or protection
- CDFW provides Consultant written approval or denial for "Property Approval." Approval signals Consultant can complete property acquisition and protection
- Consultant requests CDFW to direct NFWF to fund the approved fee title and/or conservation easement acquisition

STAGE 3

Property Protection and Closing Documentation
Closing and Recording of Documents

If CDFW is Third Party Beneficiary

- Consultant sends the grant deed and/or conservation easement to title company for recording and completes escrow
- Consultant provides CDFW with Digital Closing Package
- Consultant requests CDFW to direct National Fish and Wildlife Foundation (NFWF) to fund long term management and conservation easement monitoring endowments

If CDFW is conservation easement Grantee or acquiring land in fee title,

- CDFW Right of Way Agent submits land package to the Wildlife Conservation Board (WCB)
- WCB Reviews package and Executive Director signs certificate of acceptance. WCB sends Conservation Easement/Grant Deed to title company for recording
- Title Company/Consultant provides WCB and CDFW with Digital Closing Package
- Consultant requests CDFW to direct NFWF to fund long term management and conservation easement monitoring endowments

WESTERN JOSHUA TREE CONSERVATION PLAN

April 2025 Fish and Game Commission Meeting

PRESENTED BY:

Drew Kaiser - California Department of Fish and Wildlife

Presentation Outline

- Summary of Comments
- March Workshops
- Plan Updates

Photo: Adobe Stock

Summary of Comments

Comments Received

WJTCA/Permitting

- Clarity on "take" and "impacts"
- Flexibility of/justification for buffers, in-lieu fees, relocation
- Potential exemptions, such as defensible space, single-family homes, in-fill development, utilities, funded/in-progress public works projects
- Mitigation options beside in-lieu fees (e.g., banking)

WJT Conservation Fund

- Priority spending and transparency of Conservation Fund

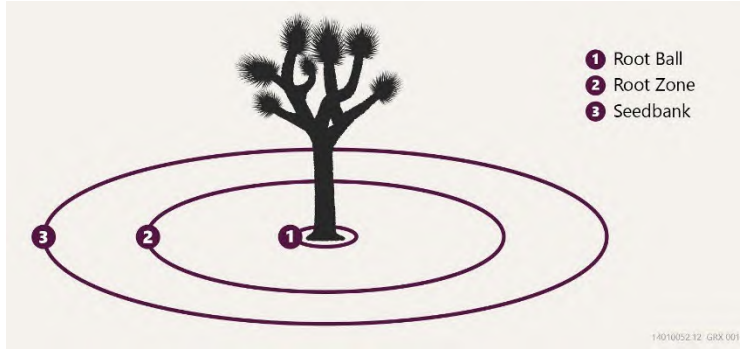



Photo: Adobe Stock


Photo: Adobe Stock

WJTCP Comments Received

WJTCP

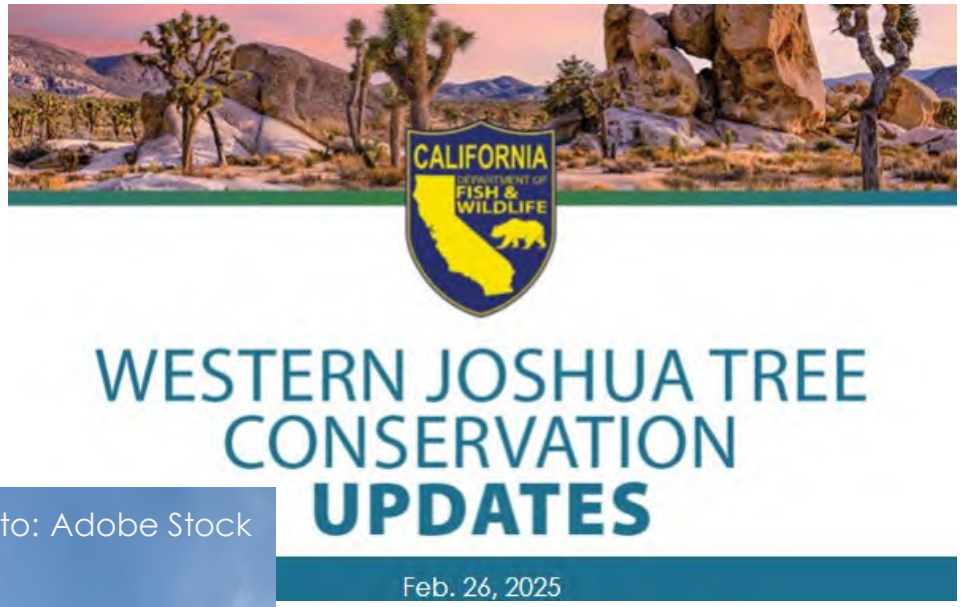
- Clarity between WJTCP vs. WJTCA
- Missing information (land jurisdiction vs. ownership; NGO preserves)
- Adaptive management and best available science
- Restoration management permits for restoration, cultivation, landscaping
- Geographic Focus Area boundary and Management Action implementation
- Public availability of data/mapping
- Conservation need given results of status review
- Ideas for additional research topics and public engagement/education
- Effectiveness Criteria (measurable, achievable, etc.)
- Clarity of climate refugia strategy
- Assisted migration, connectivity, stepping-stone habitats


Photo: Drew Kaiser

WJT Workshops

WJT Workshops Information

- Monday, March 10, 2025
- Two 3-hour virtual workshop meetings
- Outreach Process:
  - WJT website
  - Gov Delivery
  - Commission update
  - Email individuals



WJT Workshop Agenda

Workshop Agenda:

1. Overview of the Western Joshua Tree Conservation Act (WJTCA)
2. WJTCA Permitting
3. Overview of the Western Joshua Tree Conservation Plan (WJTCP)
4. Comments received on the WJTCP
5. Anticipated changes to the WJTCP
6. Public comment and questions


Photo: Drew Kaiser

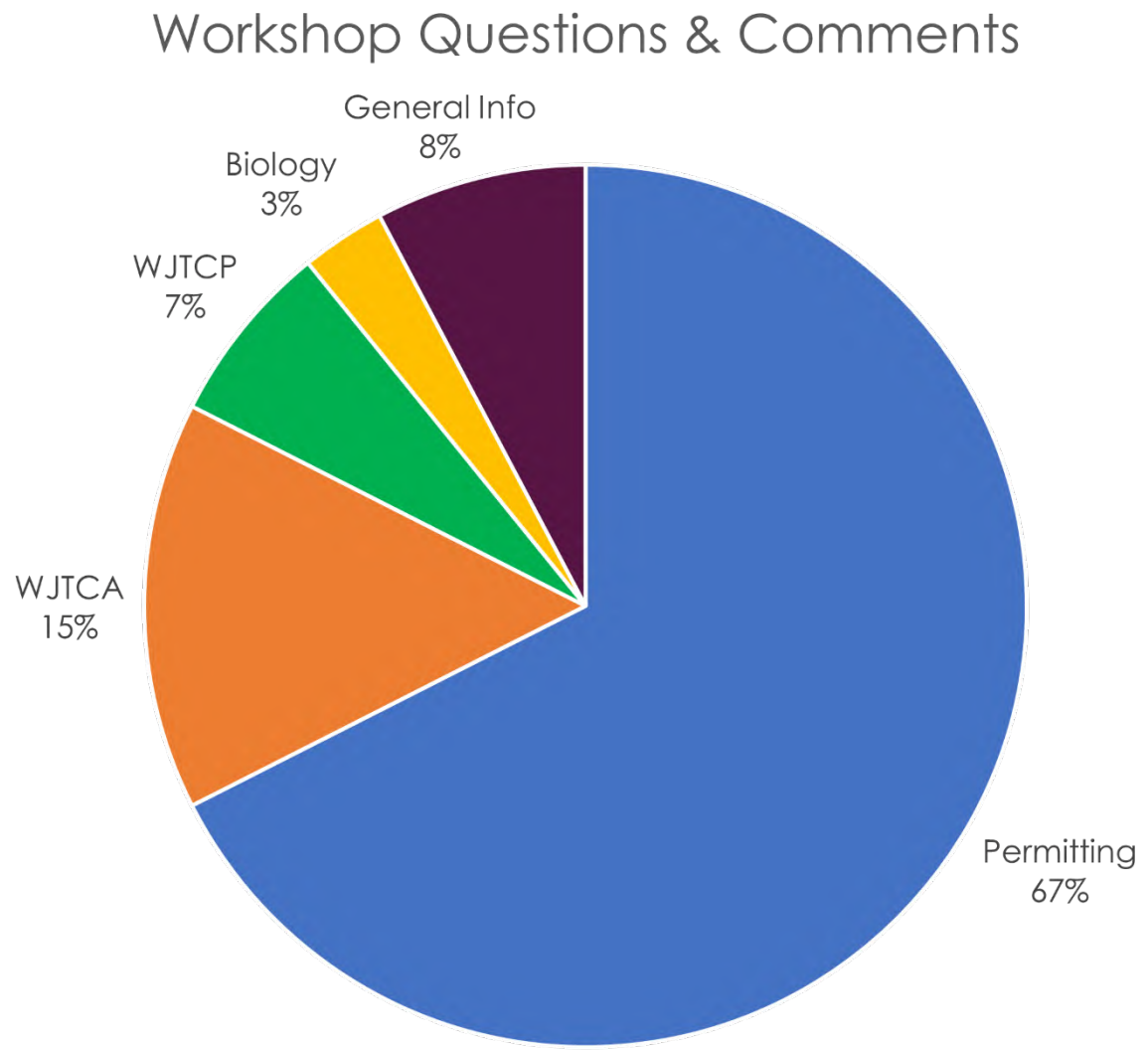
WJT Workshops Attendance

- Total registered: **491**
- Total attended: **375**
- Questions/comments: **194**


Photo: Adobe Stock

WJT Workshops Question and Comments

- Percent of questions/comments on permitting: **Approximately 67%**
- Percent of questions/comments on WTJCA: **Approximately 15%**
- Percent of questions/comments on WJTCP: **Approximately 7%**



Questions and Comments Breakdown

- **Permitting**
  - Fees: 12%
  - Relocation: 12%
  - Buffers: 12 %
  - CEQA: 6%
  - Exemptions: 6%
  - Hazard permits: 3%
  - Census: 2%
  - Other:14%
- **WJTCA:**
  - Financial burden/inequity: 6%
  - Size classes/definitions: 4%
  - Reduced fee area: 2%
  - Other: 3%
- **WJTCP**
  - How to provide comments: 2%
  - Supports WJTCP: 1%
  - Data sources/maps: 1%
  - Tribal monitoring: 1%
  - Other: 2%
- **Biology**
  - Root studies: 2%
  - Clonal growth: <1%
  - Seed dispersal: <1%
- **General Info**
  - Workshop recording: 6%
  - Email alerts: 1%
  - Regional contacts: 1%

WJT Workshop Key Takeaways

WJT Workshop Summary:

- Concern and confusion about permitting systems
- Comments on the WJTCP were minimal
- WJT workshop video posted on the WJT website


Photo: Adobe Stock

Plan Updates

Plan Updates – Chapters 1 & 2

Chapter 1 – Introduction

- Clarified language on the Fish and Game Commission's role
- Updated information on Inter-Tribal and Public Workshops

Chapter 2 – Planning Influences

- Updating Land Ownership Table 2-1
- Added language recognizing non-landowning special districts


Photo: Drew Kaiser

"...to prevent the extinction of western Joshua tree in the wild, preserve functioning ecosystems that support western Joshua tree, and maintain sustainable populations of western Joshua tree in California over the long term..."

Plan Updates – Chapters 3 & 4

Chapter 3 – Tribal Values and Uses

- No major changes


Photo: NALC

Chapter 4 – Summary of Resources

- Updated Management Units to include moderate- and high-emission scenarios data
- Updated Table 4-10 with moderate- and high-emission scenario data


Photo: Drew Kaiser

WJTCP Updates – Chapters 5 & 6

Chapter 5 – Management Actions and Effectiveness Criteria

- Added LC&M 4.4: Assisted Migration through Connectivity Corridors
- Updated Action A&M 1.2: Implement Avoidance Buffers
- Updated LC&M 1: Identify Priority Conservation Lands
- Updated R&I 1.12: Investigate Assisted Migration
- Updated Effectiveness Criteria
- Updated Priority Management Actions for Management Units

Chapter 6 – Implementation

- Added 6.6.1: Conservation Fund and 6.6.2: In-lieu Fees
- Updated 6.5: Permitting and Regulations

Photo: Adobe Stock

Photo: Adobe Stock

WJTCP Updates – Appendices

Appendix E. CDFW Relocation Guidelines and Protocols

- Updated Guidelines (considerations, percentages, relocation area criteria, technical/legal limitations)
- Updated Protocols (siting, site visits)

Appendix F. Conservation Lands Prioritization Assessment

- Updated Climate Refugia criterion


Photo: National Park Service


Photo: Adobe Stock

THANK YOU!

Drew Kaiser, WJT@wildlife.ca.gov

Summary of Changes to WJTCP – April 2025

Global Changes

- Updated citation format.
- Updated picture captions.
- Removed references to "recent" research. Replaced USGS refugia reference from "forthcoming" to "unpublished data".

Chapter 1 - Introduction

- Minor clarifying language on the Fish and Game Commission's role: "approval" to "final action", "approve" to "approval".
- Updated "Tribal Outreach" to include February 2025 inter-Tribal community workshop in Joshua Tree, California.
- Updated "Public Outreach" to include March 2025 public workshop.

Chapter 2 – Planning Influences

- Added Antelope Valley Conservancy and Bureau of Indian Affairs (BIA) lands to Land Ownership table.
- Updated State Wildlife Action Plan information.
- Added short discussion (1 paragraph) on Water Districts in "Utilities and Special Districts".

Chapter 4 – Summary of Resources

- Asexual Reproduction
    - Added information on clonal growth habitat of western Joshua trees.
- Management Units
    - Predicted Climate Refugia
        - Added moderate- and high-emission scenarios to this category.
        - Added breakdown of total area, elevation, ecoregion (location), ecological integrity, and management jurisdiction for low-, moderate-, and high-emission scenarios.
    - Buffered Climate Refugia
        - Added moderate- and high-emission scenarios to area that is buffered.

Chapter 5 – Management Actions

- Action A&M 1. 2 – Avoidance Buffers
    - Included scientific references.
- Action A&M 2.2 – Minimize Impacts on Occupied Western Joshua Tree Habitat
    - Added discussion on low-conflict siting for large development projects

- Action A&M 2.4 – Collect and Store Seeds
    - Added minor clarifying language on where seed could be useful.
- LC&M 1 – Identify Priority Conservation Lands
    - Added language on protecting unoccupied future suitable habitat (short-distance, stepping-stone habitat).
    - Added emphasis on prioritizing moderate- and high-emission scenarios.
- LC&M 4 – Restore and Enhance Habitat
    - Added LC&M 4.4 – Assisted Migration through Connectivity Corridors
        - Added management action that suggests deliberate, short-distance (<2.5 km) movement of WJT to unoccupied future suitable habitat areas is likely to be valuable for conserving the species over the long-term.
        - Moving western Joshua trees short distances is less risky and would have a higher likelihood of success, especially if done in collaboration with Tribes and with adaptive management.
- R&I 1.12 – Investigate Assisted Migration
    - Added additional discussion of, and references to, assisted migration.
    - Edited the title for Figure 5.2, "Potential Assisted migration areas where natural migration is unlikely".
- Effectiveness Criteria
    - Updated to ensure criteria are objective and measurable, and assess the effectiveness of the management actions included in WJTCP.
    - Added moderate- and high-emission scenario areas that did not overlap with low-emission scenario areas (~2,000 acres).
- Priority Actions for Management Units
    - Added section on unoccupied future suitable habitat where species can naturally migrate. Recommended actions include avoiding impacts, preserving functioning ecosystem, and short-distance assisted migration.

Chapter 6 - Implementation

- Permitting
    - Added language clarifying that WJTCA, not WJTCP, authorizes WJT permitting.
    - Added clarifying language regarding other (non-WJTCA) WJT permitting.
- In Lieu Fees
    - Added discussion on the process for adjusting the fees set forth in WJTCA ("Rulemaking Process").
    - Acknowledgement that the in-lieu fees set forth in WJTCA may disproportionally affect low-income residents and single-family homeowners.

Chapter 9 - References

- Updated references to conform with California Fish and Wildlife Journal format.

Appendix E – Relocation Guidelines and Protocols

- Reorganized and made minor changes to improve clarity
- Updated Relocation Requirement Considerations
    - Simplified thresholds for when relocation will be required.
    - Included exemptions for single, single-family residential projects.
    - Reduced recommended relocation percentages.
- Updated title for "Adjustments to Required Number of Salvage Trees" (previously, "Requirements")
    - Added high-clonal growth and legal/technical limitations.
- Updated "Relocation Areas"
    - Included Selection Criteria:
        - In a naturally vegetation community that supports western Joshua trees;
        - Prioritize locations within 16 kilometers of the salvage tree's original location, but no more than 50 kilometers from the salvage tree's original location; and
        - Within 200 meters of the salvage tree's original elevation.
    - Clarified that assisted migration opportunities will be considered on a case-by-case basis where the Relocation Area is less than 2.5 kilometers from WJT occupied habitat.
- Added "Evaluation of Legal and Technical Limitations"
    - Included discussion of legal and technical considerations that may create impracticability for relocation.
- Updated "Siting"
    - Clarified that tree relocation activities should avoid existing western Joshua trees.
- Updated "Site Visits"
    - Clarified that site visits can be conducted by a technician with relevant experience in assessing the signs of western Joshua tree health; a Desert Native Plant Specialist is not necessarily required.

Appendix F - Conservation Lands Prioritization Assessment

- Refined Predicted Climate Refugia criterion to include heavier weight for areas in higher emissions scenarios.

April 2, 2025

California Fish and Game Commission
715 P Street
PO Box 944209
Sacramento, CA 94244

Re: Comments for Western Joshua Tree Conservation Plan

Dear Commissioners,

We are concerned scientists affiliated with the Ecology and Evolutionary Biology department at the University of California, Santa Cruz. We have expertise in California ecosystems and climate change. We appreciate the tremendous effort that has gone into the draft Western Joshua Tree Conservation Plan, and we urge the commission to consider the following comments.

1. Incorporate more realistic emissions scenarios to predict regional climate refugia

The IPCC's low-emissions scenario (SSP 2-4.5) is an overly optimistic projection. At present, the plan defines refugia as areas which will "continue to provide suitable habitat conditions…based on the low emissions scenario," and builds much of its prioritization scheme around these projections. For effective planning, the more probable moderate and high emission scenarios (SSP 3-7.0 and SSP 5-8.5) should be considered as well.

2. Prioritization should not automatically exclude areas with projected climatically suitable habitat loss

The draft plan gives lower priority to populations in areas projected to lose climatically suitable habitat under the low-emissions scenario – areas also frequently under high threats from development (WJTCP report p. 4-33, 4-40). However, populations within these areas may still be valuable and worth prioritizing. Consider the following examples:

a) Local refugia: While the current plan defines refugia as the climatically suitable habitat projected to remain within the existing range, a broader definition of refugia (e.g., McLaughlin et al. 2017) includes local environments *within areas projected to lose climatically suitable habitat* that may remain suitable for small populations because of landscape features that ameliorate water stress and temperatures (e.g., persistent groundwater availability). These local refugia can provide important remnant habitats.

b) Genetic resources: Trailing-edge populations (located within areas of projected climatically suitable habitat loss) could harbor high genetic variation and climate change-adaptive alleles (Rehfeldt et al. 2002; Matías et al. 2019; Klockow et al. 2020, Hampe and Petit 2005). Because these individuals are at the driest and warmest parts of their range, they may contain the genetic resources needed to help the species adapt to climate change in other parts of the range. Maintaining these populations could maintain the species' evolutionary potential.

c) Healthy adult stands: The western Joshua tree has a long lifespan (averaging 150 and up to 300 years, with some even longer estimates), and adults appear to be less climate-sensitive than seedlings. Without severe fires, current healthy adult stands could persist into the foreseeable future, even if they are no longer reproductively viable, and support cultural and biodiversity values, genetics conservation, and ecosystem structure and function.

3. Recognize the importance of facilitated dispersal

Projected climatically suitable habitat loss under realistic climate scenarios, and western Joshua tree's low natural dispersal indicate the likely necessity of facilitated dispersal (assisted migration). The

draft plan discounts facilitated dispersal as prohibitively costly and logistically complex, in favor of prioritizing projected refugia. However, under more realistic emissions scenarios, there will likely be little remaining suitable habitat within the current distribution. The draft plan cites Ricciardi and Simberloff (2009) on ecologists' concerns around assisted migration. However, since this publication, the field of climate change ecology has developed considerably. Assisted migration is now a frequently recommended strategy by scientists for climate-adaptive management of high climate-risk species (McLaughlin et al. 2022a). In collaboration with tribal partners, it is urgent to begin the process of facilitated dispersal. Experimental plantings in newly climatically suitable habitat could offer opportunities to refine facilitated dispersal strategies, validate projected future habitat suitability, and support genetic rescue for declining populations (e.g. McLaughlin et al. 2022b).

4. Prioritize research on groundwater

Western Joshua tree is identified as a phreatophyte (Lichvar and Dixon 2007), however there is little research on the species' use of groundwater, whether groundwater can buffer climate change impacts (groundwater refugia), or sustainable levels of extraction to allow for continued support of this groundwater dependent ecosystem. If groundwater is buffering western Joshua trees from the impacts of climate, development impacts could include both direct take and increasing groundwater loss.

5. Expand effectiveness criteria

Habitat suitability analyses provide our best understanding of potential future ranges of western Joshua tree, but these predictions may be modified in light of actual range shifts, dieback, survival and recruitment, or on updated understanding of western Joshua tree physiology, and/or local effects of future climate change (as noted in Section 5.3.1, Effectiveness Criteria for Conservation). Therefore, the plan should include provisions for monitoring demographic trends, enabling an adaptive management response, with regularly updated critical thresholds.

6. Prioritize recruitment and nurse trees

Given the value of nurse plants for regenerating western Joshua trees (WJTCP report page p. 5-10), mature trees or other plants that act as nurse plants for recruits should be prioritized. Suites of adult nurse trees and recruits also should have a higher buffer of protection than trees that are not nursing seedling recruitment. In addition, healthy juveniles should be prioritized similarly to adult trees since they may have already been selected for success in a changing climate, and since they represent the future of the species.

The draft plan is an important step toward incorporating climate change into conservation planning for western Joshua tree. In closing, we emphasize the importance of incorporating more realistic emissions scenarios, the need to begin facilitated dispersal and the potential value of stands in projected areas of loss. We also recommend increasing research on groundwater interactions with climate change, expanding the effectiveness criteria to include regular monitoring, and prioritizing recruitment and nurse trees.

Respectfully,

Dr. Ioana Anghel, Postdoctoral Scholar, UC Santa Cruz
Kat Bernier, Graduate Student, UC Santa Cruz
Dr. Paige Kouba, Postdoctoral Scholar, UC Santa Cruz
Dr. Blair McLaughlin, Researcher, UC Santa Cruz
Kelly Zilliacus, Specialist, UC Santa Cruz

References:

Hampe A, Petit RJ . (2005). Conserving biodiversity under climate change: the rear-edge matters. Ecology Letters 8:461–467

Klockow, P. A., Edgar, C. B., Moore, G. W., & Vogel, J. G. (2020). Southern pines are resistant to mortality from an exceptional drought in east Texas. Frontiers in Forests and Global Change, 3, 23.

Lichvar, R., & Dixon, L. (2007). Wetland plants of specialized habitats in the arid West. https://apps.dtic.mil/sti/tr/pdf/ADA469459.pdf

Matías, L., Pérez-Ramos, I. M., & Gómez-Aparicio, L. (2019). Are northern-edge populations of cork oak more sensitive to drought than those of the southern edge?. Environmental and Experimental Botany, 163, 78-85.

McLaughlin, B.C., Ackerly, D.D., Klos, P.Z., Natali, J., Dawson, T.E. and Thompson, S.E., (2017). Hydrologic refugia, plants, and climate change. *Global change biology*, *23*(8), pp.2941-2961.

McLaughlin, B.C., Skikne, S.A., Beller, E., Blakey, R.V., Olliff-Yang, R.L., Morueta-Holme, N., Heller, N.E., Brown, B.J. and Zavaleta, E.S., (2022a). Conservation strategies for the climate crisis: An update on three decades of biodiversity management recommendations from science. *Biological Conservation*, *268*, p.109497.

McLaughlin, B., Fogg, A., Ennis, K.K., Halstrom, G., Herrera, A. and Quadri, P., (2022b). Climate change-adaptive participatory field gene banking for a California endemic oak. *Restoration Ecology*, *30*(5), p.e13573.

Rehfeldt, G. E., Tchebakova, N. M., Parfenova, Y. I., Wykoff, W. R., Kuzmina, N. A., & Milyutin, L. I. (2002). Intraspecific responses to climate in Pinus sylvestris. Global Change Biology, 8(9), 912-929.

CALCIMA

California Construction and Industrial Materials Association

April 1, 2025

Erika Zavaleta
President
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814

RE: April 16-17 Agenda Item 14: Western Joshua Tree – Draft Conservation Plan

Dear President Zavaleta,

CalCIMA appreciates the opportunity to provide continued feedback on the Draft Western Joshua Tree Conservation Plan (Plan) to the California Fish and Game Commission (Commission). We look forward to receiving a complete western Joshua Tree Conservation Plan which we will be able to submit final comments and analysis of prior to the Summer. We look forward to working with the Commission and the Department to ensure we achieve the legislature's vision of the Plan and Act, a vision best expressed by Assemblymember Juan Carrillo on the Assembly Floor as SB 122 was voted upon:

> "*This bill is not just about preservation of a remarkable species, it is a testament to the ability to strike a delicate balance between safeguarding our natural heritage and providing a pathway for the much needed economic development that our district yearns for.*"

We have expressed many comments in our previous comments and we have attached our comments from March 3rd, 2025 as well as our comments from January 30, 2025. These letters highlight our many concerns and requests for clarity and a complete plan. As indicated in our March 3rd letter, we feel this meeting needs to give the public clarity on which climate refugia map and territory will be used. In addition the plan needs to explain why the various effectiveness criteria provisions included within the plan are necessitated by the science described in the plan. In order to comment effectively we need to get to a complete plan and further we need all of the resource data we were to have during the stakeholder process.

455 Capitol Mall, Ste. 210 | Sacramento, CA 95814 | (916) 554-1000
3890 Orange Street, Suite 167 | Riverside, CA 92501 | (951) 941-7981

In order to review the plan we also need to have the complete report required by Fish and Game Code 1927.7 which will provide the commission and stakeholders invaluable information on actual implementation of the act including;

1. Number of permits issued
2. Number and sizes of trees authorized for take
3. Number of trees lethally removed
4. Number and location of western Joshua Trees relocated
5. Number and location of WJT Woodlands developed
6. Type, scope and scale of mitigation undertaken by permittees
7. Number and location of WJT woodlands conserved
8. Quality of the acres conserved
9. Amount of fees paid

Currenlty based on information released by the department we know at least 44 permits were applied for from a 2023 press release. In the 2024 release we were told over 25 WJTITP's have been issued, but we still don't have the breakdown of the items above to assist in the evaluation of the plan to actual successful and implementable permits that have been issued. Were more permits applied for, why aren't all 44 issued as this was streamlining using an in-lieu fee and it is 2025, two years after those first applications? That doesn't appear to be keeping with the intent of the legislature in adopting the WJTCA and is an indication something may be improper in the procedures as it isn't meeting the goal of providing a pathway for economic development.

CalCIMA strongly believes stakeholders need adequate time, between 60 and 90 days with a complete Western Joshua Tree Conservation Plan and underlying essential state data and justifications for effectiveness criteria, in order to provide deliberative comments and considerations for your final consideration before adoption. We hope at the conclusion of April's meeting we will know when we will receive such a document.

We encourage the Commission to ensure stakeholders have access to the resources and documents the legislature intended in order to help ensure fair deliberations. We look forward to being able to provide comments and debate effectiveness criteria based upon the department and commissions explanation of why such criteria are considered necessary.

Adam Harper
Senior Director of Policy
CalCIMA

CALCIMA

California Construction and Industrial Materials Association

March 3, 2025

Charlton “Chuck” Bonham
Director,
California Department of Fish and Wildlife
715 P Street
Sacramento, CA 95814
Via: WJT@wildlife.ca.gov

Erika Zavaleta
President
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814
Via: fgc@fgc.ca.gov

Re: Comments WJT Conservation Plan – CalCIMA – {electronically delivered)

Dear Director Bonham and President Zavaleta;

In light of the February 12, 2025 Commission meeting on western Joshua tree (“WJT”) and the deliberations and discussion which occurred relating to the draft Western Joshua Tree Conservation Plan ("Plan"), CalCIMA wanted to add these comments to the discussion as the Plan process heads towards workshops, meetings, and the April commission meeting. The draft Plan has a long way to go to being a complete plan suitable for approval. We are committed to the development of a Plan which properly uses the Legislature's in-lieu fee system to protect the species while also enabling and facilitating project permitting: a structure clearly intended by the Legislature under the Western Joshua Tree Conservation Act ("Act"). We believe the dual purposes of the Act can be met, and we commit to providing methods and examples of structures from our members’ collective experience that the Commission and Department can use to do so. Including by detailing how the plan does impact, interface, and effectively control western Joshua tree incidental take permit ("WJTCA ITP") process if it is adopted as specified by the Legislature and Governor.

The Plan before the Commission is Incomplete

There are ***multiple*** elements within the Plan which are incomplete. For example, the Plan submitted for review provides no justification for the effectiveness criteria selected and therefore does not

demonstrate how it is protecting the WJT from becoming listed under the California Endangered Species Act. We hope that the Department and Commission justify the standards using the scientific data.

The Plan also doesn't have an accurate climate refugia map that affected stakeholders can use to see if their property is impacted and scheduled to be effectively taken by the Department's proposed action. Unilaterally declaring that around 90% of private property inside the refugia is necessary to meet the Plan objective necessitates that landowners who's lands have been identified by the Department for acquisition and/or Department management have, 1) access to meaningful maps, 2) enough time for substantive review, and 3) understand potential impacts to their lands proposed by the Department, 4) an opportunity to meaningfully collaborate with the Department and Commission and other stakeholders. Stakeholders and affected landowners have yet to have that opportunity and, as a result, the Department clearly missed the December 2024 deadline to present a complete Plan before the Commission. No Plan was Agendized and presented at the Commission meeting on December 11-12, 2024. Simply listing it on the agenda under the public receipt of documents and noting it would be heard at future meeting was not sufficient. Following the February 12 meeting, it is now clear that we won't have a complete plan until April at the earliest because the Department and Commission are not aligned on which refugia scenario to use and have not even addressed the other incomplete portions of the Plan.

Below we highlight key sections of the Plan approval process that empower the Commission to oversee this process, as well as oversee the Department's implementation of permitting by properly ensuring the development and application of appropriate avoidance mitigation and relocation protocol guidance documents.

> "1927.6. (a) The department shall develop and implement a western Joshua tree conservation plan in collaboration with the commission, governmental agencies, California Native American tribes, and the public. The conservation plan shall incorporate a description of management actions necessary to conserve the western Joshua tree and objective, measurable criteria to assess the effectiveness of such actions. The conservation plan shall also include guidance for the avoidance and minimization of impacts to western Joshua trees and protocols for the successful relocation of western Joshua trees. The department shall present a complete draft conservation plan at a public meeting of the commission, for its review and approval, by December 31, 2024. The commission shall take final action on the conservation plan by June 30, 2025. The department and commission shall, if necessary, periodically update the conservation plan to ensure the conservation of the species." (emphasis added).

President Zavaleta's BAU Climate Refugia Vs. Department Climate Refugia

Given the differing views of the Commission and the Department, CalCIMA encourages the Commission, and particularly President Zavaleta to participate in the Department's workshops between now and the Commission's approval of the Plan to ensure necessary collaboration between Department and Commission. The ongoing refugia issue underscores that not enough collaboration between the Department and Commission has occurred. Additionally, it is essential to know which climate refugia area we are discussing: the Cole 2011 BAU or the yet to be released federal Climate Refugia Map, which the Department prefers. Fundamental due process demands that Stakeholders be provided maps with sufficient detail to track property ownership and anticipated impacts so that stakeholders know they are stakeholders and that their lands are in jeopardy of being declared vital western Joshua tree habitat.

Agreeing upon a climate refugia model should be achieved before or at the April Commission meeting. CalCIMA believes Commission President Zavaleta has the proper recommendation.

While the Commission briefly discussed the moral concerns of terraforming within the Plan, our current conservation challenges require evolution and change; not stagnation. It is time we moved past the stale vision of the western biologic community that nature must be frozen in the position first sketched on a notepad by a colonist getting off a boat claiming ownership of land, animals, and plants for crown and king.

Climate change reality dictates we must accept evolution occurs particularly in our policies of preservation and conservation, including migratory evolution of region based on climactic factors. The Commission and Department's mission is to draft a Plan that prevents the WJT becoming listed. Where scientific evidence indicates that the identified climate refugia are the only places that the species will survive and breed, that information will be necessary to meet the legislatures direction. It is the Legislature's and Governor's domain to adopt the Act to preserve the species and facilitate in-lieu permitting in a manner that "traditional" conservation methods do not stall economic development and adaptation. The Plan must adequately reflect this reality.

The Plan Is All About WJTCA ITP Permitting Criteria

At the February Commission meeting, concerns were expressed regarding the state of WJT incidental take permitting ("WJTCA ITP") under the Act. The Commission pondered that they may have no say in the Department's implementation of WJTCA ITP. The Commission's concern is not accurate, based on the Legislature's clear directives.

The Plan incorporates WJTCA ITP processes, and therefore the Commission, as final approval body, has broad authority over WJTCA ITPs, particularly in the development of all significant criteria, from avoidance and mitigation to relocation protocols, for the in-lieu fee program.

This in-lieu fee program is an alternative to a project developer being required to acquire conservation land and fund an endowment themselves before starting the project. Enabling vital projects, such as housing, infrastructure, flood safety, fire safety, and energy development to occur quickly, is a central goal of the Act.

The Plan impacts permitting criteria by establishing the avoidance and minimization criteria. And while the Plan does contain discussion of avoidance and minimization measures, as required, it doesn't show or provide the scientific data necessary to support the identified measures, such as a 50 feet buffer to protect roots at the base of the tree (which uses inconsistent data from multiple species, rather than observable WJT data) nor does it appear to recognize the Legislative mandate that When various measures are available to meet this obligation, the measures required shall maintain a WJTCA ITP permittee's objectives to the greatest extent possible.. Properly evaluating and vetting the information in the Plan, and ensuring its accuracy, is well within the Commission's jurisdiction.

The Commission, by exercising its authority over the Plan, can define the scope of avoidance and mitigation measures that can be implemented during the WJTCA ITP process while maintaining the CA Legislature's direction to protect a permittee's objectives when applying for a WJTCA ITP.

The Plan Determines Cost and Fees Paid By Permittees

The Plan will determine the program cost and the Commission needs to provide careful oversight of the Department's proposed permitting and associated costs. The data we shared in our initial comments is that permitting fees are currently approximately a billion dollar "voluntary fee" a year imposed on development in the Plan area. That is based on published CESA ITP costs for western Joshua Tree being nearly twelve thousand an acre and targeting between 3% and 5% of Joshua tree range be conserved every 2 years. That estimated cost, however, cannot be readily translated into a per tree fee because the Department has not yet shared any data on permitted takes under the WJTCA ITP. They missed the legislatively mandated deadline of January 2025 to provide the Legislature and Commission that detail which would have helped inform this process.

> "1927.7. (a) Beginning in 2025, by January 31 of each calendar year, the department shall submit an annual report to the commission and the Legislature assessing the conservation status of the western Joshua tree, including, but not limited to, by detailing the number of permits issued, the number and size class of western Joshua trees authorized to be taken, the number of western Joshua trees lethally removed, the number and location of western Joshua trees relocated, the number and location of acres of western Joshua tree woodlands developed, the type, scope, and scale of mitigation measures undertaken by permittees, the number and location of acres of western Joshua tree woodlands conserved, the quality of the acres conserved, the amount of fees paid, the amount of all expenditures from the fund, the projects and actions funded by expenditures from the fund, the adequacy of the fees to conserve the western Joshua tree, actions taken pursuant to the conservation plan, and other relevant information. The department's annual report shall summarize the information provided by counties and cities pursuant to agreements entered into pursuant to subdivision (c) of Section 1927.3 and subdivision (b) of Section 1927.4. (emphasis added).

Timely providing this data, just a month after the first mandated public presentation of the Plan in December of 2024, is essential to appropriately informing the immediate discussion of the fundamental criteria in the Plan, as well as evaluating the projected economics of Plan implementation. Without data on permits issued, relocation achieved, the type, scope, scale of mitigation measures and associated costs implemented by permitees, it is difficult to effectively inform the development and maintenance of the Plan's criteria. The report must be provided, with sufficient time for evaluation and public comment, before the Commission approve the Plan.

The Data we submitted in our initial comments indicates the current draft Plan would cost approximately $1 billion a year to implement. The Plan, targets between 97,000 and 161,000 acres every 2 years for land acquisition. We believe the Commission should focus carefully on cost to implement, potential fees and that impact on the dual purpose of the act. Carefully defining acquisition lands between efforts to forge federal partnerships and identification of what private lands will be sought for voluntary acquisition is one way to narrow the fee debate on these lands. We also believe the plan should clearly note that it will only seek voluntary partners for land acquisition.

Missing Legislative Deadlines

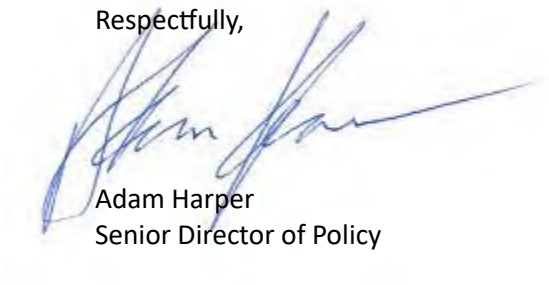
Finally, we wish to emphasize the need to timely provide necessary information to the public and the Commission during this process. While we agree missing legislative deadlines should not be planned for, it does happen. The Department has clearly missed multiple legislative deadlines: to provide a

comprehensive report to the commission and legislature on actions under this Act and providing a complete plan for the Commission's review in 2024.

We believe trying to meet the Legislature's deadline is good and we are committed to the effort. But if we don't get there, particularly because of delays in the availability of necessary information, we hope the Commission is also willing to miss this deadline. Adopting a broken plan could be a significant cost, and inhibitor, for both development and species conservation. Getting it right matters!

We look forward to participating in workshops to clarify and improve the draft. We also appreciate and the efforts of the department reflected in the Draft in front of us, but perhaps the historic scope of this project was more than anticipated.

Respectfully,



Adam Harper
Senior Director of Policy

CALCIMA
California Construction and Industrial Materials Association

January 30, 2025

Samantha Miller
President
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814

RE: Western Joshua Tree – Draft Conservation Plan – Initial Comments

Dear President Miller,

CalCIMA appreciates the opportunity to provide feedback on the Draft Western Joshua Tree Conservation Plan (Plan) to the California Fish and Game Commission (Commission). Ensuring the conservation of this iconic species is an important undertaking as is realizing the significant promise of the Western Joshua Tree Conservation Act, this was perhaps best expressed by Assemblymember Juan Carrillo on the Assembly Floor as SB 122 was voted upon:

> "*This bill is not just about preservation of a remarkable species, it is a testament to the ability to strike a delicate balance between safeguarding our natural heritage and providing a pathway for the much needed economic development that our district yearns for.*"

The dual functions of this Act were clearly expressed; namely, to preserve the iconic western Joshua tree from climate change while enabling local economic development.

CalCIMA strongly supports both missions and with the Legislature and Governor's bold action we should recognize the western Joshua tree is no longer conceivably threatened or endangered. It should also be recognized that drastic actions are not necessary, but the plan does not seem to reflect that and is seeking to place over 479,000 acres into durable conservation by 2033[1] despite the tree currently occupying over 3.23 million acres including 1.8 million acres of ecologically core and ecologically intact habitat, equal to 25% of the total developed acres of humans in California. We

[1] Appendix II – Table II – Calculation of effectiveness criteria 2 Acreage from Table 4-10 Conversion

455 Capitol Mall, Ste. 210 | Sacramento, CA 95814 | (916) 554-1000
3890 Orange Street, Suite 167 | Riverside, CA 92501 | (951) 941-7981

also believe the Plan is incomplete and therefore deficient. And finally, we have several innovative suggestions to preserve the tree and promote local opportunity. We discuss these issues at length in this letter.

Background

CalCIMA is the statewide voice of the construction and industrial materials industry. With over 500 local mines, production plants, and facilities throughout the state, producing aggregate, concrete, cement, asphalt, essential minerals, and precast construction products, our members produce the natural materials that build our state's infrastructure, including public roads, rail, and water projects; homes, schools and hospitals; they assist in growing crops and feeding livestock; and play a key role in manufacturing consumer products.

The continued availability of our members' materials is vital to California's current and future economy and environment, and local sources of these materials are essential to reducing the supply chain emissions of manufacturing and delivering the technologies we will need for a climate-smart future as well as building our homes and transit systems.

The Western Joshua Tree Conservation Plan area covers all or most of three aggregate production-consumption regions in California. The three regions are expected by the State Geologist to consume 1.6 billion tons of construction aggregate to meet human natural resource demands over the next 50 years and only 436 million tons of these vital natural resources are currently under permit[2]. We offer some specific ideas regarding improving mineral resource conservation and development for society within the mission of the conservation plan later.

The Conservation Plan is incomplete.

The legislature gave the California Department of Fish and Wildlife (CDFW) and the Fish & Game Commission a clear mandate with precise criteria. They gave direct guidance on the scope of the conservation plan in two parts. First, they defined conservation and next they specified the types of actions which would be taken within the required conservation plan. The legislature and governor defined Conservation as,

> *""Conserve" or "conservation" means to use, and the use of, methods and procedures that are necessary to bring species listed pursuant to Chapter 1.5 (commencing with Section 2050) of Division 3 to the point at which the measures provided pursuant to Chapter 1.5 (commencing with Section 2050) of Division 3*

[2] Map Sheet 52 (Updated 2018), Aggregate Sustainability in California, (Table 1 Data for; Barstow-Victorville P-C region; Palmdale P-C Region, and San Bernardino P-C Region) California Geological Survey, 2018.

are no longer necessary, and for species that are not listed to maintain or enhance the condition of the species so that listing will not become necessary.[3]"

The legislature recognized that the western Joshua tree is both 1) only a candidate species, and 2) CDFW recommended NOT Listing. The definition therefore provides clear instruction that the conservation plan for the western Joshua tree must describe "***the means to use, and the use of methods and procedures that are necessary to maintain or enhance the condition of the species {western Joshua Tree}, so that listing will not become necessary***" while also providing authorities should the Commission list. That is the purpose and objective of the conservation plan as clearly defined by the legislature. Further under Sec. 1927.6, the Conservation plan was specified as using these methods,

"The department shall develop and implement a western Joshua tree conservation plan in collaboration with the commission, governmental agencies, California Native American tribes, and the public. The conservation plan shall incorporate a ***description of management actions necessary to conserve the western Joshua tree*** *and* ***objective, measurable criteria to assess the effectiveness of such actions****. The conservation plan shall* ***also include guidance for the avoidance and minimization of impacts to western Joshua trees*** *and* ***protocols for the successful relocation of western Joshua trees****. The department* ***shall present a complete draft conservation plan at a public meeting of the commission, for its review and approval, by December 31, 2024****. The commission shall take final action on the conservation plan by June 30, 2025. The department and commission shall, if necessary, periodically update the conservation plan to ensure the conservation of the species."*

Unfortunately, the plan was not complete as provided to the Commission and as a result analysis of its methods and procedures are difficult and it is challenging to determine feasibility of the plan before the Commission. Incomplete aspects of the Plan include:

1. The Plan does not define what condition of the WJT population and/or distribution of the WJT in California would maintain the current CDFW recommendation that the species need not be listed. For example, how many WJT, distributed how broadly, and in what regions?
2. The Plan fails to define the primary effectiveness criteria level in measurable terms only stating generally, "*Global greenhouse gas emissions are reduced to a level that ensures the species is not at risk of extinction from climate change impacts in California.[4]*"
    a. This statement is not a method, procedure, or measurable.

[3] Fish and Game Code §1927.1 (c)

[4] Draft Western Joshua Tree Conservation Plan, California Department of Fish and Wildlife, P 5-45

3. Key property acquisition criteria rely extensively on information not available to reviewers (Shyrock et al. forthcoming.) and cannot be peer reviewed.
4. The unavailable information shapes Tables 4-9 to 4-12 and is used to set effectiveness criteria, and defines the Climate Refugia CDFW wants to acquire 90% of by 2033 – (Over 479,000 acres).
5. The Plan fails to provide the Commission with background information on ongoing western Joshua tree ITP permitting and effectiveness in WJT conservation. For example, the volume of acres and trees and take fee generated income received to date.
    a. The Plan is financed by the ITP fee's, and such data is vital to analysis of Plan scope and implementation feasibility by the Commission. It is currently the only identified income for the program and should be provided to the Commission, so the Commission is aware of what financial resources are available to the Plan.
6. The Plan fails to include estimated costs and resource requirements of implementing the Plan. In **Appendix IV** we provide a list of 50 duties the Department takes upon itself in the Plan and the memorandum of understanding (MOU'), if enabled, would add many more. At this time the Commission does not have the information needed to quantify, or evaluate, the financial burden these new costs will impose upon the Department.
7. We are getting our first public discussion and explanation two months late in February 2025 not December 2024.
    a. Final adoption should be extended **at least** 2 months to ensure full review and comment and to ensure the Department, Commission, and stakeholders get a complete Plan with all detail for review and comment

Due to this incomplete data, the Commission currently lacks the information necessary to complete the task delegated to it by the legislature, namely, approving a conservation Plan using measurable criteria and providing guidelines to prevent the western Joshua tree becoming a listed endangered species under CESA. Clear measurable guidelines enable advanced planning, adaptation and help the region enable economic opportunity. Unclear or infeasible guidance may result in delay, uncertainty and economic harm on development and the species. We need a clear objective that is defined and measurable and achievable by Californians. The legislature recognized this and required a complete measurable plan be submitted by CDFW. We recommend seeking clarity from the department on these issues before proceeding. Further, you must verify CDFW has the capacity, finances, and resources to implement the Plan. Or the unmet objectives could become obstructions to permitting and preservation.

No Demonstrated Capacity to Implement Plan

A significant reason the state ended up with a Western Joshua Tree Conservation Act instead of managing the species under the California Endangered Species Act (CESA) was due to the Department's statements to the Commission and the legislature that they lacked the resources to manage the western Joshua tree as a traditional species under CESA. This was because of the tree being "widespread and abundant[5]". Commissioners discussed and expressed concerns and hopes for another way as well. As noted during the petition review, Director Bonham stated,

> "*I'd be remiss, it's not I think a criteria for you per se but the practical effect of a listing here for the department is pretty enormous at the workload level, because unlike other listings it is a species with right now abundance in the millions across a large range. That will create practical challenges."*

The Plan before the Commission requires significantly more capabilities and resources of the Department than traditional CESA does. In Appendix IV we attach a list of 50 different mandates and roles that CDFW is assigned within the Plan, not even considering what mandates and authorities they may take upon themselves in a MOU with an agency or tribe. Further, the counting of 1-inch sprouts as well as the Department's hyper focus on western Joshua tree relocation appears to have made this act's permitting system at least as complex as the traditional CESA system. We know of no incidental take permit issued yet in the new method although urgent hazard permits have been. Incidental take permits issued under the new system should be provided to the commission and public and uploaded to the document library for transparency. Finally, under this Plan the department is seeking to evaluate and acquire tens to hundreds of thousands of acres of durably protected lands annually. Which is far more than the 3,136 acres of compensatory mitigation we found in 21 CESA incidental take permits issued over 3.5 years. In short, the Plan requires far more resources from the Department than a CESA managed program would.

Further, the potential cost of the extensive planned CDFW acquisitions should be a concern to the Commission. CalCIMA reviewed 21 single species covered ITPs issued under CESA regulations between 2022 and 2024, which were uploaded to the CDFW Document Library[6]. Our analysis is included as Appendix I, with results summarized in Table 1. We focused on single species ITP's as they facilitate knowing impact and mitigation acreages as they apply to the specific species. While we could identify CESA ITP permits we were not able to identify a single WJT ITP issued to a permittee under the new act. We would presume some of the 44 applications noted as having been filed in the 2023 annual report should have been processed by now[7]. The summary of the analysis is in Table 1.

---

[5] Report to the Fish and Game Commission Status Review of the Western Joshua Tree, CDFW 2022 P. 54

[6] https://nrm.dfg.ca.gov/documents/DocViewer.aspx

[7] Western Joshua Tree Conservation Updates, CDFW, Feb 2, 2024

Table 1: Totals - Single Covered Species Incidental Take Permits for Western Joshua Tree (2022-2024)

Total WJT Permits	Total WJT Acres Impacted	Total WJT Acres Compensated	Ratio	Total Security Cost	Security Cost Per Compensated Acre
21	1187.81	3136.98	2.64 to 1	$37,414,282.72	$11,926.87

If we apply those security costs and per acre costs to the anticipated acreage acquisitions in the Plan that CDFW has proposed, acquiring 3-5% of western Joshua tree range annually results in acreage targets of between 97,000 and 161,000 acres annually with a potential cost of $1.1 billion to $1.9 billion. This seems to be outside the capacity of funding from permitting impacts to trees. Real, achievable, and feasible targets are needed in the Plan. The Plan fails to demonstrate a need for these vast acreages.

As we reviewed the Plan, we saw opportunities for innovation and use of existing resources to promote the western Joshua tree's well-being. As we view the Act, the legislature defined a finite task–to plan to prevent the Joshua tree becoming listed as a species under CESA. Considering the trees' abundance, broad range and long life, the Plan should not require drastic action to prevent the tree from becoming a threatened species.

The department seems to prioritize taking private and multi-use lands allocated for human uses and entering into MOUs rather than focusing conservation on already public and conserved lands and tracking the implementation of guidelines into plans by agencies. Considering the strength of the western Joshua tree as detailed within the Plan we think the latter approach–conservation and monitoring under current authorities--is preferred. Our table 2 converts the CDFW percentage data in table 4-9 to acre data to demonstrate how much land is already protected for the tree. The Department identified 740,000 acres as in areas with land protections using the total of wilderness lands and those with preservation and light recreation[8]. This ignores Defense lands governed by the Sikes act which the Plan specifically notes includes a 52,000 acre maintained woodland and total over 572,000 acres[9]. For comparison the city of Los Angeles land area is just under 300,000 acres.

Table 2: Conversion of Draft Table 4-9 "Percent of Western Joshua Tree Range in California within Conservation Value Categories by Management Unit" to Acres

[8] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 4-62)
[9] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 2-27)

	Ecologically Core (Acres)	Ecologically Intact (Acres)	Moderately Degraded (Acres)	Highly Converted (Acres)	Not Categ (Acres)	Total (Acres)
Little or No Protection	97,023.36	206,983.17	468,946.24	294,304.19	84,086.91	1,148,109.76
Mixed Use	142,300.93	326,645.31	61,448.13	3,234.11	249,026.62	779,420.99
Defense	336,347.65	181,110.27	42,043.46	9,702.34	-	572,437.82
Wilderness	119,662.14	203,749.06	3,234.11	-	135,832.70	459,243.90
Preservation with Light Recreation/Other Use	109,959.81	97,023.36	22,638.78	3,234.11	38,809.34	271,665.41
Tribal Land	-	3,234.11	-	-	3,234.11	3,234.11
Total	805,293.89	1,018,745.28	595,076.61	310,474.75	504,521.47	3,233,820.93

We know the Commission understands the reality of climate change. We are in the most significant transition of society in human history and the cost of the accelerated transition of energy is going to be enormous and stretch our society to the breaking point. The only way political support is maintained for direct action in a democracy is making the costs of the transition economically bearable by the population. Applying mandates that cost millions and generate climate emissions for no reasonably foreseeable benefit is harmful to the mission of the Commission and preservation of the Joshua tree and should therefore be avoided. This Plan is applying the costs of climate change to the public of California. Future homeowners, workers and energy consumers will pay in the cost of development. Help mitigate those climate costs.

CalCIMA commissioned an economic analysis of the potential cost impacts of SB 122 and the western Joshua tree Conservation Act on our sector back in 2023. The analysis found that the impact of the law was likely to increase construction aggregate (rock and sand), costs on state and local government for infrastructure by between $130-$170 million annually[10]. And that's rocks not renewable energy. The Plan

[10] Impact of SB 122 Western Joshua Tree Provisions in Aggregate Mining Operations and the Economy, Capitol Matrix Consulting Williams/Genest – October 2023

impacts three significant aggregate production and consumption regions. Added material costs won't only impact on the cost of developing infrastructure but costs to build and maintain homes, hospitals and workplaces. Natural resources, energy, minerals, food, and water are the foundations of our human well-being and productivity.

This issue is especially critical to minerals and renewable energy as we need to enable the new energy systems of the future to develop. California has deposits of all 50 critical minerals and the regions covered by the plan are mineral rich areas. Inhibiting development could deprive our economy of the opportunity to be a economic leader in new energy materials and manufacturing by inhibiting permitting and development of the natural resources necessary to develop those sectors.

Knowledge Derived from Plan Regarding western Joshua Tree

As we reviewed the Plan we were again struck by the vast acreage and range of the western Joshua tree detailed above, as well as other information.

- There are currently 1.8 million acres of Ecologically Core and Ecologically Intact western Joshua tree habitat[11] = equal to 25% of the total human developed land[12] in California.
- The Plan predicts a climate refugia in the reasonably foreseeable future of 756,000 acres representing an area 2.5 times the City of LA's land area and 23% of current Joshua tree habitat area and equivalent to 11% of lands currently developed by humans in California.
- Approximately 22.6 percent of the western Joshua tree range (740,000 Acres) in California is within areas that already have land protections and are being managed for conservation[13].
- Approximately 36.4 percent of the predicted climate refugia category is within areas that already have land protections in place and are generally being managed with conservation in mind[14].
- There are currently 572,000 acres of Defense lands within the range of western Joshua tree.
- Edwards Air Force Base maintains an INRMP for 52,719 acres of Joshua tree woodland under the Sikes Act[15] and operates a planting program.

[11] Appendix 3 – Table 4-9 Conversion to Area and Analysis – CalCIMA 2025

[12] California's Nature-Based Solutions Climate Targets, Administration of Governor Newsom, (pg. 22) April 2024

[13] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 4-62)

[14] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 4-64)

[15] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 2-27)

- Edwards has identified all Joshua trees over 3 meters and reports that populations are stable and increasing[16].
- In addition, Yoder et al. (2024) found that the median interval between flowering years has decreased from historical (i.e., early 20th century) levels of flowering every 5 years to every 4 years[17].
- The Plan discusses extensive use of the western Joshua tree by Native Americans over thousands of years as a material and food[18].
- Joshua tree roots were harvested selectively by tribes and collected in batches to provide rest periods for the plants[19].
- Pruning and cutting plants are strategically done to enhance plant growth as well (Anderson 2005, 2018)[20].
- The density observed in Joshua tree woodlands suggests that Joshua trees were stimulated to grow in the desert, especially near culturally important sites (Stoffle et al. 1989, 98; Stoffle et al. 2022, 23)[21].
- There are documented accounts of Native Americans saving the seeds of agave, yucca, and desert fan palms and planting them in specific locations within the Mojave Desert, demonstrating the integral nature of plant cultivation in Native American cultural systems.[22]
- Joshua tree is abundantly present and has a wide habitat range in the desert Southwest because of this skillful knowledge and practice. The sustainability of Native American practices allows natural vegetation and human inhabitation of the landscape to coexist[23].

We select these facts and quotes from the Plan as evidence of the range and resiliency of the Joshua tree both currently and in the reasonably foreseeable future. There is a reason the Department did not recommend listing and the Commission has not acted on the petition. Listing isn't justified on these facts and population alone.

In addition, we selected those that demonstrated the extensive use and resiliency of western Joshua tree to human interaction, including those that indicate symbiotic benefits to the tree and humans from the interaction. They speak to the potential for innovative management and programs. They clearly demonstrate that low level human

---

[16] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 2-28)
[17] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 4-24)
[18] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-4 to 3-6)
[19] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-6)
[20] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-8)
[21] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-10)
[22] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-10)
[23] Draft Western Joshua Tree Conservation Plan, CDFW December 2024 (Pg 3-11)

impacts, including agriculture and other land uses, do not harm the species and may even enhance and spread it. It demonstrates that our agricultural expertise can also be utilized to improve the species' condition.

Those facts open the door to substantial innovation within the Plan and indicate there is no need for criteria targeting the purchase and creation of hundreds of thousands of additional acres of conserved lands. The Plan identifies vast conserved lands already occupied by the trees. Further, science establishes it will take centuries if not millennia for Joshua tree range to shrink due to climate change. The data proves human agricultural practice, traditional ecological knowledge (TEK) in this instance, and use can benefit or at least not harm the tree. Finally, the state has decided to conserve the tree actively, not just protect it from harm. More than TEK, items like genetics will inform management and restoration establishment activities.

The tree isn't threatened under these facts, and we don't need a massive Plan to ensure it doesn't become threatened. The target the legislature and governor gave CDFW, and the Commission doesn't require drastic action. We can undertake steps to manage the climate, and fire threats the Plan identifies as the species' primary threat. We can provide guidance for local agencies to include in policy as directed by the legislature. These include science and activities such as, determining which tree populations handle predicted climates and ranges best, identifying whether relocation or planting is best, providing safe harbors to private landowners to spread trees beyond conserved areas, and promoting the creation of populations outside primary population and fire threat areas.

We don't yet need to be using the scarce resources collected in impact fees, a finite number, to fund acquisition of lands a climate model says will be suitable in 70 years, we have the time to wait and know much more considering the existing population and range of the Joshua tree before making acquisitions and significant financial resource investment decisions.

Delete MOU Effectiveness Criteria

The Plan appears to utilize the effectiveness criteria requirement of MOUs to leverage local agencies to enter MOUs. First, single agency control is undesirable for preventing a threatened status to the species. We can't place all our eggs in one basket and fortunately our system of government separates powers so we can have federal managers and state managers, and local managers as we already do to benefit the species. This is a benefit, not a harm to the species survival.

The Plan should respect other agencies' authorities and expertise and instead use guidance as directed by the legislature to broadly and transparently direct action to benefit the species. Adoption of guidance can measure implementation just as effectively and a lot more cheaply than active engagement in a MOU. It is simply far easier and less expensive to measure adoption of guidance than to manage fire districts and local agencies' Joshua tree activities via MOU. We recommend Incorporating the

guidance the legislature asked for within the Plan then and have the department report on local agency adoptions and implementation in the two-year reviews.

If MOUs are for some reason a priority, a justification should be included in the Plan of why MOU's and breaching the separation of powers is desirable over providing guidance and reporting on agency implementation. How is it necessary to prevent listing as threatened or endangered? The statutorily defined objective of the Plan at this time. Why are MOUs and department control important? What is the extra necessary benefit? Why are the federal land managers and structures such as the Sikes Act functionally deficient? What will be included in the MOUs?

If MOUs are pursued and included as effectiveness criteria a complete list of potential MOU partners should be included in the Plan for evaluation of the criteria thresholds. We will also need the approximate areas they manage in relation to the Plans coverage area and the species range. The effectiveness of the effectiveness criteria cannot be evaluated without knowing the universe the criteria apply to and how it relates to the range of the tree. Our knowledge, as well as agency and districts' knowledge, and the Plan is incomplete without providing such measurable data to inform the review of sufficiency of the criteria.

Finally, considering scarce resources, the Commission may even wish to prohibit CDFW from the cost and liability of engaging in MOU activities particularly related to fire management, except those consistent with Fish and Game Code § 1927.2 (h) under the authority of the Plan,

> "(h) This section shall not preclude the department from authorizing, by permit or memorandum of understanding, the taking, possession, purchase, or sale within the state of a western Joshua tree to aid the conservation and recovery of the western Joshua tree, or entering into memoranda of understanding with California Native American tribes to provide for the taking and possession of western Joshua trees for tribal cultural purposes, or as otherwise required by applicable law."

Empower Native American Tribes on Their Lands

The Plan clearly demonstrates tribes are not a threat to the Joshua tree and have substantial knowledge and cultural practices dependent on the tree. Their widespread low-level impacts had no identified harms and were speculated to help the tree by multiple authors. The Plan should specify the tribes whose takes are authorized under the Plan and recognized to have no threat to the species. Obviously, CDFW's use of traditional tribal knowledge may require a MOU to protect the tribes' rights and privacy but that's between the tribes and CDFW. Tribes should not need a MOU to gather seeds or take trees based on the data within the Plan. The Commission should ensure in keeping with its JEDI doctrine that the sovereignty of the tribes is empowered based on the data and facts presented.

We also think Native Americans, if willing, could be key partners to a transformational new way for interaction with our natural lands.

Create a Cultivators Program with Safe Harbors

We think the core action to take early, aside from beginning science efforts, is to empower the people who love the Joshua tree, to plant, nurture and provide citizen science on the Joshua tree. The reasons are many, but Commissioner Sklar provided an epiphany when during initial deliberations he said,

> *"Not only is CESA outdated but it is limited in a fundamental way it does nothing to ensure conservation and restoration although it encourages it*."

Of course, if you make doing anything to help a species hard and expensive people won't be able to help a species, and only necessary impacts will be permitted. Requiring any contact with a WJT specimen to be permitted and the structure and cost of those permits will prevent people from independently doing good. We can now plan a way around that in this Plan. We can manage human behavior as validated by economic philosophy which has been proven many times over. The moment we made doing good for a species cost money, voluntary acts to assist the species disappear as they are economically harmful to people.

This is the predictable harm committed by acts like CESA and the Native Plant Act if they are applied to an abundant and widespread species like the Joshua tree. Which means under climate change impacts CESA and the Native Plant Act are broken. However, CESA is exactly the tool you want when you have a Bakers Longspur with only 9 plants where only the experts should be acting to preserve it. Joshua trees on the other hand should be available in my local nursery and planting one shouldn't degrade my property's value. That alone would preserve the species. We love them, they are iconic.

CDFW included the beginnings of such programs but fails to call for safe harbor for cultivators of trees on their own private property. CalCIMA urges you to empower mankind, the greatest agricultural species to ever evolve, to voluntarily do good for Joshua trees well beyond the adopt-a-tree concept in the rule. We request the Commission create "safe harbors", so a citizen's property is not harmed by helping the tree voluntarily.

In the Plan you should include a criterion for the department to establish a database for citizen cultivators to plant and care for Joshua trees on their property. Citizen cultivators should be able to report their assessor's parcel number for the purpose of providing safe harbor protection to their property from the cultivation of the tree. The system could include online video training on cultivation, reporting on planting techniques and climate of the grow site. Such "cultivated" trees wouldn't be subject to fees on take as well. Contact information could be used to request data over time. It can become both a garden study and known reservoir of the Joshua trees genetic

diversity outside the regions where cataclysmic climate driven fire is a concern for the primary population and genetic diversity of the Joshua tree. As such it creates resiliency, begins generating growth and propagation data now to the changed climate, and informs future restoration and or migration assistance in future years.

As the Plan is currently drafted it prevents the people who love the tree from voluntarily propagating it on their property without fines and penalties. Please create a simple path to let them plant and care for Joshua trees by removing the economic penalty for doing so. Use the Plan to create a new cultivated Joshua tree program and cultivated trees sheltered from permit obligations.

Eco-Restoration Licensing

We think the State should consider an eco-restoration license similar to the fishing and hunting license programs. A program where there are electronic educational materials on planting various species and restoring various landscapes. You can't do that for the state, but you could for Joshua tree and the Plan area. The Plan could specify the criteria and construct the program with the stakeholders.

Large and significant costs of durably conserving land is the endowment, maintenance and restoration. Enabling structures where people volunteer to participate as recreation and potentially even offer a voluntary certification fee to ensure knowledge of proper propagation techniques could help create a more effective plan that isn't solely funded by local development and the citizens of the Plan area. We can seek to empower beneficial actions and reduce community costs. We could just as easily license and enable restoring our environments as we license hunting and fishing.

Climate Refugia Identification

While we find it unfortunate that accurate plotting of the intended climate refugia maps has not been provided as the work is forthcoming, we support the concept of climate refugia. The primary threat identified is climate change and where the trees can reasonably foreseeably exist matters. Further as climate change is the dominant threat to Joshua tree the commission needs to limit the range of mandatory relocations ordered by CDFW permitting staff to a reasonable range as well as make it clear that if no landowner is willing to accept Joshua trees under the liabilities created to their property by the Plan and statute, then mandatory relocation shall not be required. The legislature was told this program would expedite permitting, not slow it.

We have basic principles we think should apply under the Plan based on what the climate refugia definition represents. Climate refugia is the state's belief of where in the reasonably foreseeable future Joshua trees will be able to survive and live. By extent, everywhere outside that climate refugia is a location where it is reasonably foreseeable to the State experts that the Joshua tree will not be able to survive.

Under no circumstance should mandatory mitigation occur to any location outside the identified climate refugia where California's scientists don't think Joshua trees will

survive in 70 years. Voluntary project actions, yes. Mandatory actions ordered by CDFW, no. Such mandatory actions would add costs for no foreseeable benefit and are therefore harmful to the survival of the species.

Mineral Resources Policy Suggestions

One item CalCIMA has been hoping for is a functional debate of how we can better integrate mineral resources and working land resources into our climate adaptation debate. The natural resource needs of humans must be carefully considered as we begin diverting scarce resources to other important priorities. We are also aware that lovers of natural resources want ways to capture more value from working land development. We think creative solutions can accommodate both objectives.

This plan enables the Commission to consider better integration of resource development for humans and preservation for the Joshua tree, if desired. Indeed, the larger than the state of Massachusetts size of the conservation plan area necessitates such considerations. The Commission only includes discussion of working with agricultural and grazing interests, not water resources, not minerals, not energy resources and working with these other necessary and vital working land users is important. Stakeholder groups to discuss how to develop both the natural resource values and the working land values for humanity should be added to this Plan.

As mentioned previously, the region where the western Joshua tree lives is expected to need over 1.6 billion tons of construction aggregates over the next 50 years[24]. If we don't produce it there, it will be mined elsewhere and shipped, causing emissions and traffic, worst case, imported through our ports. We prefer to provide construction aggregate materials from local sources, since distance matters. Construction aggregates do not include the critical strategic minerals of the new energy age which California also has important deposits of and the plan has made no consideration for their potential development. Ensuring compatibility with all vital natural resources including those humanity will need should be a key design goal of the Plan for the benefit of all Californians and the Joshua tree.

The tree's long life, extensive range, numbers in the millions, and human commitment to preserve under state law create opportunity and legal certainty to be more creative than we have been historically. Humans are the undisputed keystone agricultural species. If it can be grown humans can grow it and the tribal data on Joshua tree validates this. In addition, we have the time for careful management to reduce costs on humans while preserving and restoring the tree.

[24] Map Sheet 52 (Updated 2018), Aggregate Sustainability in California, (Table 1 Data for; Barstow-Victorville P-C region; Palmdale P-C Region, and San Bernardino P-C Region) California Geological Survey, 2018.

The species has an extensive range ensuring a large area of productive habitat during any temporal impacts of necessary human resource development and there are numerous plants to provide seeds for restoration. This isn't a species that can die tomorrow, it will take centuries for the range to change, and we will have active human management due to SB 122 and this Plan. Temporal impacts are very important when there are nine individuals, not when there are between 3 and 9 million and they live hundreds of years. Temporal impacts are largely immaterial if restored with planting after a project or by reclamation such as is required of mines.

Because of that we think, the following activities should be directed for exploration for possible development inclusion in a future amendment.

- Encourage the Department to work with the State Mining and Geology Board (SMGB), the mining community and other stakeholders to develop criteria for Joshua tree reclamation.
    - Enable Conservation Plan managers to engage in Natural Resource Mineral development (Mining) provided they use such a restoration plan design.
        - This would enable conservation areas becoming mine landlords returning revenues from working land development to natural resource preservation and controlling restoration of the land under binding legal obligations.
        - This would enable necessary mineral production for the human species.
        - Ensure Joshua tree restoration via the reclamation criteria.
        - Allow the conservation manager to use their endowment to secure reclamation costs – and credit them from take fees for the to-be-restored trees.
- Add criteria to ensure that priority conservation lands are not structured to overlay state classified or designated mineral resources where avoidable.
- Where not avoidable place policies that encourage conservation land managers to consider the feasibility of making such resources available in their conservation plan.
- Add to the avoidance discussion explicit recognition, that necessary natural resource development such as mineral resource development that can not avoid impacts is expected and acceptable for such vital natural resource development.

Mineral resources are a recognized vital natural resource in California, whose production and conservation are encouraged and considered necessary. As the legislature has stated in public resources code §2711 (f),

> *"(f) The Legislature further finds that the state's mineral resources are vital, finite, and important natural resources and the responsible protection and development of these mineral resources is vital to a sustainable California."*

The Plan covers multiple aggregate production consumption zones and has no clear plans to coordinate or manage the potential impacts of the Plan with other vital resources. Not even guidance to agency to work to address such other key issues. The development of minerals will occur, humanity's needs as a technological species will be met. It's up to us to find the most efficient ways to do so.

We recognize the concept of mitigation after impact is unthinkable in a traditional endangered species scenario. We believe it is appropriate to consider these conservation areas and under the specific facts of the western Joshua tree. It is well established that the western Joshua tree is an abundant and widespread species. It is also an extremely long-lived species. During the petition process Jeb McKay Bjerke of the CDFW Habitat Planning Branch presented evidence to the Commission that when a similar warming occurred 11,700 years ago, it wasn't until 3,700 years later that the fossil record had retreated to the Joshua tree's current range[25]. We have centuries, if not millennia, to manage the western Joshua tree range and population due to the characteristics of the species. As a result, conservation plans would seem ideally suited to be authorized to mitigate natural resource production by restoration. It can reduce costs, increase solvency and capacity of the conservation plan areas, provide important resources to society and the community, and help conserve western Joshua Trees. In the case of the Joshua tree, we can make this work.

Conclusion

We encourage the Commission to be sure of its data and science before buying Joshua tree conservation land. In the interim, empower the good of people to benefit the species, create more data, and integrate considerations for vital working land resources into the long-term plan. The Plan impacts an area larger than the State of Massachusetts and mistakes could have drastic consequences on people and the region and on the continued political will to combat climate change.

We look forward to ongoing discussions and hope we create a terraforming Plan that accommodates humanity as well as the Joshua tree. As noted in Assemblymember Carrillo's comments on the bill, this is about striking a "delicate balance" between conservation and economic development.

[25] Fish and Game Commission Hearing June 15, 2022, CDFW Presentation to Commission (Bjerke)

Do we have what it takes to integrate humanity's needs, and species needs while terraforming our state due to climate change? We believe so, but it will take working together with trust and respect. And it will require seizing the time and restoration advantages available due to the western Joshua tree's widespread abundance, long life, iconic status and the affirmative commitment of California to prevent the tree from becoming threatened.

Respectfully,

Adam Harper
Senior Director of Policy
CalCIMA

Appendix I
Single Covered Species ITP Permits (WJT) – Issued Under CESA 2022-2024

Background:

As a result of SB 473 (Hertzberg) of 2018 Incidental Take Permits (ITP's) are now published online in the CDFW Document Library providing transparency for department activities to the public. That law requires, "***Commencing January 1, 2019, the department shall post each new permit issued pursuant to subdivision (b) on its Internet Web site within 15 days of the effective date of the permit***." There are many CESA permits available as a result.

The Department does not appear to be adhering to this publishing practice for Western Joshua Tree Incidental Take Permits issued under the Western Joshua Tree Conservation Act or has issued no such permits. We therefore have no data from those permits if they exist. None of the WJTITP's our membership has filed under the new law have been processed to completion and none of their annual updates has yet mentioned any such ITP issuances although in 2023 we know 44 were filed from the 2023 Update.

The Department has issued many WJT permits under traditional CESA permitting processes and the data below is from single covered species ITP's to be sure acreages and costs apply only to the western Joshua Tree impacts. Some permits go through amendments and the final amended permit is listed and linked.

The actual costs incurred may be higher or lower than the security cost as only the permit at signature of the permittee is published within 15 days of receipt according to the law. The law did not require filing of the actual cost and final paperwork which demonstrates the permittee meeting the obligations. **As the security amounts represent the Departments estimated cost per acre of durably conserving WJT habitat the data does represent the Departments beliefs in cost per acre to durably conserve WJT habitat and is best suited for our purposes in analyzing the projected direct costs of the WJT conservation plan proposed by the Department.**

Table 1 provides the totals for the single covered species permits issued 2022 through 2024 and calculates the per acre security cost for compensated acres. Table 2 provides the individual permit details and links to the individual permits.

Appendix I
Single Covered Species ITP Permits (WJT) – Issued Under CESA 2022-2024

Table 1: Totals - Single Covered Species Incidental Take Permits for Western Joshua Tree (2022-2024)

Total WJT Permits	Total WJT Acres Impacted	Total WJT Acres Compensated	Ratio	Total Security Cost	Security Cost Per Compensated Acre
21	1187.81	3136.98	2.64 to 1	$37,414,282.72	$11,926.87

These numbers do not represent all Western Joshua Tree ITPs amended or processed in the period 2019-2024 as we excluded multiple species ITP's, the format was not conducive for identifying acres of impact to specific species, and amendments to historic ITP's to add western Joshua Tree were also problematic to review including only changed sections. And we do not know what WJTITP's have been issued under the new law as we did not find any of those plans. Number of tree's individuals was also not universally present due to acres being the criteria.

Actual costs for these permits in this table and those not analyzed should be on file with the department and may be higher or lower.

Detail included in Table 2 with links to the permits.

Table 2: Western Joshua Tree Single Species ITP's under CESA (2019-2024)

Permit Link	Permitee	Project	Acres Impact	Acres Comp	Total Security Amount
2081-2021-001-06-A1	CalTrans District 8	SBD-138 CONSTRUCT MEDIAN AND STANDARD SHOULDERS	2.87	4.31	$71,960.00
2081-2021-010-06	Copart Inc.	COPART ADELANTO 2 PROJECT	48.48	193.92	$1,834,024.00
2081-2021-012-05-A1	Lockheed Martin Aeronautics	Site Plan Review 20-009 Project Solar	67.5	120	$1,200,000.00
2081-2021-026-06-A1	Silverwood Development Phase 1, LLC	SILVERWOOD (TAPESTRY PHASE I) PROJECT	578.7	1621.9	$15,158,774.00
2081-2021-038-06	Covington Development Partners +	HESPERIA COMMERCE CENTER II PROJECT	202.14	585.9	$6,308,980.00
2081-2021-044-06	LADWP	ADELANTO SWITCHING STATION EXPANSION PROJECT	74.33	148.66	$1,674,236.00

Appendix I
Single Covered Species ITP Permits (WJT) – Issued Under CESA
2022-2024

Permit Link	Permitee	Project	Acres Impact	Acres Comp	Total Security Amount
2081-2021-054-06	Pacific Communities Builder, Inc.	TENTATIVE TRACT MAP 16751 PROJECT	21.98	54.95	$680,910.00
2081-2021-055-05	Palmdale Investors, LLC	STRATA WEST PALMDALE APARTMENTS AND STRATA COMMONS	12.76	25.52	$1,763,000.00
2081-2021-059-06	Pacific Communities Builder, Inc.	Tentative Tract Map 17243 Project	8.34	15.7	$264,860.00
2081-2021-067-06	Pixior LLC	PIXIOR DISTRIBUTION CENTER	21	42	$560,755.00
2081-2021-070-05	Maison's Palmdale 170, LP	TENTATIVE TRACT MAP 73068 DEVELOPMENT PROJECT	23.17	56.65	$2,541,150.00
2081-2021-099-04	Tumbleweed Solar, LLC	Tumbleweed Energy Storage Project	29.31	58.62	$711,823.72
2081-2022-013-06	Harris Homes, Inc.	HARRIS HOMES PROJECT	28.21	84.63	$987,055.00
2081-2022-029-06	Pathways to College Charter School	Education - K-8 School Project	10.77	21.54	$757,564.00
2081-2022-041-06	City of Hesperia	RANCHERO ROAD CORRIDOR WIDENING PROJECT	0.65	1.3	$112,220.00
2081-2022-043-06	Arman Petrosyan	ASTER 2	1.25	3.125	$145,315.00
2081-2022-060-06	Southern California Edison (SCE)	SCE WESTERN JOSHUA TREE EMERGENCY VEGETATION MANAGEMENT	0.9	0.9	$107,980.00
2081-2022-077-06	Prologis SCLC Investments/Lot 44 LLC and +	LOT 44 AND LOT 45 DEVELOPMENT PROJECT	24.45	24.45	$357,610.00
2081-2022-080-06	Poplar 18 LLC	POPLAR 18 PROJECT	10.9	32.7	$445,060.00
2081-2022-087-05	Paraclete High School	PARACLETE HIGH SCHOOL PROJECT	7.5	15	$1,365,446.00
2081-2024-010-06	CRP/NC Hesperia Owner, LLC	MESA LINDA LOGISTICS CENTER	12.6	25.2	$365,560.00

Appendix II
Conversion of Table 4-10 to Sq. Mi and Acres (CalCIMA 2025)

Table 4-10 Percent of Predicted Climate Refugia Overlapping Conservation Value Categories and Management Units Management Units (Page 4-63)	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categ	Total
Mixed Use %	2.20%	16.00%	0.50%	0.10%	9.90%	**28.60%**
Wilderness %	8.20%	14.60%	0.10%	0.00%	5.30%	**28.20%**
Little or No Protection %	0.70%	3.90%	5.70%	9.60%	1.80%	**21.70%**
Defense %	5.20%	8.10%	0.10%	0.00%	0.00%	**13.30%**
Preservation with Light Recreation / Other%	3.20%	1.90%	0.20%	0.10%	2.90%	**8.20%**
Tribal Land %	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Total %	**19.50%**	**44.50%**	**6.40%**	**9.60%**	**19.90%**	**100.00%**

Determination of Climate Refugia Size		
The predicted climate refugia category makes up 23.4 percent of the western Joshua tree Range in California. (Page 4-63)		
For purposes of this Conservation Plan, the range of western Joshua tree is considered to be approximately 13,088 square kilometers (5,053.3 square miles) (Page 8-6)	23.4% of 5053.3 =	1182.4722
Climate Refugia Size (Square Miles) =		1182.472

Table 4-10 Percent of Predicted Climate Refugia Overlapping Conservation Value Categories and Management Units Management Units (Conversion to Square Miles and Acres - CalCIMA)	Ecologically Core (Sq. Mi.)	Ecologically Intact (Sq. Mi.)	Moderately Degraded (Sq. Mi.)	Highly Converted (Sq. Mi.)	Not Categ (Sq. Mi.)	Total (Sq. Mi.)	Acres Per Square Mile	Ecologically Core (acre)	Ecologically Intact (acre)	Moderately Degraded (Acre)	Highly Converted (acre)	Not Categ (acre)	Total
Mixed Use (federal BLM USFWS ETC)	26.01	189.20	5.91	1.18	117.06	338.19	640	16,649.21	121,085.13	3,783.91	756.78	74,921.43	216,439.67
Wilderness Square Miles	96.96	172.64	1.18	0.00	62.67	333.46	640	62,056.13	110,490.18	756.78	-	40,109.45	213,412.55
Little or No Protection (Private)	8.28	46.12	67.40	113.52	21.28	256.60	640	5,297.47	29,514.50	43,136.58	72,651.08	13,622.08	164,221.71
Defense Square Miles	61.49	95.78	1.18	0.00	0.00	157.27	640	39,352.67	61,299.35	756.78	-	-	100,652.02
Preservation with Light Recreation/Other Use	37.84	22.47	2.36	1.18	34.29	96.96	640	24,217.03	14,378.86	1,513.56	756.78	21,946.68	62,056.13
Tribal Land	0.00	0.00	0.00	0.00	0.00	0.00	640	-	-	-	-	-	-
Total Land	230.58	526.20	75.68	113.52	235.31	1,182.47	640	147,572.51	336,768.03	48,434.05	72,651.08	150,599.63	756,782.08

As in Draft Western Joshua Tree Conservation Plan

Converted to Area and calculated by CalCIMA 2025

Appendix II
Conversion of Table 4-10 to Sq. Mi and Acres (CalCIMA 2025)

CalCIMA Table II – Calculation of Effectiveness Criteria 2 Acreage from Table 4-10 Conversion Data

Predicted Climate Refugia Overlapping (Derived by converting Table 4-10 to Area from Percent)	Sq. Mi	Acres
Ecologically Core+ Ecologically Intact + Moderately Degraded =	832.46	532,774.58
Effectiveness Criteria 2 (Protect 90% Above by 2033) Page 5-45	749.21	479,497.13
Wilderness + Preservation with Light Recreation/ Other Uses + Tribal (Sq. Mi)	430.42	275,468.68
Mental Comparisons		
City of Los Angeles	468.7	299,968.00
City of Sacramento	100.1	64,064.00
City of San Diego	325	208,000.00

CalCIMA Table I: Totals - Single Covered Species Incidental Take Permits for Western Joshua Tree (2019-2024) (Appendix I - for Detail)

Total WJT Permits	Total WJT Acres Impacted	Total WJT Acres Compensated	Ratio	Total Security Cost	Security Cost Per Compensated Acre
21	1187.81	3136.98	2.64 to 1	$37,414,282.72	$11,926.87

Estimated Effectiveness Criteria 2 Cost if All Land Purchased and Endowed: 479,497.13 * $11,926.87 = **$5,718,899,885.84 Billion**

As in Draft Western Joshua Tree Conservation Plan
Converted to Area and calculated by CalCIMA 2025

Appendix III
Conversion of Table 4-9 to Sq. Mi and Acres with Analysis (CalCIMA)

Table 4-9 Percent of Western Joshua Tree Range in California within Conservation Value Categories by Management Unit Management Unit	Ecologically Core	Ecologically Intact	Moderately Degraded	Highly Converted	Not Categ	Total
Little or No Protection	3.00%	6.40%	14.50%	9.10%	2.60%	**35.50%**
Mixed Use	4.40%	10.10%	1.90%	0.10%	7.70%	**24.10%**
Defense	10.40%	5.60%	1.30%	0.30%	0.00%	**17.70%**
Wilderness	3.70%	6.30%	0.10%	0.00%	4.20%	**14.20%**
Preservation with Light Recreation/Other Use	3.40%	3.00%	0.70%	0.10%	1.20%	**8.40%**
Tribal Land	0.00%	0.10%	0.00%	0.00%	0.10%	**0.10%**
Total	**24.90%**	**31.50%**	**18.40%**	**9.60%**	**15.60%**	**99.99%**

Within Western Joshua Tree Range	Sq.Mi.	Acres
Western Joshua Tree Range Square Miles (Page 8-6) =	5,053.30	3,234,112.00
Ecologically Core+ Ecologically Intact + Moderately Degraded (Sq. Mi.)	3,779.87	2,419,115.78
Wilderness + Preservation with Light Recreation/ Other Uses + Tribal (Sq. Mi)	1,147.10	734,143.42
Mental Comparisons		
City of Los Angeles	468.70	299,968.00
City of Sacramento	100.10	64,064.00
City of San Diego	325.00	208,000.00

Western Joshua Tree Range	Ecologically Core (Sq. Mi.)	Ecologically Intact (Sq. Mi.)	Moderately Degraded (Sq. Mi.)	Highly Converted (Sq. Mi.)	Not Categ (Sq. Mi.)	Total (Sq. Mi.)	Acres per Sq.Mi.	Ecologically Core (acre)	Ecologically Intact (acre)	Moderately Degraded (Acre)	Highly Converted (acre)	Not Categ (acre)	Total
Little or No Protection (Private)	151.60	323.41	732.73	459.85	131.39	1793.92	640	97,023.36	206,983.17	468,946.24	294,304.19	84,086.91	1,148,109.76
Mixed Use (Federal)	222.35	510.38	96.01	5.05	389.10	1217.85	640	142,300.93	326,645.31	61,448.13	3,234.11	249,026.62	779,420.99
Defense	525.54	282.98	65.69	15.16	0.00	894.43	640	336,347.65	181,110.27	42,043.46	9,702.34	-	572,437.82
Wilderness	186.97	318.36	5.05	0.00	212.24	717.57	640	119,662.14	203,749.06	3,234.11	-	135,832.70	459,243.90
Preservation with Light Recreation/Other Use	171.81	151.60	35.37	5.05	60.64	424.48	640	109,959.81	97,023.36	22,638.78	3,234.11	38,809.34	271,665.41
Tribal Land	0.00	5.05	0.00	0.00	5.05	5.05	640	-	3,234.11	-	-	3,234.11	3,234.11
Total	1258.27	1591.79	929.81	485.12	788.31	5052.85	640	805,293.89	1,018,745.28	595,076.61	310,474.75	504,521.47	3,233,820.93

As in Draft Western Joshua Tree Conservation Plan

Converted to Area by CalCIMA 2025

Appendix IV
CDFW Duties and Roles
Draft WJT Conservation Plan

CDFW Duty	Page
the conservation management actions will be implemented through continued collaboration between CDFW and local, state, and federal agencies by establishing interagency written agreements or written memoranda of understanding and by developing co-management written agreements and written memoranda of understanding with tribal collaborators.	**1-17**
CDFW will monitor conservation management actions that have been implemented, including those in progress since the species' candidacy for listing under CESA, and others that have been developed specifically in response to WJTCA and the western Joshua tree population condition.	**1-17**
CDFW will gather and evaluate new knowledge from the scientific community, agencies, and Tribes needed to achieve or improve effectiveness of management actions. As	**1-17**
CDFW will report on the performance of the permitting and mitigation program and provide an assessment of the conservation status of western Joshua tree in annual reporting, described in Section 6.8.1,	**1-17**
CDFW will also recommend Conservation Plan amendments to the Commission every 2 years at a public meeting, as necessary	**1-17**
CDFW will have the opportunity to collaborate with CSP on management actions to be implemented at Hungry Valley and Onyx Ranch SVRAs in support of western Joshua tree conservation.	**2-49**
Identification of high priority areas for protection to further the conservation of western Joshua tree will be completed as needed by CDFW and partners and will be supported by information produced by the research and tribal communities. While it would be ideal to complete steps 1 through 4 before prioritizing areas for protection, CDFW must begin work to conserve western Joshua tree immediately and must therefore begin initial prioritization of areas for protection based on the best, currently available information.	**5-5**
Protect priority areas while accommodating compatible existing and emerging land uses. Informed by the results of step 5, high priority areas should be protected while accommodating existing and emerging land uses that are compatible with the overall western Joshua tree conservation strategy (Henson et al. 2018).	**5-6**
CDFW will use the Conservation Fund to conserve priority lands.	**5-6**

With finite resources available for conservation efforts, CDFW will define criteria for prioritizing lands that are most suited to the persistence of western Joshua tree. The criteria will help guide agencies, NGOs, Tribes, and others in protecting conservation land.	**5-18**
On a local scale, CDFW will identify priority conservation lands based on the best available site data relevant to western Joshua tree's ecological needs for long-term viability. Available information will be analyzed initially, and additional information will be collected to properly assess the relative conservation value of the evaluated lands.	**5-20**
CDFW will work with land managers to develop long-term monitoring and management plans or conservation easement stewardship agreements for conserved lands.	**5-23**
CDFW will seek to establish written MOUs or other written agreements with state and federal agencies for long-term monitoring and management to benefit western Joshua tree on priority conservation lands. Approximately 28 percent of these lands are within predicted climate refugia, which increases the importance of managing these lands to conserve western Joshua tree.	**5-23**
Develop written MOUs or other written collaboration agreements between CDFW, California Native American tribes, and relevant entities that would embody co-management principles	**5-35**
At minimum, one written MOU or other written collaboration agreement incorporating co-management principles has been established between CDFW or other land managers and California Native American tribes by 2028.	**5-46**
In addition, CDFW will continue to consult with Tribes and federal, state, and local agencies to plan and implement activities consistent with western Joshua tree conservation; identify opportunities to conserve western Joshua tree on CDFW-owned lands; integrate protective measures for western Joshua tree into CDFW guidelines and regulations for public use and into land management plans; implement restoration or enhancement of western Joshua tree habitat; receive relocated western Joshua trees; and manage wildland fire risk.	**6-2**

CDFW will continue to collaborate with interested federal agencies to coordinate management actions and share conservation information. The extent and type of federal lands in the Conservation Plan's geographic focus area are described in more detail in Section 2.3.3, "Federal Land Management." A summary of responses from potential federal agency collaborators to outreach meetings and the questionnaire is provided below:	**6-4**
CDFW will prioritize the execution of a written MOU or other agreement with USFWS to document shared goals and aspirations for conservation of western Joshua tree.	**6-4**
CDFW will also seek feedback on aspects of the permitting process and written delegation agreements, ways to foster public awareness and engagement in western Joshua tree conservation in their communities, and creative solutions for specific projects to promote consistency with the conservation of western Joshua tree and WJTCA. In	**6-7**
CDFW will oversee all expenditures from the Conservation Fund and ensure funding is only allocated to eligible activities and entities. CDFW will prioritize expenditures and mitigation activities on properties with the highest conservation value to western Joshua tree, determined using a model-based land prioritization framework and mapping tool developed primarily by CDFW and NFWF.	6-16
Federal agencies with existing management plans or practices related to western Joshua tree conservation may agree to entering into a written MOU or other agreement with CDFW to implement management actions in the Conservation Plan.	5-6
Use Conservtion Fund to Preserve priority Lands	
CDFW will define criteria for prioritizing lands that are most suited to the persistence of western Joshua tree.	5-18
CDFW will continue to review the science including TEK on western Joshua tree during implementation of the Conservation Plan and update impact avoidance buffers as appropriate.	5-12
As additional information generated from steps 1 through 4 becomes available, CDFW will incorporate it into decision making and future updates of the Conservation Plan.	5-6
On a local scale, CDFW will identify priority conservation lands based on the best available site data relevant to western Joshua tree's ecological needs for long-term viability. Available information will be analyzed initially, and additional information will be collected to properly assess the relative conservation value of the evaluated lands.	5-20

CDFW will work with land managers to develop long-term monitoring and management plans or conservation easement stewardship agreements for conserved lands.	5-23
CDFW will seek to establish written MOUs or other written agreements with state and federal agencies for long-term monitoring and management to benefit western Joshua tree on priority conservation lands.	5-23
In collaboration with other agencies and institutions, CDFW will develop and adopt standards and protocols for western Joshua tree seed collection strategies to maximize genetic seed diversity.	5-29
Tribes and CDFW will collaborate to incorporate cultural burning where it would be an effective tool (outlined under Management Action LC&M 3) for reduction of wildland fire risk or enhancement of western Joshua tree population conditions on tribal lands.	5-35
CDFW will coordinate with California Department of Forestry and Fire Protection (CAL FIRE) and others on developing additional fuel treatment methods for western Joshua tree habitat, including manual and mechanical treatment methods.	5-39
CDFW will work with Tribes to support tribal priorities for education and outreach to their communities. The following are examples of undertakings or materials that may be developed to support tribal-led and tribal-designed efforts:	5-41
§ ethnobotanical studies, § lesson plans and curricula for various age groups, § professional certification programs (e.g., for tribal cultural monitors, TEK practitioners, fire and restoration specialists), § printed materials designed to strengthen cultural knowledge, and § workshops.	5-41
CDFW will work with partners to develop accessible informational items for distribution to the public in multiple languages. The informational items may be handouts, brochures, presentations, digital materials, surveys, interactive web pages, or other outreach tools.	5-41
CDFW will support and encourage volunteer opportunities by promoting them on their website, social media, and printed media (e.g., handouts, newsletters). Special focus will be given to providing opportunities for underserved	5-43
CDFW will coordinate with partner organizations to encourage development of newsletters and conduct western Joshua tree–focused social media campaigns.	5-43

CDFW will coordinate with agricultural organizations to encourage development of guidance regarding grazing best practices in western Joshua tree habitat and make it available to ranchers, rangeland managers, and others in the grazing community.	5-44
CDFW will coordinate with local governments to encourage the development of educational materials for private residential and other property owners with western Joshua trees to participate in urban conservation and recovery efforts.	5-44
CDFW will reach out to partners to encourage organizations to develop opportunities for an **adopt-a-Joshua tree program.**	5-43
CDFW will seek to protect an additional 3 to 5 percent of occupied western Joshua tree range every 2 years until the effectiveness criteria related to land protection for conservation of western Joshua tree in California are achieved.	5-46
CDFW will use total cost accounting when determining the adequacy of the fees for ensuring conservation of the species.	6-16
If CDFW determines land is eligible for acquisition or protection, CDFW will work with the landowner to prepare a lands package consisting of real estate documents and land surveyor products (e.g., boundary, improvements or encumbrances maps, deed, preliminary title report).	6-17
For lands requiring conservation easement acquisitions, CDFW will evaluate and approve an easement holder (grantee), land manager, and endowment holder to ensure compliance with Civil Code sections 815–816 and Government Code sections 65965–65968.	6-17
In the final stage of the land acquisition process, the real estate transaction will be completed (e.g., coordinate escrow, title, closing). The transaction will be funded with monies from the Conservation Fund, as directed by CDFW.	6-17
If the conservation easement or land acquisition includes restoration, enhancement, translocation, interim management, long-term land management, or monitoring, CDFW must review and approve a plan outlining these activities to ensure they are completed.	6-17
CDFW will review potential enhancement and restoration projects for those lands, in accordance with the process shown in the CDFW Western Joshua Tree Conservation Act Enhancement and Restoration Projects Assessment (see Appendix H, “Enhancement and Restoration Prioritization Assessment”)	6-17 to 6-18

CDFW is required by WJTCA (Fish & G. Code, § 1927.7, subd. (a)) to provide annual reports to the Commission and the Legislature. These annual reports will document metrics related to the performance of the permitting and mitigation framework included in WJTCA and described above in Section 6.5, as well as metrics related to the conservation status of western Joshua tree, including the following information:	6-18
CDFW will prepare an updated status review report for western Joshua tree and submit it to the Commission no later than January 1, 2033. The Commission will then determine whether western Joshua tree should be listed as endangered or threatened pursuant to CESA.	6-19
In accordance with WJTCA, starting in 2026 and at least every 2 years thereafter, the Commission will review the effectiveness of the Conservation Plan in conserving the species (Fish & G. Code, § 1927.8). CDFW will make recommendations to the Commission concurrent with the Commission's review of the status of western Joshua tree. As part of this review, CDFW will recommend proposed amendments to the Conservation Plan, if needed. Any Conservation Plan amendments must be reviewed and adopted by the Commission.	6-20
CDFW will also continue to seek input from the general public regarding implementation of the Conservation Plan and its effectiveness in conserving western Joshua tree.	6-20

Impact of SB 122 Western Joshua Tree Provisions on Aggregate Mining Operations and the Economy

October 2023

Prepared for:

California Construction and Industrial Materials Association (CalCIMA)

Prepared by:

Brad Williams, Chief Economist

Michael C. Genest, Founder and Chairman

Capitol Matrix Consulting

About the Authors

The authors are partners with Capitol Matrix Consulting (CMC), a firm that provides consulting services on a wide range of economic, taxation, and state-and-local government budget issues. Together, they have over 80 years of combined experience in economic and public policy analysis.

Brad Williams joined Capitol Matrix Consulting in 2011, after having served in various positions in state government for 33 years. Mr. Williams served for over a decade as the chief economist for the Legislative Analyst's Office, where he was considered one of the state's top experts on the tax system, the California economy, and government revenues. He was recognized by the Wall Street Journal as the most accurate forecaster of the California economy in the 1990s, and has authored numerous studies related to taxation and the economic impacts of policy proposals. Immediately prior to joining CMC, Mr. Williams served as a consultant to the Assembly Appropriations Committee, where he advised leadership of the majority party on proposed legislation relating to taxation, local government, labor, and banking.

Mike Genest founded Capitol Matrix Consulting (originally Genest Consulting) in 2010 after concluding a 32-year career in state government, which culminated as Director of the California Department of Finance (DOF) under Governor Arnold Schwarzenegger. Prior to his four-year stint as the Governor's chief fiscal policy advisor, Mr. Genest held top analytical and leadership positions in both the executive and legislative branches of government. These included Undersecretary of the Health and Human Services Agency, Staff Director of the Senate Republican Fiscal Office, Chief of Administration of the California Department of Corrections and Rehabilitation, and Director of the Social Services section of California's Legislative Analyst's Office.

Table of Contents

Executive Summary

In June 2023, the Governor signed SB 122 (Chapter 51 of the Statutes of 2023), which was a"trailer bill" to the 2023 Budget Act. The bill imposes several conditions for any "taking" of a Western Joshua Tree (WJT) including the requirement that the permittee (1) minimize the impacts of takings as much as practicable; (2) mitigate the takings of the WJT and insure that adequate funding is available to do so, or pay per-tree in-lieu fees; and (3) relocate trees as directed by the California Department of Fish and Wildlife using guidelines yet to be adopted. In view of the potentially major implications of SB 122 for aggregate mining operations in Southern California, The California Construction and Industrial Materials Association (CalCIMA) engaged our firm to provide estimates of financial and economic impacts of SB 122 on the aggregates industry. Our key findings are as follows:

- Aggregates are basic construction materials that go into residential and commercial building construction, highways, roads and public transit, and other public infrastructure ranging from schools, courts, public administration, parks and natural resources. Without an adequate supply of aggregates, the housing crisis and homelessness will worsen, and traffic congestion will increase.
- Local production is important. This is because transportation costs are extraordinarily high given the weight and bulk of aggregates, making imports from other regions expensive.
- Mining operations located in the WJT territories in the high deserts of Los Angeles, San Bernardino, Riverside, Kern, Inyo and Mono Counties account for about 13 percent of total permitted acreage in California, and about 32 percent of permitted acreage in Southern California.
- All regions of California face long term shortfalls in supplies of aggregates from permitted lands. For the Southern California region served by mines in WJT territories, permitted aggregate reserves cover about three quarters of total projected demand over the next 50 years. Thus, the region needs more permitted lands and aggregate mining supplies.
- SB 122 will significantly increase costs to mining operations in WJT territories, discouraging production. Companies report that additional costs related to the in-lieu fee and and tree-relocation provisions of the bill could range into the tens of millions of dollars for larger operations.
- Companies also reported that impacts on their specific mining projects would be uneven, depending on WJT density, reserve depths and other factors.
- Estimates we prepared indicate that cost increases associated with in-lieu fees and tree location could be as high as $17 million for a single 200 acre project located in an area with high WJT density. Based on the methodology described in the main body of this report, we estimate that prices would need to rise by between $5.50 and $7.00 per ton (increase of between 37 percent and 47 percent relative to current prices excluding delivery costs) to offset these added expenses.
- These price increases would have significant impacts on residential and commercial construction, raising building costs for a typical home by between $2,200 and $2,800, and costs for a typical school or hospital by between $85,000 and $105,000.
- They would have major impacts on freeway construction projects, where aggregates account for between 8 percent and 10 percent of total construction costs. Price increase of $5.50 to $7.00 per ton would raise construction costs for an 8-lane freeway by between $1.7 and $2.1 million per mile.
- Overall, we estimate that annual costs to state and local governments for infrastructure spending would rise by between $130 million and $170 million annually, with about one-half attributable to the state of California and the other half attributable to local governments located in the Southern California region.

California's Aggregate Mining Industry

Aggregate mining is an essential industry. Sand, gravel and rocks (for convenience, we refer to all these products as aggregate throughout this report) are basic materials used throughout much of the construction industry[1]:

- 34 percent of all aggregate is used in residential construction,
- 17 percent goes to commercial construction,
- 26 percent goes to build and maintain highways, roads and public transit, and;
- 17 percent goes to other public infrastructure.

Without these materials construction in the state would come to a halt, homelessness would increase, roads and other infrastructure would deteriorate.

Anyone reading this analysis is likely sitting in a chair that rests on a concrete floor (or on a wooden floor resting on concrete footings), in a building which would not stand without concrete; they might well have driven to work on a road that was built and maintained with asphalt (which is 92 percent aggregate) or concrete (75 percent aggregate) or ridden to work in a light-rail system built mostly of concrete.

"We are the least known industry with whom you have an intimate relation," operator of an aggregate mine in California's WJT area.

Aggregate mines are subject to a variety of laws and regulations and local permitting requirements. (These are described in detail in the section below on SB 122.)

Aggregate mines need to be sited near local demand

According to the California Department of Conservation[2]:

> *"Aggregate is a low-unit-value, high-bulk-weight commodity, and it must be obtained from nearby sources to minimize both the dollar cost to the aggregate consumer and other environmental and economic costs associated with transportation. If nearby sources do not exist, then transportation costs may significantly increase the cost of the aggregate by the time it reaches the consumer.*
>
> *"Increased aggregate haul distances not only increase the cost of aggregate to the consumer, but also increase environmental and societal impacts such as increased fuel consumption, carbon dioxide (CO_2) emissions, air pollution, traffic congestion, and road maintenance."*

In order to minimize environmental disruption and the costs of building new homes and other essential buildings and maintaining, replacing and expanding roads and other infrastructure, the state needs to ensure aggregate continues to be mined as close as possible to each area of the state where it is needed. The importation of aggregate from abroad or from one region of the state to another region miles away, will increase construction costs as well as CO_2 and other emissions.

---

[1] California Department of Transportation Memorandum to District Directors, "2018 Aggregate Resource Policy Statement and Tools", March 1, 2018.

[2] Map Sheet 52 (Updated 2018) Aggregate Sustainability In California, 2018; California Geological Survey, Department of Conservation.

In fact, the Legislature itself has recognized the vital role that localized mining of aggregate plays in the state's economy:

> *"The Legislature further finds that the production and development of local mineral resources that help maintain a strong economy and that are necessary to build the state's infrastructure are vital to reducing transportation emissions that result from the distribution of hundreds of millions of tons of construction aggregates that are used annually in building and maintaining the state[3]."*

California needs to open new aggregate mines to meet projected demand

The Department of Conservation estimates that California will need 11 billion tons of aggregate over the 50-year period 2018-2068 (see Figure 1) and that the amount that is available in mines that already have permits to operate is only 69 percent of that need.[4] On the other hand, the Department also estimates that the state has 74 billion tons lying underground in acreage for which there are currently no permits granted to extract it.[5] Clearly, the state needs to expand the amount of land on which aggregate mining is permitted and to do so in all areas nearby local demand where existing permitted mining is inadequate to meet long- term demand. The only alternative sources for end-users is more imports into local regions via additional trucking and through California's ports, both of which are expensive alternatives.[6]

Figure 1
California Aggregate Demand/Supply
Statewide and Area Containing Western Joshua Trees

Aggregate Study Area	50-Year Demand (million tons)	Permitted Aggregate Reserves (million tons)	Permitted Aggregate Reserves Compared to 50-Year Demand (percent)	Projected Years Remaining
Statewide	11,045	7,628	69%	10 to >50
WJT Area	3,587	2,711	76%	<10-40
WJT Percent	32%	36%		

SB 122's Western Joshua Tree Provisions

Prior Law. The Western Joshua Tree (WJT) is a common and widespread species naturally occurring in the desert and scrub brush regions of Southern California and the southernmost portions of Northern California. There are millions of individual WJTs primarily located in 6 counties that also include aggregate mining operations: Kern, Inyo, Los Angeles, Riverside, Mono and San Bernardino.

Under the Surface Mining and Reclamation Act (SMARA) California mining operators have an obligation to reclaim mined lands. The reclamation standards are set during a project's approval (*e.g.*, approval of a reclamation plan), according to various statutory and regulatory standards, which generally

[3] Public Resources Code Section 2711 (d)

[4] Map Sheet 52 (Updated 2018) Aggregate Sustainability In California ,2018; California Geological Survey, Department of Conservation.

[5] Ibid.

[6] Currently, some aggregates supplies are shipped to Southern California from mines in Quebec Canada.

include revegetation on the mined lands. For many mining operations within the area covered by the WJT, these reclamation standards were established, in part, by requirements in the Native Plant Protection Act and Desert Native Plant Act, which set removal and revegetation requirements for, among other plants, the WJT. The costs for complying with these respective provisions are site- and project-dependent, based on the original approval conditions, variations in annual costs (*e.g.*, nursery maintenance, if applicable), and the required success criteria. Mining operations are also subject to the same general laws and regulations — for example, the California Environmental Quality Act — as other businesses.

Additionally, the California Endangered Species Act (CESA), requires the Fish and Game Commission to establish a list of endangered species and to add or remove species from the list if it finds, upon the receipt of sufficient scientific information that the action is warranted. The Department of Fish and Wildlife has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. CESA prohibits the "take"[7] of listed endangered, threatened and even "candidate species" ("Listed Species"), except under certain conditions. The WJT was listed as a candidate species under CESA in September of 2020, based on a petition for listing filed by the Center for Biological Diversity on October 21, 2019. Under CESA, the Department of Fish and Wildlife may authorize, by permit, the take of a listed species if certain conditions are met. CESA applies to any actual take of a listed species, and serves to protect and mitigate the impacts from any authorized take.

Accordingly, CESA listings have the potential to alter, conflict with, and/or increase SMARA reclamation and revegetation obligations. It is noteworthy that this applies even to "candidate species" – that is, any species that is under consideration for listing, which currently includes the WJT. For example, SMARA revegetation obligations may require the recovery of WJT seeds for later planting.

SB 122. SB 122 (Chapter 51 of the Statutes of 2023) is a "trailer bill" to the 2023 Budget Act and as such is an omnibus bill with many statutory provisions affecting state laws regarding the implementation and management of various programs relating to Natural Resources. Among these provisions are several that relate to authorizing the take of any WJT. These provisions are entitled the Western Joshua Tree Conservation Act (WJTCA). Specifically, the WJTCA imposes the following rules and conditions:

- **Removes the WJT from regulation under prior statutory regimes,** including the Native Plant Protection Act, the Desert Native Plant Act and the CESA, thus superseding the permitting requirements of these statutes.
- **Mandated mitigation.** Prohibits the take of western Joshua tree within the State of California unless the person has a take permit granted under either CESA (while the WJT is a candidate species) or the SB 22 WJTCA, *whether or not the Commission ultimately lists the WJT as an endangered species*.
- **Provides alternative take authorization to CESA during WJT candidacy:** The WJTCA provides an *alternative* method to authorize a take during any time period where the WJT is either (1) a candidate species under CESA; or (2) not listed under CESA. During any period the WJT is a candidate species, take authorization may also be obtained by obtaining a CESA incidental take permit.
- **Gives the Department of Fish and Wildlife authority to permit takings of the WJT.** Specifically, SB122 sets the following conditions on the granting of a takings authorization by the Department of Fish and Wildlife:

[7] The term "take" is a term of art used throughout the CESA. It encompasses not just the removal of a species, but any action that affects the potential viability of any covered species, including encroachment and trimming as well as actual removal or relocation.

- The permittee must give the DFW a detailed census of the WJT on the acreage for which a permit is requested;
- The permittee must minimize the impacts of takings as much as practicable;
- The permittee must mitigate the takings of the WJT and ensure that adequate funding is available to do so.

- **In-lieu Fees.** SB122 allows permittees to pay a per-tree fee ("in-lieu fee") based on the survey instead of undertaking the mitigation and minimization measures mentioned above. The fee amounts are shown in Figure 1. The proceeds of these fees will go into a fund to be used by the Department of Fish and Wildlife solely for the purposes of acquiring, conserving, and managing WJT conservation lands and completing other activities to conserve the WJT.

- **Relocation.** The permittee must relocate trees as directed by the Department of Fish and Wildlife using guidelines yet to be adopted. This requirement applies whether or not the permittee pays the in-lieu fees.

Figure 2
In-lieu Fees Authorized by SB 122

Height of WJT	Fee range (depending on location)
Less than 1 meter	$150 to $340 per tree
Between 1 and 5 meters	$200 to $500 per tree
Five meters or greater	$1,000 to $2,500 per tree

Essentially, SB 122 adds a new and additional permitting cost to both existing and new operations that supersede the site-specific conditions of approval and other requirements generally embodied in each mining operation's individual permit approval and/or reclamation and revegetation requirements.

Because SB 122 usurps the CESA process relating to determination of the WJT as an endangered species, this report attributes all *new* mitigation costs for each site to the bill. As noted above, the California Fish and Game Commission has designated the WJT as a candidate species under CESA, mandating that mine operators obtain "take authorization" for any to-be-affected WJT, regardless of whether such taking was already authorized and accounted for during the mine's approval process. Without the SB 122 mandate it could be asserted that mine operators could have faced even more dramatic cost increases in the permitting process, since the takings conditions under CESA are quite stringent and often impossible to satisfy economically. In this regard, SB 122 could even be theoretically credited for reducing permitting costs, since it would at least provide a path forward for mining operations.

However, this line of reasoning does not take into account the fact that the ultimate listing of the WJT as an endangered species was highly uncertain, arguably even unlikely. The Department of Fish and Wildlife recommended against such a listing in its report issued in March 2022 and the Fish and Wildlife Commission deadlocked in its initial vote in June 2022. After all, in any objective sense the WJT is clearly *not* an endangered species since there are millions of the trees thriving in the state. SB 122 prejudged the scientific merits of naming the species as endangered and instead imposed "take"requirements on a permanent basis, even if the Commission ultimately determines listing is not warranted. Thus, SB 122 imposes mandatory permanent protections, even if the WJT does not actually warrant listing under CESA, significantly increasing costs for existing and future mine operator entitlements.

In addition, other provisions of SB 122 suggest that the in-lieu fees might not actually reduce permitting costs and difficulty. Specifically, new law allows (but does not require) the DFW to:

"include permit conditions that require the permittee to relocate one or more of the (WJT). If relocation is required, the permittee shall implement measures to assist the survival of relocated trees, and to comply with any other reasonable measures required by the department to facilitate the successful relocation and survival of the western Joshua trees…"

It is not clear whether and to what extent relocation will be required as a condition of the approval for new mining permits. Until this is clarified, any estimate of the costs to mine operators of SB 122 will necessarily be somewhat speculative. At a minimum, however, mine operators will be required to obtain SB 122 take authorization – through either mitigation compliance or fee payment – for all WJT's that must be removed, damaged or interfered with on a mine's property.

For all these reasons, this analysis assumes that SB 122 imposes all new costs, relative to prior law.

Economic Impacts of SB 122

SB 122 will have substantial impacts on the aggregate industry operating in WJT territory, and by extension, final users of aggregate products in the California economy. There are 59 mining operations in areas populated by WJTs in California and thus directly affected by SB 122. These operations have about 22,000 acres operating under current (i.e., pre-SB 122) permits, which represents about 13 percent of the statewide total, and about 30 percent of the total permitted acreage for the 10 Southern California counties served by the mines in the WJT areas.[8]

In this section, we discuss the impact of SB 122 on costs and return-on-investment for mining operations within WJT territories, and how these impacts will affect aggregate supplies and prices in Southern California markets.

Survey of Mining Operators

As a key part of our analysis, we surveyed the 6 companies that have annual production within WJT territories. These companies' annual production of aggregate range from less than 300,000 tons to over 10 million. Key findings of this survey include:

Main markets. Most of the product supplied by these companies is sent to users in Los Angeles, Riverside, and San Bernardino Counties, with lesser amounts shipped to Orange, San Diego, Inyo, Imperial, Kern, Mono and Ventura counties. About one-half of their products are used for public infrastructure, with the other half used primarily for residential and commercial construction.

Costs of SB 122. The companies reported cost increases resulting from SB 122 ranging from under one-half million to the low tens of millions of dollars. Variation in costs reported by companies primarily reflected differences in the size of current active operations, the planned amount of future development, and the density of WJTs in their project areas. These estimates were based primarily on in-lieu fee payments and costs to relocate trees. Some of the companies reported that actual costs could be much

[8] As noted above, there are 6 counties in the WJT area that have aggregate mines. According to the operators of these mines, they sell their products to customers in Ventura, Orange, Imperial, and San Diego counties, in addition to customers located in their own counties.

higher depending on how the Department of Fish and Wildlife implements SB 122[9], although our estimates below do *not* include such costs.

Variability of impacts. Representatives we spoke to emphasized that SB 122 will have uneven impacts on specific projects within their permitted lands. While some current and planned projects have relatively few WJTs, others are in areas with dense WJT populations. A challenge presented by SB 122 is that project development on permitted lands takes place in carefully planned phases that have gone through extensive planning and regulatory approvals. Altering development patterns to avoid high cost areas would be disruptive and impractical for mining companies.

Bottom line from survey. SB 122 will materially increase the cost of mining operations, especially in areas where WJT populations are dense. If directly passed along to consumers, these cost increases will materially raise prices that governments and private sector construction contractors will pay for aggregates. If mining operations are not able to pass along these increases, the main near-term impact will likely be less investment and less mining in the WJT areas, resulting in fewer supplies of aggregate being available in Southern California markets. Because of the extremely high transportation costs associated shipping of aggregates from one region to another, fewer supplies from local sources will translate into higher prices paid by consumers in these markets. These price increases will lead to higher costs of residential housing, commercial buildings, roads, highways, schools and other public infrastructure.

Range of Impacts on Specific Mining Projects

In this section we calculate the range of costs imposed by SB 122 on a typical project (or project phase) located in WJT territory. We then put these costs into context by by calculating their potential impact on the project's return on a project investment.

Mining Project Cost Impacts

Figure 3 provides our estimate of the additional costs authorized by SB 122 for in-lieu fees and tree relocation requirements, as well as other mitigation requirements that could be imposed as a condition for a WJT takings. These costs are based on a mid-sized, 200-acre project located in WJT territories with varying tree densities.

Costs for in-lieu fees and tree census. As indicated in Figure 3, total costs could range from $600,000 for a project located in the lower-fee zone and on land having an average density of 7 WJTs per acre. However, the fee would be much higher - $5 million - if the project is located in the higher-fee zone and has a density of 30 trees or more per acre. The range of costs could be higher if the Department of Fish and Wildlife adopts counting methodologies that results in a higher count of trees. Section 1927.3(b) of the Public Resources Code requires that "each western Joshua tree stem or trunk arising from the ground shall be considered an individual tree, regardless of its proximity to any other western Joshua tree stem or trunk." The concern expressed by company representatives is that this language gives the Department discretion to adopt aggressive counting practices, leading to multiple fees for what is in fact a single tree.

Tree relocation. As noted earlier, SB 122 authorizes the Department of Fish and Wildlife to require tree relocation as a condition of receiving a takings permit, even if the permittee has paid the in-lieu fee. The costs of complying with tree relocation provisions of SB 122 depends on (1) WJT density in the project

[9] Specifically, these mine operators believe, based on their past experience with the Department, that it might attempt to interpret the bill to allow it to require even those operators who pay the in-lieu fee to also purchase and maintain conservation easements. However, we do not read SB122 to allow the Department to require mine operators who have paid the in-lien fees to also purchase conservation easements. The in-lieu fee, after all, goes to a fund that would be used by the Department for purchasing and maintaining such easements. In addition, the specific language of the bill waives such expensive mitigations for those who pay the in-lieu fee.Thus, we do not include any such costs in our estimates below.

areas, (2) the Department's decisions regarding whether some or all of the trees need to be moved, and (3) additional measures that the permittee would be required to take to ensure the survival of relocated trees.[10]

Figure 3
Additional Mining Project Costs From SB 122 - 200 Acre Project

Provision	Cost Range	Factors Affecting Costs
In lieu fees + tree census	$0.6 million to $5.0 million	Location in low fee or high fee zone, average number of trees per acre, mix of trees by height
Tree relocation	$1.1 million to $12 million	Number of trees, cost per tree, and amount of follow-up care.

As indicated in Figure 3, we estimate that relocation costs could range from $1.1 million to $12.0 million for a typical 200 acre project. The low-end estimate assumes an average of 7 trees per acre and relocation costs of $1,000 per tree (a typical cost cited by mining company representatives) and a per tree endowment of $500 for ongoing monitoring. The high-end estimate assumes that an average of 30 trees per acre are relocated, per-tree relocation costs of $1,000, and a per-tree endowment of $1,000 for monitoring and other measures that the Department of Fish and Wildlife may determine are needed to assist in its survival.

Total costs. Payment of mitigation fees and required relocation of trees on disturbed lands would result in new project costs of between $1.7 million and $17 million for a 200 acre project.

Range of Impacts on Investment Returns

While a successful mining operation can yield significant profits over a large number of years, these earnings only occur after an enormous amount of time and money is spent up-front on development costs (e.g. water, power, and road improvements), equipment, other pre-production activities, permitting and regulatory reviews, and financial commitments for site reclamation. Even before the WJT was made a candidate for endangered species, a typical 200 to 300 acre project could take take well over a decade to receive conditional use permits and regulatory approvals from state and local governments. As discussed in the nearby box, mining operators incur major expenses over this pre-production period for land, equipment, exploration, and for satisfying numerous regulatory and permitting requirements, including site reclamation.

Combined, these costs can run into the millions to tens-of-millions of dollars, depending on project size, location, and conditions placed on permit approvals. For a project to be financially viable, profits during the active mining phase must be sufficient to cover these up-front costs and generate a satisfactory "rate of return" on the initial investment. Projects failing to generate a minimum rate of return will not receive investment funding, which for larger multi-state companies will flow to other regions with higher investment returns.

[10] Subsection (a) of Section 1927.3 of the Public Resources Code requires that "(i)f relocation is required, the permittee shall implement measures to assist the survival of relocated trees, and to comply with any other reasonable measures required by the department to facilitate the successful relocation and survival of the western Joshua trees."

SB 122 Adds to Already Hefty Up-Front Costs for Mining Operations

Aggregate mining is a capital intensive industry that involves large up-front investments for purchases of land and equipment including backhoes, front-end loaders, bulldozers, conveyers, hoppers, conveyor belts, and crushers. It also involves considerable expense for exploration activities, materials sampling, and geophysical surveys to determine the location, volume, extent and quality of sand and gravel deposits in a reserve. For projects that move forward to the production stage, further pre-production costs are incurred for site design removal of overburden from the surface, and the installation of culvert pipes, ditches and collection pools to drain surface runoff and prevent erosion.

Substantial pre-production costs are also incurred for permits and regulatory reviews at the state and local level. The process includes numerous public meetings, preparations of a major environmental impact report as required by the California Environmental Quality Act (CEQA), court challenges, numerous mitigation requirements, and project revisions.

Mining site reclamation has also been an integral part of the local government project review and permitting process. Site reclamation includes removal of waste, supplies and equipment from the site, reducing the slope of quarry walls, replacement of topsoil and and overburden, and revegetation consistent with the plan for post-mining uses. As noted previously, reclamation of mining operations within WJT areas includes revegetation of the WJT and other plant species, consistent with requirements of Native Plant Protection Act and Desert Native Plant Act. Project approval can also be contingent on the operator agreeing to prepare the land for other specified end uses, such as housing, agriculture, a reservoir, or commercial development. Companies are required to provide financial assurances for reclamation costs, which can run into the millions of dollars for a typical project. One concern raised by mining company representatives is that previously agree-to and funded reclamation agreements with local governments may be in conflict with takings provisions in SB 122.

Impacts of SB 122 on financial viability of mining projects. SB 122 will increase up-front project costs and significantly lower the rate of return on both existing and future projects. To provide a quantitive estimate of how large the impact on investment returns could be, we developed a simplified cash flow model for a typical mining project in WJT territory. This model compares upfront costs and ongoing earnings on a present value basis. Companies evaluating and prioritizing potential mining projects often use such models for comparing investment opportunities.

We then calculated internal rates of return for these investments, first excluding, then including the costs required by SB 122. The general parameters for our estimates are based on data from public mining companies annual reports and other public documents, and thus are intended to be reasonable estimates of costs and revenues associated with mining investments. We recognize, however, that the actual costs and revenues can vary significantly from one project to another. Thus the focus of this analysis should be on the *differences* in investment returns under the different alternatives, as opposed to the *levels* of baseline investments, production and profits.

Specifically, we calculated a "baseline" internal rate of return[11] for a 200-acre mining project under the following assumptions: an average per-acre yield of 100,000 tons (see nearby box); up-front costs of $20 million for land, equipment, permitting, reclamation assurances, and pre-mining expenses; average production of 800,000 tons per year for 25 years; pre-tax profits on sales of $6.00 per ton; and a combined federal and state income tax rate of 30 percent. As indicated in Figure 4, the up-front costs for this project would be $20 million and annual after-tax cash flow would average $3.8 million per year during the 25 year active mining period. The internal rate of return for this project would be 17.3 percent.

Figure 4
Impact of SB 122 on Investment Returns of a 200 Acre Project

	Baseline	Alternative A (Low WJT Density Area)	Alternative B (High WJT Density Area)
Up-Front Costs Excluding SB 122 Impacts	$20.0	$20.0	$20.0
Additional Up-Front Costs from SB 122	0	$2.9	$17.1
Total Up-Front Costs	$20	$22.9	$37.1
Average annual after-tax profits over 25 years of production.	$3.8	$3.8	$3.8
Internal Rate of Return	17.3%	14.8%	8.5%

We then recalculated the internal rate of return incorporating the additional costs related to the in-lieu fees and tree relocation requirements authorized by SB 122. We show the results under two alternatives

- The first alternative assumes the project is located in the lower-fee zone and is in an area with relatively sparse WJT populations of 7 trees per acre, consistent with the low-end estimates shown in Figure 3. For this project, SB 122 would reduce the internal rate of return only modestly, from 17.3 percent to 14.8 percent. We estimate it would take about a $1-per ton increase in price to offset the added costs and fully restore the return on investment under this alternative.
- The second alternative assumes the project is located in the higher-fee zone and is in an area with a dense WJT population, consistent with the high-end estimates shown in Figure 3. For this project, SB 122 would reduce the internal rate of return by over 50 percent, from 17.3 percent down to 8.5 percent.
- The reductions shown in Figure 4 are understated for companies that have to borrow to cover the additional up-front costs authorized by SB 122. For example, companies financing the $17.1 million in additional costs shown under Alternative B would incur total expenses of $34.9 million ($24.3 million in today's dollars) to repay the debt over 25 years.[12]

We estimate that it would take a $5.50 increase in the per-ton sales price of aggregates to offset the negative impacts of SB 122 under the second, high-cost, alternative. For companies using debt to finance

[11] The internal rate of return (IRR) is a metric used in financial analysis to estimate the profitability of potential investments. IRR is a discount rate that makes the net present value (NPV) of all cash flows equal to zero in a discounted cash flow analysis. Generally speaking, the higher an internal rate of return, the more desirable an investment is to undertake. IRR is uniform for investments of varying types and, as such, can be used to rank multiple prospective investments or projects on a relatively even basis.

[12] This assumes an average interest rate of 7 percent and level annual payments over the 25 year period.

the higher costs, the price increase needed to fully restore investment returns would be as much as $7 per ton.

Impact of SB 122 on End Users

Impact on Product Prices

The bottom line from both our survey and our modeling is that SB 122 will materially increase costs of mining operations, especially those in areas of high WJT density. If these costs are directly passed along to consumers, prices paid by governments and private sector construction contractors will rise commensurately. If mining operators are not initially able to pass along cost increase to consumers, the near-term impact will likely be less mining investment and fewer projects in the WJT areas. This will lead to a reduction in local supply into Southern California markets and product shortages, which will in turn drive up prices in the region.[13]

Thus, while the exact mechanism by which price increase will occur is unclear, higher costs imposed by SB 122 will almost certainly result in higher prices to consumers in Southern California, who will directly pay more for newly constructed housing and commercial buildings, and - as taxpayers - will pay more for highways, schools, and other public infrastructure.

For purposes of our subsequent discussion of impacts on end-users, we are using the $5.50 to $7.00 price increase increase needed to restore investment returns for projects in areas with WJTs as a general indicator of how much WJT would boost aggregates prices into Southern California markets.

[13] In competitive commodity markets, prices are established by several factors, including price elasticity of demand of consumers and production costs of suppliers. If the initial response to SB 122 is less investment and lower supplies by the affected mining operators, there will be a shortage in the Southern California aggregates markets. Such a shortage will cause prices to be "bid upward" to the point where a combination of reduced consumer demand and new supplies into the market restore the balance between supply and demand. Given that demand for aggregates is relatively inelastic most of the adjustment will likely have to come from additional supplies. And, given the high cost of imports and already tight supplies in California aggregate markets, a logical source of these incremental supplies would be mines in high-density WJT areas. In this regard, $5.50 to $7 per ton increase provides a reasonable measure of how much prices would have to rise in Southern California markets to restore production incentives to mines operating in WJT territories and eliminated the gap between supply and demand in Southern California aggregates markets.

Impact of Reserve Depth and Volume Yields on SB 122 Costs

Our internal rate of return calculations in Figure 3 show differing impacts from SB 122 based primarily on the number of WJTs per project acre. A second source of variation, not shown in Figure 3, is the per-acre yield of aggregate product. For purposes of our calculations we assumed the typical project would be in areas with average reserve depth of 50 feet, and that about 90 percent of the product would be marketable. While we believe these are reasonable averages, there can be variations in both measures, but in particular reserve depth. Alluvial deposits in WJT territory are mostly between 40 feet and 60 feet deep, but some areas exceed 100 feet. To provide a general indication of the relationship between acreage and tonnage of reserves, if we assume (1) sand and gravel deposit depths averaging 40 feet, (2) 90 percent of the materials are marketable, and (3) average weight of about 1.4 tons per cubic yard, each acre will yield about 90,000 tons of marketable product. If the reserves are assumed to be 100 feet deep and the other assumptions are held constant, the per-acre yield would be about 225,000 tons. The implication is that the per-ton cost of a specific level of in-lieu fees, tree relocation or compensatory land purchases per acre will be 2 to 3 times greater for projects in shallow reserves than for projects in deep reserves.

Impact of Higher Product Prices on Typical Construction Projects

According to the American Equipment Association (AEM), 400 tons of aggregate are needed to construct the average home, 15,000 tons are needed to construct the average-size school or hospital, and 38,000 tons of aggregates are necessary to construct one mile of a single lane of an interstate highway.[14] Based on these amounts, a $5.50 to $7.00 increase in the price of aggregates would raise construction costs for a typical single family home by between $2,100 and $2,800, the costs for a medium-size hospital, or school facility by $85,000 and $105,000, and the cost of an eight-lane interstate freeway by between $1.7 million and $2.1 million per mile.

Figure 4
Impact of a $5.50 to $7.00 Increase in Aggregates Prices on Various Construction Projects

Type of Construction Project	Type of Construction Project
Interstate Freeway	$1.7 million to $2.1 million per one-mile of an 8-lane freeway.
Hospital or school	$85,000 to $105,000 for average facility
Residential housing	$2,200 to $2,800 for an average single family home

Broader Impacts of Higher Prices on Selected Economic Sectors

Residential construction. Approximately 61,000 residential permits for new construction were issued in Southern California during 2022.[15] Assuming a weighted average of 300 tons of aggregate per unit (a weighted average based on a mix of single family homes and multifamily units), total aggregate demand for new residential construction was about 18.3 million tons during the year. A $5.50 to $7.00 per-ton

[14] Source: Association of Equipment Manufacturers (AEM). "Construction Aggregates 101: What They Are (And Whey They Matter)." August 7, 2023.

[15] Source: "Building Permits by MSA." U.S. Census. https://www.census.gov/construction/bps/msamonthly.html

price increase would translate into additional residential construction costs totaling between $100 million to $130 million for the Southern California region.

Given all of the factors affecting California housing markets, it seems unlikely that a $5.50 to $7.00 per ton increase would, by itself, be enough to keep most residential construction projects from moving forward. It could, however, make a difference in projects where developer profits are already squeezed by state and local regulatory requirements (e.g. inclusionary zoning), developer fees, rising interest rates, high costs and supply chain issues for other commodities (such as lumber), and high costs for land and labor. At a minimum, the price increases would would make California's ambitious goals for new construction a little less attainable.

The more likely alternative is that projects will move forward with the added costs embedded in the price of the home. In these cases, the main effects will be higher rents and mortgages in an area already impacted by extraordinarily high costs in these areas. The impacts on individual homebuyers or renters would be modest. For example, if the $2,900 cost increase for an average single family home were added to a mortgage balance, the annual cost to the homeowner would be about $240 per year. Collectively, however, the impacts of higher rents and mortgages will add up. The additional $130 million in construction costs, if passed along to consumers, will reduce discretionary incomes and spending on other goods and services. These reductions will have negative ripple effects on employment, wages, and profits of companies throughout the region.

Non-residential construction. Federal and state governments have stopped producing detailed data on non-residential permits valuations. Older data, however, as well as indirect information from property tax roll data, suggests that the impacts on the non-residential side of the market would be in the range of $50 million to $100 million in added costs, which if passed along to consumers would generate the same type of leases, and discretionary income and employment as described for the residential construction markets.

State and local governments. The impacts of higher aggregate prices would be substantial for state and local government in the Southern California region. This reflects the large amount of construction-related spending by state and local governments generally, and in particular the large amount of spending on roads and highways, which require substantial amounts of aggregates. The California Department of Transportation has estimated that between 8 percent and 10 percent of highway construction costs are attributable to aggregates.[16]

According to the *U.S. Census of State and Local Governments*, $49 billion was spent by state and local governments in California for construction-related capital outlay in 2021, including about $10 billion for transportation.[17] Based on these totals, we estimate that about $1.2 billion was spent by state and local governments throughout California on aggregates during the year.[18] Of this statewide total, we estimate that about about one-third, or $400 million was spent by state and local governments for projects in Southern California counties supplied by mining operations in WJT territories. A $5.50- to $7-per ton increase in the price of aggregate would raise state and local government costs in this region by about between **$130 million** and **$170 million annually.** About one-half of these totals would impact state

[16] See page 9 of "Aggregate Resource Availability in the Conterminous United States, Including Suggestions for Addressing Shortages, Quality, and Environmental Concerns." William H. Langer, U.S. Department of Interior, U.S. Geological Survey. https://pubs.usgs.gov/of/2011/1119/pdf/OF11-1119_report_508.pdf

[17] See "U.S. Survey of State and Local Finances, 2021 Tables." U.S. Census Bureau. https://www.census.gov/programs-surveys/gov-finances.html.

[18] This estimate is based on the assumption that 9 percent of total transportation capital outlay spending is spent on aggregates (mid-point of the 2007 Department of Transportation estimate of 8 percent to 10 percent) and that about 1 percent of construction spending on other construction projects is spent on aggregates. The latter estimate is based on our review of interindustry spending patterns in the U.S. economy.

government and the other half would impact local governments in the region. Absent higher taxes or a redirection of spending from other government programs, the higher costs will translate into fewer road and highway projects, which will have negative impacts on traffic congestion, employment, wages, and business income in the region.

Conclusion

SB 122 will raise costs to mining operations located in WJT territories. The exact magnitude will depend on how the key provisions of SB 122 are implemented by the Department of Fish and Wildlife, but even under conservative assumptions, the costs will be substantial. Some of these costs will fall on existing operations, imposing new requirements, raising costs, and reducing incomes for existing projects that have already gone through an extensive (and expensive) regulatory and permitting process. Other costs will fall on future projects on permitted lands. In the latter case, mining operators will face potentially major declines in projected investment returns which can only be recouped through higher prices to consumers. To the extent local mining operators are able to pass forward cost increases, end users will experience immediate price increases; if local mining operators are not able to pass forward price increases, the result will be less profits, investment, and production in the Southern California region - an area already facing long-term shortages in permitted production. The loss of production will in turn drive up aggregate prices in the future. All end users will face higher costs, but the impacts will fall particularly heavily on state and local governments, which are major purchasers of aggregates used in construction and improvements to roads and highways. To the extent that lost local production results in more imports from other regions, there will also be significant increased environmental and societal impacts from increased fuel consumption, CO_2 emissions, air pollution, traffic congestion, and road maintenance.

PRESERVATION RANCH, LLC

473 E. Carnegie Drive, Suite 200, San Bernardino, California, 92408

March 31, 2025

[Submitted online to WJT@wildlife.ca.gov]

Subject: Comments on the Draft Western Joshua Tree Conservation Plan

Dear California Department of Fish and Wildlife,

Preservation Ranch appreciates the California Department of Fish and Wildlife's (CDFW) efforts in developing the Draft Western Joshua Tree Conservation Plan. The plan provides a framework for managing and mitigating impacts to the species while identifying conservation priorities to support long-term population resilience. We recognize securing funding for land acquisition, restoration, and management actions is necessary to maintain habitat connectivity and address threats such as climate change, wildfire, and development pressures. However, we have questions regarding certain elements of the plan and believe they require additional clarification.

Defining and Prioritizing Climate Refugia
The draft conservation plan acknowledges the importance of climate refugia for the long-term survival of the western Joshua tree, but it does not clearly define the criteria used to identify these areas or how they will be prioritized for conservation actions. The plan should provide a detailed methodology explaining how climate refugia were modeled and how they will be incorporated into long-term conservation strategies. Clearly outlining these criteria will help ensure that conservation efforts are directed toward the most ecologically significant areas and allow for adaptive management over time as new information becomes available.

Inclusion of Maps and Figures Identifying Predicted Climate Refugia
The draft plan references predicted climate refugia but lacks sufficient visual representation, making it difficult to understand where these critical areas are located within the species' range. Table 4-9, *Percent of Western Joshua Tree Range in California within Conservation Value Categories by Management Unit*, which presents the percentage of the current western Joshua tree range within various conservation value categories by management unit, includes data on predicted climate refugia, buffered climate refugia, and unoccupied future suitable habitat. However, without corresponding maps and figures, it is difficult to assess the spatial distribution of these areas. Providing a map illustrating a clear visual representation of these areas should be provided to enhance clarity and accessibility of the data for stakeholders and decision-makers.

Clarification on the Connection Between Climate Refugia and Conservation Value Categories
The plan should clarify the connection between climate refugia and conservation value categories. Understanding how these classifications overlap or influence one another is crucial for prioritizing conservation actions. Additionally, details on how the described conservation actions will be targeted within these categories must be provided to strengthen the effectiveness of the plan.

Greater Emphasis on Coordination with Federal Agencies
Since the majority of the western Joshua Tree's range falls on federally managed lands, the conservation strategy should prioritize collaboration with federal agencies. According to Table 2-

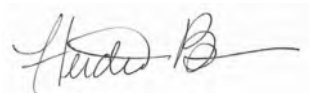
1, *Land Ownership in Western Joshua Tree Range in California*, 63% of the species' range is under federal jurisdiction, with 28% managed by the Bureau of Land Management (BLM). To ensure effective conservation, the strategy must establish a clear path for commitment between state and federal agencies, facilitating coordinated management and targeted investment of mitigation funds on federal lands. This effort should focus on improving and streamlining the implementation of existing agreements, such as the Durability Agreement, to enhance their effectiveness. Developing a more efficient framework for collaboration—beyond general recommendations—is essential to support long-term conservation across the species' range.

Determining Federal Land's Contribution to Climate Refugia
The draft plan states that 63% of the Western Joshua Tree's range is federally owned, but it does not specify what percentage of these lands are predicted to serve as climate refugia. This information is essential for evaluating the effectiveness of the conservation strategy. The plan should include an analysis of how much of the predicted climate refugia falls within federally managed areas to better inform conservation priorities and partnerships.

Transparency in the Conservation Fund's Management and Allocation
The draft plan establishes a Conservation Fund to support mitigation, acquisition, and habitat management, but it does not provide sufficient detail on how funds will be managed or allocated. Greater transparency is needed to ensure that financial resources are directed effectively toward meaningful conservation outcomes. The plan should clarify the criteria used to prioritize land acquisitions and restoration efforts, as well as the percentage of funds that will be allocated to different conservation actions. Additionally, the plan should describe how other conservation funding sources will be leveraged to maximize the program's effectiveness. Coordinating with federal and local funding programs can enhance conservation efforts and ensure efficient use of resources. Furthermore, the fund should ensure that conservation investments are directed strategically, particularly in areas with high conservation value regardless of land ownership. Prioritizing these areas will help maximize the ecological benefits of conservation efforts and support the long-term viability of western Joshua tree populations.

We appreciate the opportunity to provide input on this conservation effort and encourage CDFW to refine the plan by addressing these key areas.

Sincerely,



Heidi Brannon
Preservation Ranch, LLC
heidi@preservationranch.us

VIA E-MAIL: fgc@fgc.ca.gov April 3, 2025

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-209

Re: Large-scale Solar Association's Comments on April 16 Meeting Agenda – Western Joshua Tree Conservation Plan (Agenda Item 14)

Dear President, Vice President, and Members of the Commission:

On behalf of the Large-scale Solar Association (LSA), we submit these comments on the draft Western Joshua Tree Conservation Plan (Plan) and the recent virtual public Western Joshua Tree Workshop meetings (Workshops) hosted by the California Department of Fish and Wildlife (Department) on March 10, 2025.

LSA is a non-partisan association of solar and battery storage developers that advocates appropriate policies to enable market penetration of utility-scale solar technologies in California and the Western United States. LSA's members are leaders in the utility-scale solar industry with extensive technical experience in all disciplines necessary to site, develop, engineer, construct, finance, and operate utility-scale solar and battery storage systems. LSA's member companies are principally responsible for developing much of the operational and planned large-scale solar and storage capacity in California today. Our member companies have experienced environmental and permitting practitioners on staff and as part of project teams who provide natural resources knowledge that is used in support of creative conservation solutions at their project sites.

LSA appreciates the Department's responsiveness to comments made during the February 12th California Fish and Game Commission (Commission) meeting regarding the need for more public engagement on the draft Western Joshua Tree Conservation Plan. The Workshops, however, highlighted the shortcomings of the draft Plan and emphasized the need for a more deliberate and collaborative process in developing the Plan.

These comments outline the following concerns and recommendations regarding the draft Western Joshua Tree Conservation Plan:

- **Technical Concerns:** Relocation and seed collection protocols in the draft Plan are currently infeasible for solar development. In addition to the specific comments in this letter, we have attached our previous letters to the Commission detailing our technical concerns on the draft Plan. These can serve as a reference for distinct recommendations LSA made previously on the draft Plan that we hope the Department will incorporate into amendments in the upcoming version.
- **Process Deficiencies:** Concerns with the process by which the Plan has been developed are outlined below relative to public engagement and timing.
- **Recommendations:** The comments provide recommendations about how the Department can pivot to create a Plan that reflects the true intent and vision of the Western Joshua Tree Conservation Act.

Technical Concerns: Relocation and Seed Collection Requirements
LSA participated in both Workshops on March 10, 2025. Consistent with our prior comments, relocation and seed collection protocols in the draft Plan are currently infeasible for solar development.

Relocation
To be clear, the Act does not require permittees to relocate trees but rather gives the Department the discretion to determine whether permittees should do so, and it provides criteria for relocation should it be required. In this, we urge the Department to exercise restraint considering realities on the ground and the overall goal of the Act.

Much needs to be understood before strict protocols are adopted and universally applied by the Department. The science of the tree and our understanding about relocated tree viability and impact on its surrounding habitat are nascent. Questions that merit our shared attention include the following: Is it best to relocate trees in close proximity to development sites, or is it better to move them to refugia sites? If trees are relocated to where native trees already exist, how close to existing trees should relocated trees be planted? Getting answers to these and other questions validates the need for a 'go-slow- and-learn' approach, rather than a cudgel of premature requirements that may yield questionable results or even result in converse effects.

At the very least, if the Department does require relocation, it should implement a phased approach where the percentage of relocated trees starts small and increases over time in response to the effectiveness of the Act, the measures implemented, and ultimately the reported results of relocation methodologies. Initially, there should be no fixed relocation requirement, but rather smaller relocation efforts that are tailored to advance our scientific

understanding of how to best relocate trees to created specific mitigation outcomes. We should also recognize that different project types (solar, housing, large infrastructure, warehousing) have specific constraints and opportunities when it comes to feasibly relocating trees. Because tree migration in a changing climate will be central to the success of the Plan, LSA recommends that as we and the Department learn about relocation implementation and the Department concurrently work to identify conservation lands that can serve as a stepping-stone and long-term habitat for the species in what will be a warming world. This should be the cornerstone of the Plan.

Along those lines, the Plan should reflect language of the Act in noting that that permittees are not required to acquire and conserve mitigation lands for WJT (1927.3(f)). Since neither the Department nor the parties have sufficient understanding of the species and of relocation and other elements to merit rigorous early relocation requirements, it would be more effective for the Department to work with permittees to ensure resources are directed to where they will have the greatest, and most successful, conservation impact.

Seed Collection

The Plan needs to recognize that project development timelines may not allow for lawful seed collection to occur in every instance. Minimization and avoidance measures, such as seed collection, require permittees to have a WJTCA Incidental Take Permit (ITP), and the issuance of the ITP requires the department to make certain finding under the California Environmental Quality Act (CEQA). Typically, development projects obtain CEQA coverage as one of the last steps in their permitting process, leaving 3-6 months between the completion of CEQA and the issuance of final discretionary permits (building permits, grading permits, ITPs, Lake and Streambed Alteration Agreements, etc.). This narrow permitting window, when coupled with the fact that WJT do not produce seeds every year, could make it difficult, if not impossible, for permittees to lawfully collect seeds in advance of construction. Utility-scale solar projects have strict financial penalties for delaying the date that energy is available to the grid, further constraining a project's ability to collect seeds.

Step-wise Solution: Pilot Projects

LSA recommends the draft Plan initially create pilot projects for WJT conservation efforts before drafting strict regulations that may not work during implementation. Such pilot projects can be real-world testing grounds to understand the species' resiliency in a changing environment during project development and through new mitigation measures. The WJT must – and will – migrate with climate change, and pilot projects will improve our understanding of the benefits (and challenges) of expanding existing and creating new

contiguous habitat for WJT conservation efforts. Such efforts would vet the best regulations to set the WJT up for success under a changing climate.

Plan Development Process Deficiencies

Workshop and Public Engagement

First, we understand the Department is managing a significant workload and that the development of the WJT Plan fell to staff with already-full portfolios. However, it is the responsibility of the Department to ensure that development of this unprecedented Plan is done transparently and with more than cursory public engagement. California has never before developed a comprehensive, species-oriented conservation plan designed specifically to support the presence of that species into the future with the goal of avoiding a listing. Because the WJT is abundant across its range, this Plan touches all forms of development and residential homeowners – posing complex implementation challenges that merit thorough discussion with the parties to identify the proper pathways forward. Unfortunately, rather than providing for this, in the workshop settings the Department has typically referred parties back to the Act itself, rather than engaging in the kind of give-and-take dialogue that leads to shared understanding and problem solving. This approach was repeated in every workshop in which LSA participated, and it served to frustrate – rather than foster – sincere engagement.

LSA understands from the Department that there will be no amendments to the Plan shared in advance of the April meeting, and thus, no meaningful review or comment opportunity will be available at that time, limiting the kind of iterative feedback that leads to an effective and attainable outcome. Further, the Department has stated it will not provide a complete updated draft until the final Plan is up for vote in June. This approach provides not even the pretense of a stakeholder process. To provide a transparent and functional public process, LSA urges the Department to release the final Plan to the public with adequate time for both stakeholder review and comment, as well as time for the Department to amend the Plan as appropriate prior to the June Commission meeting.

LSA acknowledges that the June deadline is legislated in the Act. However, as Commissioner Anderson noted in the February Commission meeting, the Act does not call for enforcement of the deadline; and in this case, haste truly makes waste. Parties and the Department need time to learn how to successfully relocate trees, to identify and purchase the best relocation sites, and to land on shared desired mitigation outcome(s) before committing to strict relocation thresholds. The same diligence and consideration should be applied to seed collection, buffer zones, and other elements LSA has outlined in its previous comments. By taking more time for methodical stakeholder engagement,

science-based analysis, and the crafting of a stepwise program approach, the Department can craft a truly sound Plan that protects both the trees and the solar development that will ultimately mitigate the climate threat.

Conclusion: Implications of the Current Plan

Implementation of the Act is both complex and precedent setting. The Plan, as currently written, fails to recognize gaps in the science of relocating trees and the scarceness of appropriate mitigation sites, thereby unintentionally creating more barriers to building clean energy projects that would help the State meet its climate targets. Rather than integrating environmental and clean energy goals, the avoidance and minimization guidelines in the draft Plan, specifically on buffer zones, relocation requirements, and seed collection, present substantial, and perhaps insuperable, impediments to the development of utility-scale solar projects. As stated in previous comments, those aspects of the draft Plan will so impede solar development as to undermine the conservation purposes of the Act by hamstringing mitigation of the primary threat to the WJT – climate change.

LSA appreciates both your attention in this matter and the work of the Department thus far, and we respectfully urge the Department to amend its course in the development of the Plan. We look forward to deeper collaboration on these issues going forward.

Sincerely,

/s/Shannon Eddy/s/

Shannon Eddy
Executive Director
Large-scale Solar Association

Appendices

- LSA letter to CDFW Re: Draft Western Joshua Tree Conservation Plan (6/14/24)
- LSA letter to CFGC Re: Comments on February 12 Meeting Agenda –Western Joshua Tree Conservation Plan (Agenda Item 15) (1/30/25)

Large-scale Solar Association
2501 Portola Way
Sacramento, CA 95818
Phone: 916-731-8371

6/14/2024

Chuck Bonham, Director
California Department of Fish and Wildlife
715 P Street, Sacramento, CA 95814

Re: Draft Western Joshua Tree Conservation Plan

Director Bonham:

On behalf of the Large-scale Solar Association (LSA) member companies - who represent a significant amount of California's current solar energy generation capacity and are committed to increasing that capacity to support California's transition to a decarbonized power portfolio – we write to offer our comments on the draft Western Joshua Tree Conservation Plan (the Plan), a requirement under the Western Joshua Tree Conservation Act (the Act). The Act provides a roadmap for protecting the culturally and ecologically important western Joshua tree from the impacts of climate change while allowing for the continued development of utility-scale solar energy projects that will reduce emissions and, thereby, help reduce the impacts of climate change on California's plants and wildlife.

The Act requires the California Department of Fish and Wildlife (the Department) to produce the draft Plan for review by the California Fish and Game Commission no later than December 31, 2024 (Act 1927.6(a)). Following passage of the Act, the Department began soliciting input on the Plan. As part of this process, LSA members attended two formal outreach sessions hosted by the Department. Based on the information provided during the sessions, we offer the following comments:

- **Scope and reach of the Plan.** By our reading, the Plan is intended to standardize avoidance and minimization measures that may be included as part of the Department's Take Authorization under the Act (Act 1927.3). The scope of the Plan is therefore limited to activities for which the Department has permitting and enforcement authority under the Act and CESA and would not properly extend beyond that existing legal authority. As the Department has previously stated, western Joshua trees (WJT) are "widespread and abundant" so failure to limit the scope of the plan could result in a de facto land use management plan for 2.5 to 3.4 million acres (Status Review at 18). This was not contemplated in the Act.

  The Department should participate in existing regulatory processes that govern land use decisions within the range of the WJT under its existing regulatory authority.

- **Scale of Avoidance and Minimization Measures.** The Act allows the Department to authorize take of WJT subject to several key provisions (1927.3).

Large-scale Solar Association
2501 Portola Way
Sacramento, CA 95818
Phone: 916-731-8371

Among those provisions are the requirements for the permittee to submit a WJT census, pay the required funds, and avoid and minimize the take of WJT to the maximum extent practicable. The Plan should acknowledge that practical avoidance and minimization of WJT take for large-scale solar projects is different than for projects that operate at smaller scales. For instance, it may be practicable for a homeowner to collect seeds from every WJT in their census or avoid a certain percentage of WJT present within their property, while these same standards would be infeasible for utility-scale solar projects. The Plan should recognize that utility-scale solar projects must be located in close proximity to existing transmission infrastructure. So too, solar projects cannot reduce impacts by building vertically or increasing height as can other types of projects. These factors limit a project's ability to avoid and minimize impacts.

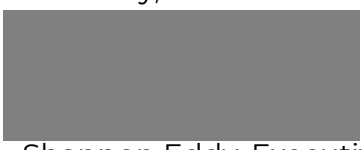
Additionally, the solar industry's contribution to addressing the primary threat to WJT – climate change – should be acknowledged when applying avoidance and minimization standards.

- **Relocation and Compensatory Habitat Mitigation Land.** The Act (1927.3(a)(4)(A) gives the Department the discretion to require the permittee to relocate one or more WJT. However, the permittee cannot be required to relocate WJT off the project development site, i.e., a permittee cannot be required to acquire and conserve habitat mitigation lands for WJT. If a permittee elects to relocate WJT off-site, the permit authorizes such relocation. The Plan should be clear that permittees are not *required* to acquire and conserve mitigation lands for WJT (1927.3(f)).

The state's cross-sectoral decarbonization strategy and vision rely significantly on large-scale solar power. A Plan with the appropriate scope, that acknowledges the scale of renewable energy projects, and avoids duplicative mitigation will ensure that our companies are able to meet the need for more solar development in California's desert region in support of California's battle against climate change.

LSA appreciates the opportunity to submit these Comments on the draft Plan and looks forward to further engagement on these matters.

Sincerely,



Shannon Eddy, Executive Director
Large-scale Solar Association

VIA E-MAIL: fgc@fgc.ca.gov January 30, 2025

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

Re: Large-scale Solar Association's Comments on February 12 Meeting Agenda – Western Joshua Tree Conservation Plan (Agenda Item 15)

Dear President, Vice President, and Members of the Commission:

On behalf of the Large-scale Solar Association (LSA), we submit these comments on the draft Western Joshua Tree Conservation Plan (WJTCP). While we recognize the importance of conserving the Western Joshua Tree, we urge the Commission to ensure the Plan strikes an appropriate balance between protecting the species and advancing California's critical clean energy goals. Utility-scale solar projects are essential to the state's efforts to mitigate climate change, which is the greatest long-term threat to the Western Joshua Tree and its desert ecosystem.

LSA is a non-partisan association of solar and battery storage developers that advocates appropriate policies to enable market penetration of utility-scale solar technologies in California and the Western United States. LSA's members are leaders in the utility-scale solar industry with extensive technical experience in all disciplines necessary to site, develop, engineer, construct, finance, and operate utility-scale solar and battery storage systems. LSA's member companies are principally responsible for developing much of the operational and planned large-scale solar and storage capacity in California today. Our member companies have experienced environmental and permitting practitioners on staff and as part of project teams who provide natural resources knowledge that is used in support of creative conservation solutions at their project sites.

Utility-scale solar projects play a key role in reducing greenhouse gas emissions, stabilizing ecosystems, and protecting species like the Western Joshua Tree from the devastating impacts of climate change. With between 3.1 to 4.9 million Western Joshua Trees across a 2.5- to 3.4-million-acre range,[1] the species is not threatened or endangered, and conservation strategies should reflect this context. Conservation actions should focus on practical and scientifically supported measures while avoiding unnecessary burdens on solar development that could slow California's transition to clean energy.

[1] California Department of Fish and Wildlife (2022) *Report to the Fish and Game Commission – Status Review of Western Joshua Tree (Yucca brevifolia)*. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=201995&inline.

To that end, these comments outline the following concerns and recommendations regarding the draft WJTCP:

- **Buffer Zones**: The proposed buffer zones for Western Joshua Trees are overly rigid and fail to account for site-specific conditions. Flexible, site-specific guidelines will achieve a better balance between habitat protection and clean energy development.
- **Relocation Requirements**: Relocation protocols are currently infeasible. Requiring projects to purchase additional lands to relocate trees to (in addition to other mitigation requirements) is a high cost with a questionable success rate. The Department should consider the practicality and success rate of implementing such requirements to ensure resources are directed to where they will have the greatest impact. Additionally, the Department should align relocation requirements with fee zones.
- **Seed Collection**: Because WJT do not produce seeds every year, it may not be possible to collect and harvest seeds (if available) in the narrow permit window between project approval and construction start. Additionally, the draft Plan offers no directive on seed storage. Seed collection requirements merit more consideration and discussion with affected stakeholders.

As the Commission is aware, the Western Joshua Tree Conservation Act (WJTCA or Act) exempts the Department of Fish and Wildlife (CDFW or Department) from the rulemaking requirements of the Administrative Procedure Act (APA) for adopting (1) relocation guidelines and protocols and (2) standardized survey and assessment methods for the annual reports provided by local governments. Fish and Game Code § 1927.3(a)(4)(C) [relocation]; §§ 1927.3(c)(6)(B) and 1927.4(c)(2) [annual assessment]. The Act contains no other exemptions from APA rulemaking requirements, for either CDFW or the Commission.

At the same time, the Act directs the Department to "develop and implement a Western Joshua Tree Conservation Plan" that includes, inter alia, "guidance for the avoidance and minimization of impacts to" Western Joshua Trees and "protocols for the successful relocation of" Western Joshua Trees. Fish and Game Code § 1927.6(a). The Act requires the Department to submit a draft Conservation Plan to the Commission for its "review and approval" and specifies that the Commission must "take final action on" the Conservation Plan by June 30, 2025. Fish and Game Code section § 1927.6(a).

It must be stated that both the avoidance and minimization guidelines and the relocation guidelines and protocols developed by the Department and included in the draft Conservation Plan present substantial, and perhaps insuperable, impediments to the development of utility-scale solar projects. The Department can be expected to impose the "guideline" avoidance and minimization measures and relocation requirements in incidental take permits (ITPs) issued pursuant to the Act. Therefore, if left unchanged,

those aspects of the draft Conservation Plan will so impede solar development as to undermine the conservation purposes of the Act by hamstringing mitigation of the primary threat to the Joshua tree – climate change. Thus, we respectfully request the Commission, in the course of its review of the draft Conservation Plan, to refuse to give its approval unless and until the draft is revised appropriately, as explained below, to account for the size and complexity of utility-scale solar projects. It is important that the Commission not rubber stamp the draft Conservation Plan.[2]

Concerns with Avoidance, Relocation, and Restoration Requirements

The proposed avoidance, relocation, and restoration elements in the draft Plan present significant challenges for utility-scale solar projects. The proposed buffer zones for Western Joshua Trees are overly rigid and fail to account for site-specific conditions. There is insufficient evidence to suggest that ground disturbing activities within close proximity of a WJT will adversely affect that individual. While protecting root zones and seedbanks is important, overly large and inflexible buffers unnecessarily constrain solar project siting, and WJT relocation, without providing proportional conservation benefits. In many instances, these buffers require solar companies to mitigate for trees on adjacent properties based on the unsubstantiated belief that these neighboring trees may be impacted. LSA believes additional science is needed before ridged buffers are established. Flexible, site-specific guidelines will achieve a better balance between habitat protection and clean energy development.

Relocation requirements should use zones that match the Act's fee structure. That is to say, the Department should have lower relocation and seed collection requirements in the lower fee zone. The establishment of the two zones is an intentional and critical component of the Act that allows for WJT conservation to occur without impeding critical development projects that are vital to the state's economy, including but not limited to utility-scale solar.

Relocation protocols, as outlined in the draft Plan, are currently infeasible. The requirement to relocate mature Joshua Trees over 10 feet in height or with several branches has demonstrated very low survival rates. Also, to relocate trees, there must be land to which to relocate them. The vast majority of the land within the range of the WJT is under federal control (BLM, DoD, USFS, etc.) and is unavailable for WJT relocation. The remaining land is difficult to acquire, as evidenced by the Department's inability to purchase similar

[2] While the Department appears to be of the view that the Relocation Guidelines and Protocols it has developed and included as Appendix E of the draft Conservation Plan have regulatory effect (i.e., have the force of law) because it was not required to conduct APA rulemaking before adopting them, it is not clear that is the case because the Conservation Plan, in which they are to be incorporated, must be reviewed and approved by the Commission. Moreover, it is not clear that even the Commission approval would given Conservation Plan and its contents regulatory effect unless approved pursuant to APA rulemaking. The same holds for the Conservation Plan's avoidance and minimization measures (section 5.2.1), which the Act did not exempt from APA rulemaking for adoption by the Department.

conservation land with the WJT Conservation Fund. The draft Plan neither acknowledges nor addresses this fundamental flaw.

Requiring projects to purchase additional lands to receive trees (in addition to other mitigation requirements) is a cost that will ultimately be borne by ratepayers already struggling with rising electricity bills. A more practical approach would be to prioritize relocating younger trees to bolster populations, or to establish new populations within the range of the tree. Before suggesting arbitrary percentages of trees to be relocated, the Department should demonstrate that such lands can be acquired (perhaps through use of the WJT Conservation Fund) and make these lands available for WJT relocation. Otherwise, the practicality and success rate of implementing such requirements is questionable, at best. LSA requests that this be remedied in the Plan prior to being finalized.

Relocation efforts should not only focus on conserved or "wild" areas. Relocated Joshua trees could also be used as landscaping for public places and to enhance their visibility to the public. Indeed, one of the goals of the Plan is to allow people to interact with WJT. To accomplish this at least some of the trees should be relocated to urban areas where they can meet people where they are.

Seed collection and propagation are important components of habitat restoration and genetic diversity preservation. However, the Plan must recognize that WJT do not produce seeds every year. Utility-scale solar projects, like other development projects, require discretionary permits, leaving less than one year between permit issuance and start of construction. This timing may not allow for seeds to be collected and harvested (if available) in the narrow window between project approval and construction start. It is, of course, imprudent for project developers to collect seeds for a project that may not be approved.

In addition, the Plan has no directive for storing seeds, nor does it appear the Department is proposing to create a seed vault to protect or propagate the seeds at a later time. This gap in planning is antithetical to the purpose of collecting the seeds, and it undermines the purpose of seed collection. While we appreciate that this draft Plan was developed on a short timeline, it is clear that seed collection merits more consideration and discussion with affected stakeholders prior to being finalized.

As with relocation, seed collection has very little benefit to WJT if there is no plan to plant the seeds. Developers are well-positioned to contribute funding and logistical support for these programs, but the burden of seed collection should not disproportionately fall on solar projects, especially given the industry's significant contributions to conservation funding overall. With most of the range of the WJT overlapping with federal lands, it's hard to imagine close cooperation on this front under the current political environment. For these reasons, seed collection should be encouraged, but not required, under the WJTCP.

The Critical Role of Utility-Scale Solar in Climate Solutions
As the fifth largest economy in the world, California's plan to achieve a net-zero carbon economy by 2045 remains a north star in the nation's effort to meet the climate imperative. To achieve this goal, California is expected to add more than 165,000 Megawatts (MW) of new utility-scale clean energy to the grid, including approximately 70,000 MW of utility-scale solar.[3] Siting these solar projects will require an estimated 600,000 to 700,000 acres of land in a state facing multiple land-use pressures, visionary conservation targets, and unprecedented climate impacts. This nexus between clean energy goals and land availability demands strategic planning and creativity. With solar as the backbone of California's climate strategies, minimizing and mitigating species impacts while accelerating the siting and operation of these projects is key to ensuring California meets its clean energy goals sustainably.

Solar developers are also likely to serve as the largest source of funding for Western Joshua Tree conservation under the draft Plan. Mitigation fees and other contributions from the industry will enable critical actions such as habitat restoration and long-term monitoring. However, these funds must be used efficiently to prioritize impactful measures that address real threats to the species, rather than imposing excessive requirements that hinder clean energy progress.

As California strives to meet its goals, especially at a time of unprecedented federal action against climate change, LSA supports implementing conservation and mitigation efforts for the Western Joshua Tree that allow for and even encourage the efficient deployment of clean energy technologies. The draft Plan should pursue the benefits of expanding existing and creating new contiguous habitat for WJT conservation efforts. The Commission should specify coordinated use of WJT Conservation Fund resources to aid in the establishment of relocation areas, seed collection, and propagation programs, and it should advance the science on how WJT may be impacted by adjacent disturbance.

The Role of Solar Industry in WJT CP Development
Utility-scale solar developers are key stakeholders in this process and should be actively involved in shaping the Conservation Plan. The industry's direct experience with avoidance, relocation, and restoration measures can provide valuable insights to ensure policies are practical, effective, and aligned with California's clean energy and conservation objectives.

Conclusion
We urge the Commission to adopt a balanced and pragmatic approach that supports both the conservation of the Western Joshua Tree and the rapid growth of California's renewable energy infrastructure. By focusing on practical, science-based strategies and avoiding

[3] California Independent System Operator (2024) *2024 20-Year Transmission Outlook*. https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/20-Year-transmission-outlook-2023-2024.

overly burdensome requirements, the Conservation Plan can achieve its dual objectives of protecting the tree while ensuring clean energy development continues apace.

Thank you for considering our comments. We look forward to continued collaboration with the California Fish and Game Commission to advance these shared goals.

Sincerely,

/s/Shannon Eddy

Shannon Eddy
Executive Director
Large-scale Solar Association

April 3, 2025

California Department of Fish and Wildlife
Habitat Conservation Planning Branch
Attn: Drew Kaiser
P.O. Box 944209
Sacramento, CA 94344-2090

Submitted via email to: WJT@wildlife.ca.gov, Andrew.Kaiser@wildlife.ca.gov, HCPB@wildlife.ca.gov

Re: Environmental Organization Comments - Western Joshua Tree Conservation Plan

Dear Mr. Kaiser:

Thank you for the opportunity to comment on the Western Joshua Tree Conservation Plan (WJTCP). The following comments are submitted on behalf of the California Native Plant Society (CNPS), Western Watersheds Project, Friends of the Amargosa Basin, Californians for Western Wilderness, Basin and Range Watch, Audubon California, Friends of the Inyo, and Defenders of Wildlife.

CNPS is a non-profit environmental organization with over 13,000 members in 36 Chapters across California and Baja California, Mexico. CNPS's mission is to protect California's native plants and their natural habitats, today and into the future, through science, education, stewardship, gardening, and advocacy. We work closely with decision-makers, scientists, and local planners to advocate for well-informed policies, regulations, and land management practices.

The mission of Western Watersheds Project (WWP) is to protect and restore western watersheds and wildlife through education, public policy initiatives, and legal advocacy.

The mission of Friends of the Amargosa Basin is to: "Support the diversity of life in the Amargosa Basin by protecting its land, water, and beauty."

Californians for Western Wilderness advocates for and educates about the importance of protecting public lands across the West. Native plants and animals are critically important components of any landscape, needing protection in their own right.

Basin and Range Watch works to conserve the deserts of Nevada, Arizona and California and to educate the public about the diversity of life, culture, and history of the ecosystems and wild lands of the desert.

Audubon's mission is to restore and conserve natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.

Friends of the Inyo protects and cares for the lands of California's Eastern Sierra.

Defenders of Wildlife is a national non-profit organization founded in 1947 and is dedicated to the protection of all native animals and plants in their natural communities.

We appreciate the time and effort that the Department has made in the preparation of the Conservation Plan, including the comprehensive review of the biology, life history, reproduction, and population trends of the western Joshua tree (WJT). An extensive

amount of scientific information was used to develop this plan, and science is the foundation of the actions it prescribes.

While there is much more research to be done, we must rely on the best currently available science. The plan will be updated as new information becomes available, and many of the recommendations of the plan, from the census of trees to the careful tracking of transplanted individuals, will provide the information needed to ensure that the plan is effective for the conservation of WJT while not being overly restrictive. For example, if the current transplantation protocols are shown to be more effective than has been predicted, the number of trees that would need to be relocated to meet conservation goals could be reduced. This will not be known unless the department implements the plan and begins to track its effectiveness.

Comment letters that claim that there is not sufficient evidence to show that the recommended buffer zones for individual trees are needed are not backed up by sufficient evidence to recommend that these buffers are not needed. However, there may be a need for separate guidance for developed and undeveloped areas. We feel that allowing for exceptions on residential properties or where existing development or disturbance is within the buffer zones may be necessary to ensure that buffers do not pose an undue burden to maintaining existing facilities or for homeowners maintaining their properties. Exceptions for certain situations where impacts have already occurred within buffers or where there is insufficient space on a residential property to apply a buffer while implementing necessary infrastructure improvements or other actions unlikely to negatively impact WJT should be taken into consideration.

While we are in support of the development of renewable energy sources these projects should not come at the expense of intact WJT habitat. We advocate for the siting of renewable energy, housing, and industrial/warehouse developments in low conflict areas, such as urban infill, degraded ag-land, and rooftop solar while avoiding the development of intact habitats across California.

Removing or weakening any requirements of the conservation plan prior to additional information gathering would be counterintuitive given the scientific justification for the current management recommendations. We agree with the determinations of the CDFW scientists tasked with the evaluation of the WJT. With the management actions proposed in the Draft Conservation Plan and future updates informed by data collected, we are confident that there will be a balance between the conservation needs of the western Joshua tree and other land uses. Thank you for the opportunity to comment on the development of the conservation plan and please contact us if you have any questions.

Sincerely,

Brendan Wilce
Conservation Program Coordinator
California Native Plant Society
bwilce@cnps.org

Laura Cunningham
California Director
Western Watersheds Project
lcunningham@westernwatersheds.org

Cameron Mayer
Executive Director
Friends of the Amargosa Basin
Cmayer@friendsoftheamargosabasin.org

Michael J. Painter
Coordinator
Californians for Western Wilderness
mike@caluwild.org

Kevin Emmerich
Co-Founder
Basin and Range Watch
atomicquailranch@gmail.com

Mike Lynes
Policy Director
Audubon California
Mike.Lynes@audubon.org

Wendy Schneider
Executive Director
Friends of the Inyo
Wendy@friendsoftheinyo.org

Pamela Flick
California Program Director
Defenders of Wildlife
pflick@defenders.org

From: Krystian Lahage [redacted]
Sent: Thursday, April 3, 2025 2:50 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Comment for April 16th Meeting Item on Western Joshua Tree

Good afternoon commissioners,

Today I am speaking in support of the draft Western Joshua Tree Conservation plan on behalf of the Mojave Desert Land Trust (MDLT), a nonprofit organization based in Joshua Tree, CA. MDLT works on landscape acquisition, restoration, and conveyance, seed banking, education, and wildlife conservation in the California portion of the Mojave and Colorado deserts. I write to share our support for the draft conservation plan for the species.

Climate change, increasingly frequent wildfires, and human development all pose existential threats to the western Joshua tree that require collaboration and unified management to counter. Several peer-reviewed studies show that much of the Joshua tree's habitat may be climatically unsuitable at the end of the century under shifting temperature and precipitation patterns projected by certain climate scenarios. Besides its status as one of our state's most iconic fauna, Joshua trees play an integral part in our functioning desert ecosystems necessary for carbon sequestration and climate regulation and are a significant economic driver for tourism to the area. MDLT has been actively engaged in the species' conservation through land conservation, seed collecting, research, and coalition-building.

With funding from California's wildlife Conservation Board (WCB), MDLT initiated the Joshua Tree Conservation Coalition (JTCC) comprised of experts and land managers from agencies and organizations including the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, Native American Land Conservancy, U.S. Geological Survey, California Department of Fish and Wildlife, and the Mojave Desert Land Trust. This coalition will address the need for swift action and strong partnerships in combating these threats. Ultimately, it will compliment and align the state's conservation plan by providing the science-based structure and information necessary to effectively monitor and conserve the Joshua tree.

This draft conservation plan is a crucial base for the state's role in the species' conservation. To date, the Western Joshua Tree Conservation Act has led to minimal acquisitions of Joshua tree habitat. By establishing protocols for annual monitoring and reporting, the state's plan will provide more actionable information to agencies about viable Joshua tree habitat for acquisitions. The plan also uses the latest science to look forward into what lands may be suitable climate refugia should current climate trends continue.

Management actions implemented by the plan are not new statutory or regulatory mandates, but instead guidelines to be voluntarily adopted by industries, land managers, and others who seek to conserve the species. Reflecting the collaborative approach needed for such a task, the plan enables implementable management actions for the public, researchers, local governments, and project developers. These voluntary management actions including impact avoidance, land conservation, tribal co-management, research, and education provide means to protect the species without incurring additional regulations.

With Joshua tree habitats existing on a complex tapestry of private, state and federal lands, this plan will prove foundational for the multi-pronged conservation approach needed to not only protect the Joshua tree but protect the desert ecosystem our communities rely on. We need to take innovative, coordinated, and bold action if we want to ensure the future of one of North America's emblematic species – implementation of this plan is the essential first step towards that goal. Thank you for your leadership and for the opportunity to be involved in this important mission.

Thank you,

Krystian Lahage

Krystian Lahage *(he/him)*

Public Policy Officer

Phone: 760-366-5440 x257

Email: krystian.lahage@mdlt.org

P.O. Box 1544 | 60124 29 Palms Hwy | Joshua Tree, CA 92252

Follow us! Facebook | Twitter | Instagram | LinkedIn

From: Wildlife Western Joshua Tree <wjt@wildlife.ca.gov>
Sent: Thursday, April 3, 2025 2:47 PM
To: FGC <FGC@fgc.ca.gov>
Subject: FW: WJT Process Improvement Suggestions for Discussion on Friday

Not sure if Ms. Gilbert sent you this separately, but if not, I think she wants it in the record even thought it pertains mostly permitting.

Sign up to receive WJT updates from CDFW

From: Ellsworth, Alisa@Wildlife [redacted]
Sent: Friday, March 14, 2025 4:11 PM
To: Wildlife Western Joshua Tree <wjt@wildlife.ca.gov>
Cc: Wood, Brandy@Wildlife [redacted]
Subject: FW: WJT Process Improvement Suggestions for Discussion on Friday

Hi Drew,

Julie Gilbert asked Brandy and I to forward the attached narrative to you as public comment for the WJTCA workshop this last Monday. We did meet with her and talked through some of her concerns and then said we would share this document with you.

Thank you,

Alisa Ellsworth, Environmental Program Manager
California Department of Fish and Wildlife
Inland Deserts Region, North
787 North Main Street Suite 220
Bishop, Ca 93514
(760) 937-2519
Alisa.Ellsworth@wildlife.ca.gov

From: Julie Gilbert [redacted]
Sent: Tuesday, March 11, 2025 10:28 AM
To: Wood, Brandy@Wildlife [redacted]

Cc: Ellsworth, Alisa@Wildlife [redacted]
Subject: WJT Process Improvement Suggestions for Discussion on Friday

Hello Brandy and Alisa – I tried to put together something for discussion on Friday. I would hope that this will get to your management for consideration. I am doing this on my own time, not paid by anyone, have very little free time, so it is still rough, but hoping we can have real discussion about this.

Thank you again for meeting with me.

Julie Gilbert
President
Compass Consulting Enterprises, Inc.
PO Box 2627, Avalon, CA 90704
Phone: (909) 496-5960

Agenda for Friday 3/14/25 Meeting with Brandy Wood

Thank you for agreeing to meet with me on Friday. Again, my goal is to really help work through this for a solution that is workable for everyone. Right now, I think the CDFW staff is implementing this as a cheap CESA and not the streamlined process focused on conservation as the Act intended. However, by being strategic with the Plan definitions and processes, you CAN offer relief across the board. I would really hope that your management can review this and attend.

This document contains suggested process improvement to identify middle ground in accordance with the Act.

The Plan is the implementing tool of the Act – just like a General Plan has Implementing Policies. You ABSOLUTELY DO have a lot of latitude to make this work. The Act does not restrict you to the permitting requirements of the Plan. It is strictly CDFW management's interpretation of how to implement the Act that is restricting and burdening this entire process. You have no way to exempt SFRs, utilities and infill per the Act unless you let up on some of the Plan permit requirements.

Honestly, I think the crux of the issue is the following that needs to be improved upon:

- Take – this means to kill the tree, or any part thereof, ie, a root. CDFW is assuming take for every project, including project types where there would be no take of trees or roots.
- CEQA – need to allow CEQA exemptions
- Census – the Act specifically restricts the census to the Project Site. It is the Plan that is requiring the census in the buffer which can explode a project into thousands of trees. The justification for the off-site buffer assumes "perceived" impacts to root systems, when in fact, there may not be any impacts to trees or roots in some projects.
- Mitigation Option **OR** Fees – the Act says permittees must mitigate "roughly proportional to the take" OR pay the fees. CDFW is charging fees on perceived take and not providing guidance on what would be suitable mitigation that is "roughly proportional to the take." Hi Desert Water District, for example, would have to pay $17 million in fees even though they are not "killing" or "taking" one tree. So how is that fee "roughly proportional" when there is no take, and when there is no mitigation offer. Mitigation should be "roughly proportional."

Honestly if the species were super imperiled, I could see being so strict with the "implementing policies," but it is not imperiled. Even the Plan admits the Act was a backdoor way to keep it protected because the Commission could not decide. So I think you are left with just being more strategic to reflect what you are really trying to accomplish while managing the burden that the implementation policies in their current form are placing on everyone.

Also, when you encourage people to meet about their specific project directly with staff, that is great. BUT, the outcome has to be equally applied to similar projects. Meeting behind closed doors is not very transparent.

We are in this for 10 years with honestly no way out because this is a climate-change-issued listing that should have never happened. There is no end to climate change. But 10 years of these draconian measures to these communities is HUGE and will decimate these communities.

For discussion on Friday:

1. **CEQA**: Please check with your legal counsel. So far, the only document that CDFW has said would be acceptable is nothing less than an Initial Study. That even goes for single family homes, which would normally be ministerial – an Initial Study for a SFR is overkill, and requires a full Planning Application, etc. I am of the opinion that the way the Act is written, someone can get a "permit" and pay a fee that substitutes for/satisfies mitigation. Therefore, this could be seen as nothing more than a standard permit like one would get for streambed alteration, construction from the water board (NOI, SWPPP, WQMP). Compliance with laws and obtaining permits is not mitigation. Thoughts?

   Suggestion: Return the power of CEQA determination to the Lead Agency – if that is a CEQA Exemption, so be it. It might be a CEQA Exemption filed with SCH as ministerial for SFR and the more in depth CEQA Justification for a CEQA Exemption for In-Fill, Existing Facilities, etc. For SFRs, the jurisdictions could have their planning department file a Notice of Exemption showing the ministerial exemption statute, grading permit issued once proof of permit is provided, and it's done. Accepting the Lead Agency's CEQA determination would be way helpful and reduce A LOT of time and cost.

2. **Define and Differentiate "Root Encroachment" for purposes of avoidance and minimization and "take" which has to be mitigated OR pay fees.** It seems that the issue with the buffer is to protect the roots. Roots are below the ground, correct? Typically about a foot or two, correct? So how would there be "root encroachment" if you are not digging, but just doing surface work, such as road surfacing, pouring a driveway, installing a fence (post not included) or SCE staging on the road to do overhead line work, etc. ie. no digging. How does this qualify as "root encroachment"?

   Suggestion: Provide a definition in the Plan of "root encroachment" to mean "work that is performed underground where roots are present, or work that impacts a visible root." There also has to be a differentiation between "root encroachment" and "root take" which would technically mean to "kill a root." Technically, under 1927.3 (2) you can authorize a permit if someone "avoids and minimizes impacts to… the maximum extent practicable." So how is doing surface work not "avoidance?" Please also define "root take" because in theory, "take" is all that you are authorized to mitigate via fees under the Act. The only way to kill a root would be to severe it from the tree in a manner that would impact the tree, or cause the root to die or be "killed," correct? And, as I recall, not ALL roots are key to the tree's survival. So in theory, a root could be cut, and the tree still survives. Also, in relocation, you are severing the entire rootball, and the tree survives. The Act was clear that there are methods to avoid and minimize root encroachment – your permit under the Act for mitigation is actual TAKE.

   A permit matrix is provided at the end of this document. I can see there being some construction best management practices for surface work (no digging) like placing an orange fence at the dripline of the tree in accordance with arborists standards, and biological monitoring. This goes back to what the Caltrans biologist stated today, and for all the other linear projects that only do surface work. As stated, "root

encroachment" should only be defined as truly digging where a visible root system is present.

3. **Stick to the Census Being Provided on the Project Site Per the Act vs Including Off Project Site.** Again, this addresses the buffers, which is solely for "root encroachment" and the absolutely craziness of doing the census and mitigation for trees in the buffer off the project site. Section 1927.3(a)(1) states the census of "all western Joshua trees on the project site..." To require the census to go off-site, especially with binoculars or whatever that you can't get any good data, how is this helpful? This is a tree, not a bird, and not all projects require digging that would kill the root zone. Recommend you stick to "the project site" per the Act. The only way to include trees off the "project site" would be if the work would include digging or grading in the potential root systems, defined as root ball, of the off-site tree. Since you do not have balanced "best scientific data" that includes how projects have been constructed in the urban areas over the past decades, you cannot make the kind of conclusions you are making.

   Suggestion: For projects that would be digging, instead of making them do a census now and pay the fee based on some "perceived root encroachment zone" have them monitor the work in the "Project Site" and if a biologist notices that the trench has a Joshua tree root, then he can trace it to that tree, and that tree documented and paid for. Instead of paying the fee up front, then perhaps require them to provide a final report that identifies all of the trees where roots where roots were severed, not perceived "root encroachment." There are a ton of underground projects that can work around the roots, not sever them, and they are fine, with a biologist's blessing. Therefore, remove the "perceived" root zone and only hold them accountable for the "actual root encroachment/sever/kill." Under Section 1927.5 (c), you can charge a flat fee for more of a "notification" type permit with a followup requirement. See the matrix for suggestion.

4. **No Mitigating for Off-Site Trees**. Again, check with your legal counsel because I believe this to be illegal. At least, this is extremely problematic to require to pay the fee for a tree that is 50 feet away from the "project site," on someone else's property, just because they are within the buffer zone. Example: Mrs. Jones puts in the sewer line on her property near her driveway. Her sewer line is within 50 feet of Mrs. Browns Joshua trees, also where a sewer line would be located. Mrs. Jones then pays for her Joshua Trees AND Mrs. Brown's Joshua Trees. So how is Mrs. Brown's trees handled? Does Mrs. Brown get to take her trees for free because Mrs. Jones paid for them? Or is Mrs. Brown also expected to pay for her trees that Mrs. Jones paid for, thereby causing double mitigation for the same trees? Additionally, public agencies, such as Caltrans, Mojave Water Agency, Hi Desert Water District, cannot provide funding for trees on private property that ultimately benefit the private property owner – that is a gift of public funds. Therefore, again, stick to the ACT – "PROJECT SITE." The Project Site is defined as the actual area of work – that's it. The actual work for a pipeline might be – within a 24-foot-wide road, develop an 3-foot-wide by 6 foot deep trench, place the pipe. Cover. Staging and storage areas could be within the lots, adjacent to a WJT, with an orange fence installed around it in accordance with arborists standards – something that represents the drip line of the tree based on its size. Done. You have eliminated a lot of issues. Biologists monitor, if they discover a root, they go under the root, no lethal harm to

the tree, but they GPS the tree, it is recorded, and THEN WHAT? Generally, that other tree is on a different property. THIS HAS TO BE ADDRESSED.

5. **Root Impact Studies in Urban Zones**. Per many commentors, there is no evidence at all that root encroachment has harmed trees. All of the jurisdictions over the years have issued construction permits where they come right up next to the tree, and it's fine. You REALLY need to include this in your studies in order to provide a balanced approach. Until you have the "best scientific data" that is balanced, there is no basis to "assume" take in some perceived buffer. There are multiple reports from desert plant biologists for all these projects that have been constructed over decades, and no harm has come to the trees. You could ask the cities and counties to provide copies of the reports for previous projects and send someone out to inspect the tree.

   Suggestion: suspend for one year the whole "root buffer" and spend some time and really study the real-world impacts of construction projects that have already occurred. For the notification projects, you can also follow up . Replace it with a clear definition of "root encroachment" per the Act to mean actual "root kill" where the root has been severed from the tree (which kills the root which is part of the tree).

6. **Expand Relocation Availability**. You are going to need to find where these trees can be relocated. Can some of the land you purchased be used to relocate these? Seriously, no one wants them. I used to work for San Bernardino County Public Works (before you came on board) and I remember getting calls from new homeowners all the time asking if we were going to be removing any and could they have them in their yard. I would call tree relocation companies and they said they too got calls all the time from homeowners who wanted to accept relocated trees for their yard, and a few even had a waiting list. But not now.

   Since relocation is optional, then I recommend that if you or the applicant do not have a spot for them, then do not make it mandatory in any permit. And if they are on private property, how is this going to be handled? Maybe the homeowner decides a few years later they want to put a fence within 50 feet of the relocated tree… can they do that? Will they need a permit? YES – which is why no one wants them.

   Suggestion: allow them to be relocated on the same property in SFR and in landscaping for in fill developments. This maintains the same location as the tree originally was for genetics and facilitates the development. This should actually be encouraged. While the Act does not specifically identify the fee for relocation, you could encourage this by charging the reduced fee. Allow for relocation on tribal and CDFW mitigation lands.

7. **Add Relocation Spacing in Guidance.** How far apart can these be relocated? Thinking of homeowners that may want to relocate on other areas of their lot.

8. **Mitigation for Dead Trees.** Why are we paying mitigation for dead trees? Are they not a fire hazard? Nowhere in the act does it say you HAVE to charge a fee for a dead tree – this is staff discretion. *Suggestion:* remove the requirement to pay mitigation fees for the dead trees.

9. **Conservation Measure Accountability.** You mentioned in the workshop you would work on that. That is good to hear. There is absolutely no way to track progress on a species listed due to climate change, in my opinion, so good luck with that.

10. **Permit Issuance Timeline**. The 12 to 18 months has got to improve, and I know you all are working hard. Again, this species is not imperiled – the Act was a backdoor move because the Commission could not make a decision. And we are in this for 10 years! So, with better definitions, and a more clear fee structure, should help streamline this. The Act was supposed to be more streamlined, not a cheaper CESA permit that has to be agonized over. I don't think that is the intent.

    Suggestion: why not do something like your streambed permit where 30 days for completeness, and 60 to issue the permit. See the matrix

11. **Define what is meant by "measures required to meet this obligation shall be roughly proportional in extent to the impact of the authorized taking**.." What is "roughly proportional?" Do you know? Can you provide an example? So in the Hi Desert Water District's sewer project, for example, they will move the pipe to go under the roots system – They have not removed the tree or killed the root. They have not taken or removed any tree. What is "roughly proportional" to not severing a root or removing a tree (or kill, which is the CDFW swim lane)? How is digging next to a tree, avoiding the roots, not severing the roots "roughly proportional" to having to pay for all trees within 50 feet of the tree? Please provide examples.

    Suggestion: stay within the swim lane of the Act – you regulate actual take, not perceived or assumed take of the tree or any part thereof.

12. **Define "in lieu of completing the mitigation obligation on its own, permittee may elect to satisfy.. by paying fees."** Please provide legal counsel opinion. What is the mitigation obligation under the permit that they have to satisfy in which they can elect to pay the fee instead? Please define. Please provide examples. I think 19727.3 is the most confusing and needs A LOT of explanation. What "mitigation obligation" is available where the permittee would NOT have to pay fees? Right now, the fees are just being charged on everything.

If you implemented the above, larger projects such as the Hi Desert Water District sewer project, Mojave Water Agency linear projects, and the Big Horn Water Agency water line projects (and I have a few others in the wings that are similar from other agencies and utilities) would be impacted this way (with further development in the attached matrix).

- Project Site is defined as the road or disturbed right-of-way where the "project site" occurs ONLY.
- The Project would need a permit to encroach on root systems that are yet undefined. Fees would be paid at the end of the project based on actual take, meaning only those trees that are removed or roots killed.
- Sewer lines are going under roots, not severing the roots, which qualifies as avoidance and minimization, not mitigation.
- Fee would be assessed for mitigation on the actual root "KILL" or TAKE, which is defined as a root that is severed, as observed in the field, certified by the biologist, to be collected on a

final report. Lets say they truly sever the roots of 20 trees mid-size trees. That is a lot better than the $17 million in mitigation fees (which is more than half their grant) they would be responsible for, for all the trees in the "perceived" 50 foot buffer zone.
- Permit issued within 90 days which allows them to proceed.

If you implemented the above for SFRs and In-Fill projects:

- SFR or Infill processed as normal by CEQA Guidelines through Lead Agencies. Exemptions filed at the State Clearinghouse (required by State Clearinghouse anyway)
- Relocation to another portion of the lot represents "mitigation roughly proportional to the taking" that will facilitate development. They are also not responsible for paying any fees because their "mitigation is roughly proportional to the take."
- Some removal of trees still required (fees required per the Act), for trees that cannot be relocated to accommodate the development. While I don't anticipate this to be common, there will be trees that cannot be relocated. Relocate to your conservation land that you bought or tribal lands for gene diversity, and monitor for study.
- Permit issued within 90 days which allows them to be within range of their home or investor financing arrangements.

Alternatively:

1. Suspend the "buffer" for one year until you can study the impacts of "root encroachment" in urban areas and provide better guidance and a balanced scientific study because you truly do not know. You have heard from the community.
2. Define Root Encroachment to mean killing the root by digging the root in a manner that severs it from the tree only, and the fee paid only for the tree with the severed root.
3. Define a Joshua Tree woodland in terms of acres and density, in the "wild" or where there is no urban or rural urban interface, and then apply the buffers. Honestly, you are trying to prevent the removal of thousands of trees from these massive solar farms out in the middle of nowhere. Not on these small homeowner lots that have been there for decades that now are required to have a sewer connection. Or a water line that needs to be installed in a rural community along already dirt roads. Focus on what you are trying to accomplish.

Refer to the suggested matrix and see what we can come up with.

Again, despite what you tell people, CDFW STAFF DOES have the power to make this workable for everyone. It is not the Act's fault. But the interpretation and the pain everyone is feeling, is something you CAN control.

Thank you, I look forward to working with you on Friday and I am very interested in working with the CDFW to develop this into a workable permit solution for the long-term.

Sincerely,

Julie Gilbert

Attachment: Suggested Permitting Matrix

Suggested Joshua Tree Permit Matrix

1927.2 (a) No person… **"take"/kill** a western Joshua **tree** or **any part or product of the tree** except as authorized by this chapter, or CESA, or NCCPA.

Will the project **remove** any Joshua trees? **Or** will the Project involve major grading or digging that could **remove/take** the root system (see Examples)

No

Provide Self-Certifying Project Notification (*Sample to be developed*).
Flat fees assessed pursuant to 1927.5 (c): $500 for larger projects; $250 for smaller

Did project require Biological Report Verification to be transmitted to CDFW within 60 days of Project completion

No

Notification filed. No further action

Yes

CDFW reviews report. Were any Joshua Trees removed, or were any roots killed, or were any incident reports filed.

No

Notification filed. No further action

Yes

Biologist report identifies each tree removed and each tree severed. Applicant either pays the fees for each per the Act or develops alternative mitigation strategy. CDFW issues take permit based on the actual work and actual impacts – which is compliant with the impacts that are roughly proportional to the take.

Yes

1927.3(a): Provide a permit application that contains the following:
1927.3(a): 1. submit census of PROJECT SITE
1927.3(a): 2. Identify avoidance and minimization measures
1927.3: Identify how the Project will mitigate for impacts that are roughly proportional to take impacts **OR** pay the fee.

1927.3(e): Any person or public agency that meets the criteria of 1927.3 (a)(1) **may elect, in lieu of satisfying the mitigation obligation** in 1927.3, may pay fees. (*Define acceptable mitigation options*)

Examples of $500 flat fee permit with self- certification With/Without Biological Report Verification*

- Linear Projects by public agencies and private utilities and public special districts where there is surface work only or grading/excavation up to 1 foot below ground surface such as:
  - Road maintenance
  - Road resurfacing including a disturbed shoulder
  - Overhead utility line maintenance and new installation where all staging and pull sites are within the road right-of-way or disturbed areas of the road shoulder
  - Sidewalk repair and new sidewalk installation
  - Park maintenance that does not involve mechanical or hand removal of stems or Joshua trees (except that are hazardous per the Act)
  - Existing water recharge basin maintenance using established haul routes to remove debris and where debris piles are not within the drip zone of a Joshua tree as marked with orange fencing.
  - Emergency existing underground pipeline or utility line repair
  - Existing underground pipeline or utility repair
  - New water production well drilling plus underground and above ground equipment.

**Note: Biological Report Verification is required to be submitted for linear projects that are 0.5 mile or greater in length, all emergency underground repair, existing underground pipeline/utility repair and water production well drilling.*

Examples of $250 flat fee with self- certification With/Without Biological Report Verification*

- Home Maintenance and Repair such as:
  - Driveway installation/repair
  - Fence installation (see guidance (*to be developed)* for post holes)
  - Exterior home repairs (such as roofing, painting)
  - Pre-fab shed building with or without concrete foundation that does not extend 12 inches below grade and where the structure is placed outside of the drip line as identified in arborist industry standards
  - Accessory Dwelling Unit construction with or without concrete foundation that does not extend 12 inches below grade and where the structure is placed outside of the drip line as identified in arborist industry standards
  - Weed abatement with hand tools that does not remove stems of Joshua trees
  - Weed abatement with power tools that does not remove Joshua tree stems or trees
  - Placement of decorative rock or other decorative features
  - Minor site grading for drainage restoration that does not exceed 1 foot in depth or more than the cubic yards required by the jurisdiction to obtain a grading permit and where the grading occurs outside of the drip zone of the tree and is clearly marked.
  - Emergency existing underground plumbing repairs
  - Well drilling where the well is located beyond the drip line of the tree

**Note: Biological Report Verification is required to be submitted for emergency existing underground plumbing repairs and private well drilling. Homeowners may submit photo documentation.*

- Commercial Maintenance and Repair:
  - Existing parking lot resurfacing
  - Landscape maintenance and improvements, where a Joshua Tree is present
  - Establishment of new material and equipment storage areas on an existing lot provided that the new areas do not extend into the drip zone of a western Joshua Tree as clearly marked on the lot and the activity is permitted by the zoning and jurisdiction lead agency.
  - Minor grading that does not exceed 1 foot in depth or more than the cubic yards required by the jurisdiction to first obtain a grading permit

Examples of a Western Joshua Tree Permit where More Than Minor Grading (meaning needing a jurisdictional permit) or Trenching Occurs

- New Single Family Home or Commercial Construction where one or more Joshua Trees require removal or relocation
- Solar and Wind farms, including all off-site interconnection routes and facilities
- New underground utility construction (water, sewer, electrical) within public or private property
- New water recharge basins and associated piping

Required Permit Application Submittal:

- Project Site Defined with Map (do not go outside of the boundary of the Project Site per 1927.3(a))
- Census of trees in the Project Site per the existing census methods guidance.
- Biological Resources Report that describes the surrounding environment – are Joshua Trees present adjacent to the Project Site, and if so, what is the approximate size range and density. Provide a vegetation map
- Lead Agency CEQA Determination (may include Exemption if Lead Agency determines applicable)
- Identification of Avoidance and Minimization Measures. Acceptable avoidance and minimization measures would include but not be limited to:
    - Where significant underground work is planned, hand spade potholing along the Project Site/alignment to determine the potential for visible root systems and take corrective action or plan mitigation.
    - Biological monitoring during construction, with daily logs and photos. Monitoring can be spot monitoring, half day or full day, at the biologist discretion depending on sensitivity of work and location.
    - Utility lines that are placed under or adjacent to western Joshua Tree roots, and where the roots will be protected and not severed or not "killed."
- Provide a strategy to mitigate for impacts **that are roughly proportional to take impacts**.

  Examples of suitable mitigation strategies that are roughly proportionate to "take"/kill of individual trees and the "take"/kill of roots of other trees would include but are not limited to:

  - Relocate the removed trees to elsewhere on the Project Site even if incorporated into the landscaping (*good for new SFRs and Commercial, encourages relocation in the same genetic area*). Property owner not responsible for success. *Since there is no fee structure in the Act specific to relocation, CDFW could assign the fee structure to be the reduced fee, which would promote relocation as a mitigation strategy*. Relocation may be 1:1 or as demonstrated as

  - Relocate trees to tribal lands or CDFW mitigation lands pursuant to an agreement between the applicant and the tribe or CDFW.

  - Pay the fee defined by the Act for the actual root impacts of other trees that would not be removed but where the roots are visible in the areas of the trees to be relocated and the relocation area.

  OR

  - Pay the fee for all trees to be removed and the perceived impact of tree roots in the 50 foot buffer.

  Example: A SFR defines that 5 trees must be removed for the project, removal is take. As such, the mitigation strategy would be relocation to another portion of the lot. If during removal of the five trees, roots of other trees are visibly observed, and those roots would be "killed" (severed) in the process; therefore, the trees that those roots belong to would be added to the fee calculation only.

From: Nelson Day [redacted]
Sent: Friday, March 7, 2025 8:33 PM
To: FGC <FGC@fgc.ca.gov>
Cc: rural radd [redacted]
Subject: western joshua tree protection act violation near Joshua Tree National Park

I live in the town of Joshua Tree, less than 1 mile from the National Park boundary. There is a proposed development near my residence (also1 mile from the National Park boundary) that encompasses 18 acres of undeveloped land. I have been reviewing their CEQA documents, and all they are currently required to do is pay roughly $300-$500 per Joshua Tree to just bulldoze the tree over. That is horrifc. There are over 100 Joshua Trees on the development land (Currently Labeled Lovemore Ranch San Bernardino County Planning Report). The land owner has budgeted $20,000 to bulldoze 100 Joshua Trees. How is this minimal fee environmentally protecting anything? The project proposes 64 dwelling units on 18 acres of land. This type of land abuse and overdevelopment in our town of Joshua Tree so close to Joshua Tree National Park must be stopped. The San Bernardino county planning commission has approved the project. I don't understand how they could have approved the take of this many Joshua Trees for a residential housing project.

Please help us protect these trees!

--

Nelson Day, P.E.

[redacted]

[redacted]

From: Valeree Woodard [redacted]
Sent: Sunday, March 9, 2025 6:10 PM
To: Wildlife Western Joshua Tree <wjt@wildlife.ca.gov>
Subject: Western Joshua Tree

To all concerned

I am in favor of protecting the Western Joshua Tree for future generations to come.

We cannot allow the trees to be bulldozed for housing etc.. because mass grading is cheaper and faster. It can not be only about money!

If you do not act now, then when? It will set a horrible greed driven precedent.

The Joshua tree bloom, is rare and essential for quite a few insect populations. I included a video I took today that shows the variety of insects it attracts. I have lived on my property for just about 20 years and this is the first time this tree has bloomed, and is the only one on my 2.5 acres that has a bloom right now.

I will not be able to attend Mondays meeting, but would appreciate you sharing this pertinent information with attendees.

Thank you, Valeree Woodard

[redacted]

From: [redacted]
Sent: Thursday, April 3, 2025 4:35 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Long Term Species Conservation Plan

I encourage you to fully adopt the draft Western Joshua Tree Conservation Plan and uphold the Western Joshua Tree Conservation Act. It includes science-based management actions, like avoiding and minimizing harm to the species and its habitat, creating avoidance buffer zones, supporting public education programs, and developing meaningful co-management alongside local Tribes. Finally, it's what we need!

Suvan Geer, Santa Ana Ca

From: Joan Taylor [redacted]
Sent: Wednesday, March 12, 2025 1:16 PM
To: Kaiser, Andrew (Drew)@Wildlife [redacted]
Subject: Western Joshua Tree Conservation Plan

Attached you'll find Sierra Club comments on the draft Western Joshua Tree Conservation Plan. Please make this part of the record on the matter. Thanks very much for your assistance.

Andrew Kaiser,
Senior Environmental Scientist
Calif Dept of Fish & Wildlife
3602 Inland Empire Blvd #200
Ontario CA 91764

By email to: [redacted]

Re: Supporting all guidance measures in the draft Western Joshua Tree Conservation Plan

Dear Mr. Kaiser:

I write on behalf of the California/Nevada Desert Committee of Sierra Club to urge the Department to retain the protections embodied in the current draft Western Joshua Tree Conservation Plan. The draft's measures are not onerous, and in fact are all needed to achieve the intent of the Western Joshua Tree Conservation Act which would logically require gathering baseline and experiential data which will be needed going forward.

Thank you for the opportunity to comment on this important Conservation Plan.

Very truly yours,

[redacted]

Joan Taylor, Chair
California/Nevada Desert Committee
Sierra Club

From: Margaret Strachan [redacted]
Sent: Sunday, March 9, 2025 09:11 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Comments re Draft Western Joshua Tree Conservation Plan

3/9/2025

Please consider our comments noted below:

Re 5.2.1 Impact avoidance and mitigation
Action A and M 1.2: Implement avoidance buffers concerns us. With regard to residential property, the recommended buffer distances are unrealistic, and if implemented, would greatly diminish a property owner's ability to maintain their property to say nothing about developing a raw property. Action A and M 1.2 would preclude routine septic maintenance and repairs or improvements requiring trenching could take months for permitting and inspections, potentially displacing residents for lengthy periods of time.

We don't see how High Desert Water District (HDWD) will be able to implement phase 2 of the sewer project in town of Yucca Valley as streets will need to be trenched for piping and many Western Joshua Trees are located in yards and on roadsides within the recommended buffer zones. Our home in town of Yucca Valley sits several hundred feet off the street with a forest of Western Joshua Trees and other native plants in the front yard. There is no way for our home to be connected to HDWD's sewer project and maintain the suggested buffer zones.

Mitigation fees can bankrupt residents who need to update or repair their home. Most residents of the high desert communities do not have tens of thousands of dollars for mitigation fees and that includes us. We suggest a fee waiver for existing residential properties particularly within incorporated town or city boundaries.

Another concern is liability for mitigation. SCE and their contractors or lessees have repeatedly trespassed on our property to access poles as front of property is unfenced and neighbors have fenced the actual utility easement. Last year we had to stop town of Yucca Valley staff from using heavy equipment on our property—they were pushing dirt onto young Western Joshua Trees growing in a wash. We are concerned about outside parties commencing ground disturbing work or even damaging or destroying Western Joshua Trees without consent or permits and the liability that ensues.

We do support Action A and M 2.2: Minimize impacts on occupied Western Joshua Tree habitat. We want to preserve the Western Joshua Tree, but we also want to reside in our home and coexist peacefully in our established community.

We appreciate the opportunity to comment.

Thank you,

Margaret Strachan
Barry Sheinbaum
[redacted]

Sent from my iPad

From: Affinity Flooring [redacted]
Sent: Wednesday, March 26, 2025 02:51 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Fwd: Western Joshua Tree

Dear Ericka Zavaleta,

I hope this letter finds you well. I am writing to express my concerns regarding the current consideration to list Joshua trees as an endangered species in California. While I understand the need to protect endangered flora and fauna, I believe that the classification of Joshua trees under such protection is misguided and has significant negative consequences for landowners like myself.

One of the main issues stems from the strict regulations surrounding land development when Joshua trees are present on the property. Specifically, the requirement that no ground disturbance occurs within 50 feet of a Joshua tree is impractical and places unreasonable burdens on homeowners. This limitation severely restricts the use of land that would otherwise be viable for construction, gardening, and other personal property use.

For many residents, including myself, these regulations make it difficult, if not impossible, to develop or modify their homes as they see fit. Whether trying to build a new home, install a fence, or simply maintain their property, the stringent rules around Joshua tree protection impede progress and often lead to increased costs, delays, and frustration. The reality is that many homeowners find themselves caught in a difficult position, where their rights to manage and develop their land are unfairly compromised.

While I acknowledge the importance of conserving our natural environment, I urge you to reconsider the impact these regulations have on those of us who live and work on the land. A more balanced approach, one that accounts for both environmental conservation and property rights, would be far more reasonable. Perhaps a more flexible buffer zone around Joshua trees or a system that allows for specific exemptions when landowners are not harming the trees themselves would be a step in the right direction.

I respectfully ask that you take these concerns into account as you consider this important issue. Thank you for your time and attention to this matter, and I look forward to hearing from you.

Sincerely,

Denise Ledcke

From: Kerrie Aley [redacted]
Sent: Wednesday, March 26, 2025 04:19 PM
To: FGC <FGC@fgc.ca.gov>
Subject: Fwd: Substantive- Public Comment WJT Conservation Act, Policies and Permitting

Attn: Commission President Erika Zavaleta

March 12 2025

To-

San Bernardino County **Supervisor Dawn Rowe**
San Bernardino County Land Use **Director Mark Wardlaw**
Yucca Valley **Mayor Jeff Drozd**
California Department Fish and Wildlife **Drew Kaiser, CDFW Native Plant Program**

Please find attached substantive comments pertaining to the WJT Conservation Act, Policies and Permitting, specifically the required Survey Census and Report requirements.

In addtion-

I object to the CA Fish and Wildlife joining the WJT "coalition" while excluding people who own land and govenment agencies such as Yucca Valley and San Bernardino County. Are these the same people that help draft the WJT Consevation Act and the policies?

While I think its great CA is attempting to work with indigious communities, excluding the Morongo Basin community from this steering committee is just another layer of increasing miscommunication and denial of the real impacts of the Western Joshua Tree Act on our local economy. Clueless.

https://www.mdlt.org/press-releases/new-coalition-of-experts-to-tackle-conservation-of-imperiled-joshua-trees

I object to the fact that due to the Mitigation Fee Structure in the WJT Conservation Act the Morongo Basin must pay 225% to 250% higher take fees than the reduced fee areas like Palmdale, Landcaster, Apple Avelly and Kern County. **WHY?** This legislation must be changed so it considers existing permited homes and structures and that their is equity and some sort of financial relief for repairs. How about require planting a few Joshua Tree seedlings or small trees instead? Seems to me the MDLT can at least offer this service to homeowners. Or is this just a another ploy to drain the high desert of money while relocating the Western Joshua Tree hundreds of miles away to refugios.

I'd like to know how many hundreds of millions of dollars in "take fee" does the state plan on spending? What's the budget and where is the accountability for this space race to save this imperiled succulent.

Our properties are over 50 years old and the income level in this area is low. My fire insurance is now 5 times what it was seven years ago. My retired neighbor cannot afford insurance any more. If his 30 year old septic system goes out where is the money going to come from to pay the "Take Fee" if his septic field fails? He has been taking care of these WJT for 40 years and this is how CA treats him like some sort of tree killer??? There is no consideration of residents.

Sorry for the drama....Please do something sane for a change.

Regards,

Kerrie Aley

Pipes Canyon / PIoneertown