Attachment 4

Integrated Vegetation Management Plan

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

INTEGRATED VEGETATION MANAGEMENT PLAN

January 2020

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

Los Angeles
DEPARTMENT OF WATER AND POWER

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

ANF	Angeles National Forest
Application for New License	Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426
BLM	U.S. Department of the Interior, Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
CalVTP	California Vegetation Treatment Program
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
DWR	California Department of Water Resources
Emergency	Defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including California Independent System Operator and Los Angeles Department of Water and Power, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.
ESA	Endangered Species Act of 1973, as amended
FERC	Federal Energy Regulatory Commission
FSS	U.S. Department of Agriculture, Forest Service Sensitive Species
IVMP	Integrated Vegetation Management Plan
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power

LPNF	Los Padres National Forest
mph	miles per hour
NEPA	National Environmental Policy Act
NFS	National Forest System
NNIP	non-native invasive plant
O&M	operation and maintenance
PEIR	Preliminary Environmental Impact Report
Project	South SWP Hydropower, FERC Project Number 2426
Project boundary	The area to which the Licensees require access for normal Project operations and maintenance
SCWIP	Santa Clara Watershed Invasive Plant Treatment Project
SRA	State Responsibility Area
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
WUI	Wildland-Urban Interface

1.0 INTRODUCTION

In January 2020, the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees), pursuant to Title 18 of the Code of Federal Regulations, Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Integrated Licensing Process), filed with the Federal Energy Regulatory Commission (FERC) an Application for a New License for Major Project – Existing Dam (Application for New License) for the Licensees' South SWP Hydropower, FERC Project Number 2426 (Project). The Licensees included this Integrated Vegetation Management Plan (IVMP) in their Application for New License.

1.1 OVERVIEW

This IVMP provides guidance for the management of terrestrial vegetation within the Project boundary. Facilities and features within the Project boundary include: hydroelectric facilities, Primary Project Roads, staging areas, Project recreation areas, rights-of-way, and other appurtenant facilities as described in the Application for New License. There are specific requirements that are referenced in this IVMP for those parts of the Project on National Forest System (NFS) lands and State lands. Any specific Angeles National Forest (ANF) and Los Padres National Forest (LPNF) requirements only apply to NFS lands under the management of each respective National Forest. When vegetation management takes place on NFS lands requirements of the ANF and LPNF will be followed.

1.2 PROJECT LOCATION AND DESCRIPTION

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in Los Angeles County in southern California, on the West Branch of the SWP. The Project has a FERC-authorized installed capacity of 1,349,290 kilowatts. Project facilities range in elevation from 3,325 feet to 1,130 feet, and include the Warne Power Development and Castaic Power Development. Facilities and features of the Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Primary Project Roads and Trails; (7) Quail Lake recreation facilities and (8) streamflow and reservoir stage gages. Facilities and features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7)

Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities.

The Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions. In essence, the Project is operated in a run-of-river mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users.

Figure 1.1-1 shows the Project vicinity. Figure 1.1-2 shows the Project facilities, including land ownership.

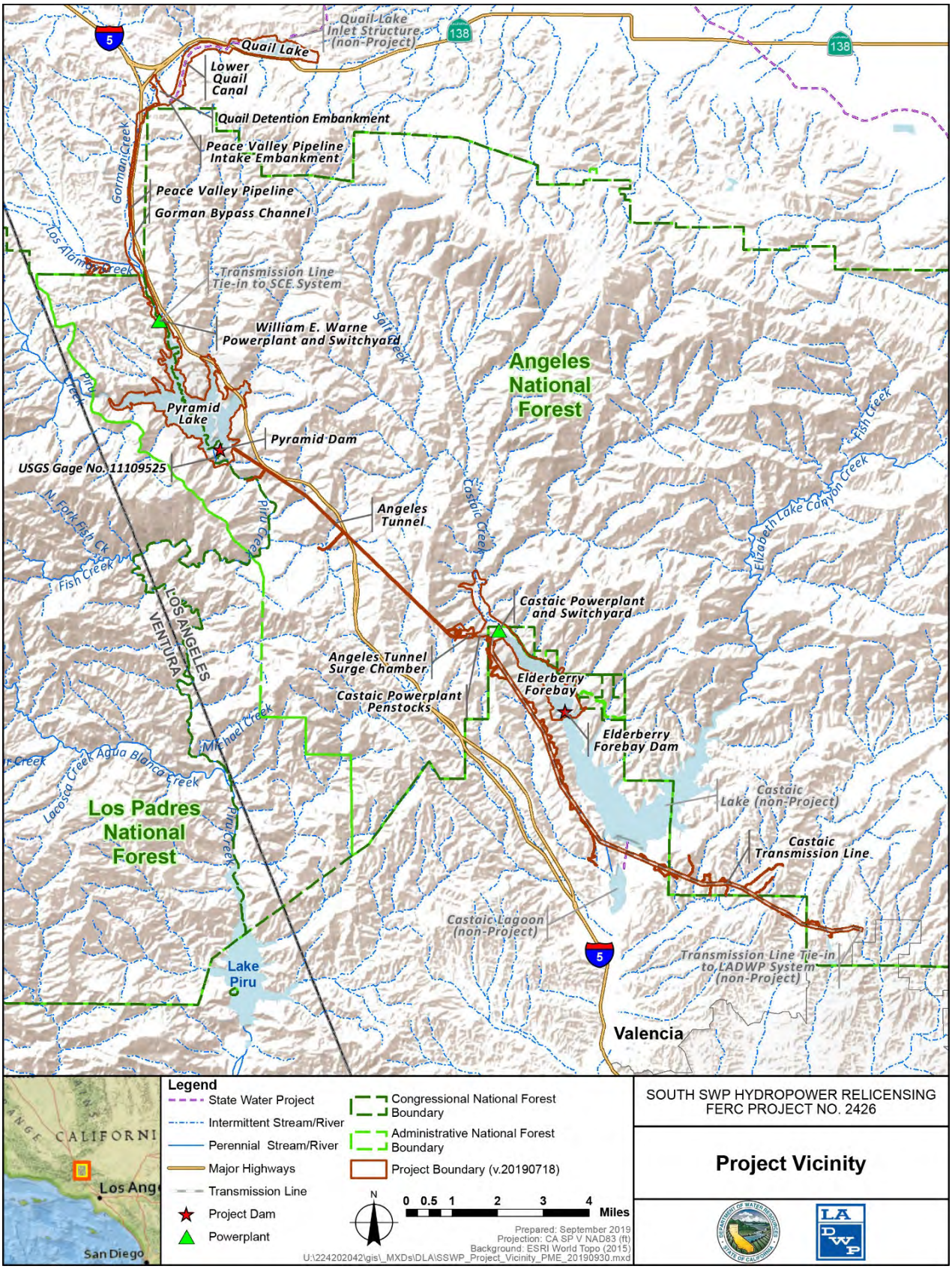

Figure 1.1-1. South SWP Hydropower Vicinity Map

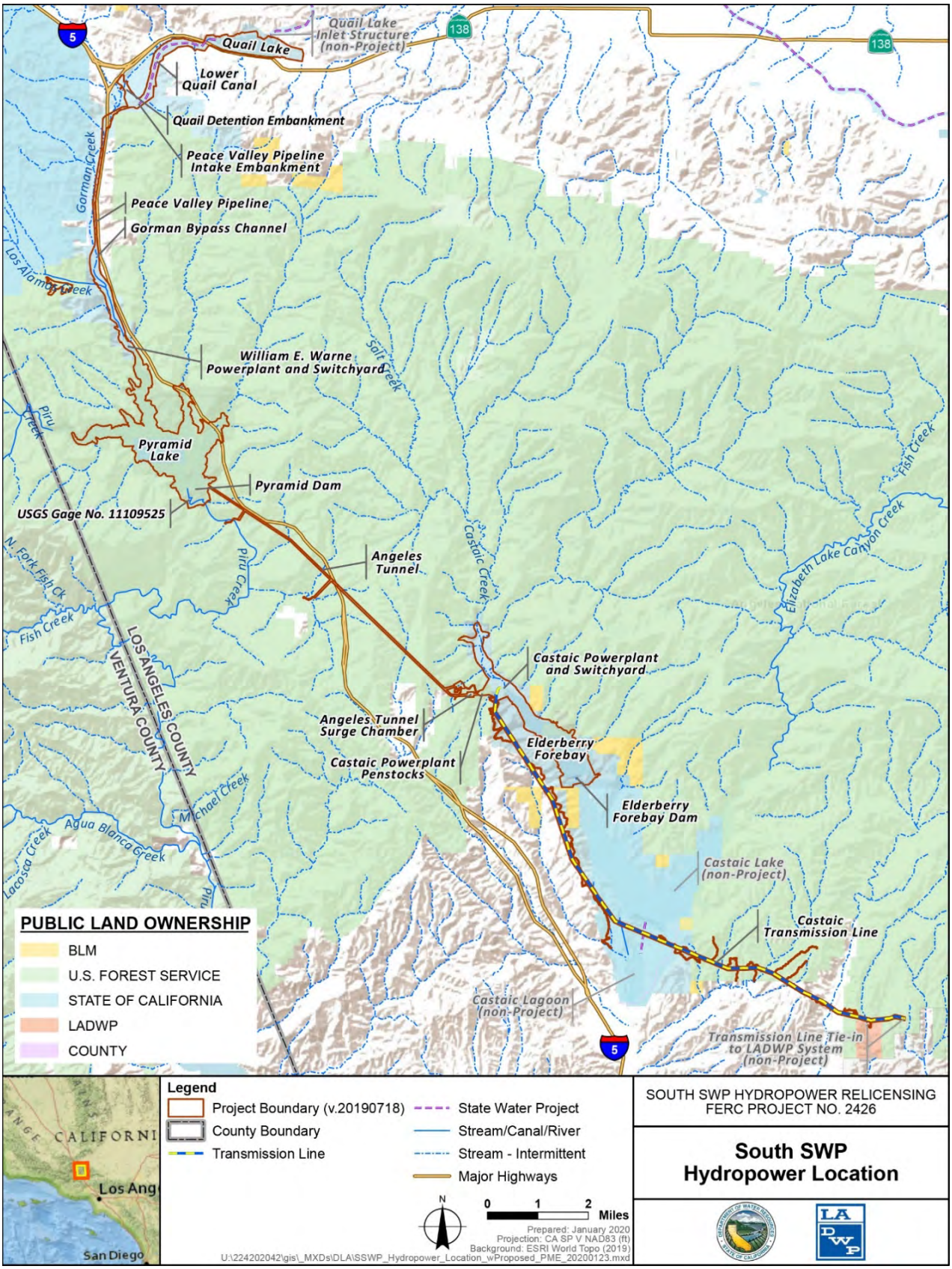

Figure 1.1-2. South SWP Hydropower Facilities and Land Ownership

1.3 PURPOSE OF THE PLAN

This IVMP provides guidance for the management of terrestrial vegetation within the Project boundary, which includes implementation of measures to manage non-native invasive plants (NNIP), along with measures to manage and protect special-status plants (as defined in Section 3.1 of this IVMP) and natural vegetation communities (including sensitive vegetation communities). This IVMP also guides vegetation management related to Project operation and maintenance (O&M) activities, such as facility management, Primary Project Road maintenance, and recreation site management within the Project boundary. This IVMP is to be used in conjunction with other resource management plans pertaining to Project resources, as coordinated by the Licensees.

This IVMP is designed to avoid or minimize disturbance to sensitive areas. Sensitive areas, as defined for the purpose of this IVMP, include areas of known special-status plants and wildlife, and areas of known sensitive natural communities, including riparian zones and wetlands.

This IVMP facilitates the integrated management of vegetation with several factors related to operation of the Project:

- Facility reliability, including powerline safety and reliability regulations
- O&M demands
- Staff and public safety
- Federal regulations governing special-status species protection
- Recreation management
- Vegetation fuels management
- NNIP management
- Herbicide best management practices (BMP)

1.4 GOALS AND OBJECTIVES

The goal of this IVMP is to provide a terrestrial vegetation management framework that includes identifying, assessing, monitoring, and controlling NNIP within the Project boundary, and managing and protecting native vegetation present within the Project boundary for the duration of the term of the license. The following five objectives are critical to the success of reaching this goal:

1. Manage NNIP through prevention of the introduction, establishment, and spread of new NNIP, and the control of known and future infestations.

2. Implement measures to manage and protect known special-status plants, and sensitive natural vegetation communities that could be affected by Project O&M and other Project activities.

3. Ensure that avoidance and protection measures are implemented during vegetation management related to Project O&M.

4. Revegetate natural landscapes disturbed by Project O&M activities, conserve native vegetation resources, reduce soil erosion, and monitor these efforts.

5. Apply herbicide and implement manual treatments using BMPs.

With the varying ownership, there may be different regulatory requirements regarding vegetation management that would apply to the Project. Refer to Figure 1.1-2 for land ownership within the Project boundary. For example, on NFS lands, approvals for NNIP control efforts will comply with all U.S. Department of Agriculture, Forest Service (USFS) guidance documents (USFS 2013a).

1.5 VEGETATION SURVEY PROTOCOLS

This section discusses protocols used to conduct botanical baseline surveys. These protocols will be utilized for botanical inventory and monitoring surveys under the new license. Baseline botanical surveys conducted for the Project relicensing followed protocols detailed in the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (U.S. Fish and Wildlife Service [USFWS] 1996 or most current), *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFW 2009, 2018c), and protocols as specified by USFS at the Agency Consultation meetings (Section 6.2) when surveys are performed on NFS lands. Surveys included data collection on NFS lands that required completing the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database forms and USFS' Threatened, Endangered, and Sensitive Plant Occurrence forms. These forms include information regarding relative abundance, phenology, habitat description, habitat condition, and the presence of any NNIP.

Documentation of surveys on NFS lands included completion of USFS data forms for any USFS Sensitive Species (FSS), as specified in the USFS Threatened, Endangered, and Sensitive Plants Survey Field Guide (USFS 2005a), and the Threatened, Endangered and Sensitive Plants Element Occurrence Protocol Field Guide (USFS 2005b). Special-status plants and sensitive natural communities identified during the 2017 botanical inventory surveys were documented using a Global Positioning System unit. All data collected was reviewed in a Geographic Information System database.

Protocols for any future botanical surveys under the new license would utilize the most current methods from CDFW, USFWS, and/or USFS, where applicable. USFS will coordinate with the Licensees at the Agency Consultation Meeting (Section 6.2) to ensure the Licensee obtain and implement the agencies' most current vegetation and Project monitoring protocols on NFS lands. In order to maintain a complete dataset,

data from new methods or protocols will be collected in a way such that they remain compatible with data previously collected under this IVMP.

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2.0 NON-NATIVE INVASIVE PLANT MANAGEMENT

2.1 NON-NATIVE INVASIVE PLANTS WITHIN THE PROJECT BOUNDARY

Surveys for target NNIP were completed in 2018 and 2019, along with a comprehensive and systematic botanical inventory, within the Project boundary (where accessible) in support of the Project relicensing. Target NNIP during the study were California Department of Food and Agriculture (CDFA) A-, B-, D-, and Q-rated weeds; California Invasive Plant Council (Cal-IPC) high- or moderate-ranked weeds; and those designated as invasive plants by USFS. Surveys were performed during the period within which most NNIP were expected to flower (i.e., April through September), with at least two survey visits performed in all accessible portions of the Project boundary to maximize the likelihood of detection of NNIP (see Figures A-1 through A-16 in Appendix A for portions of the Project boundary that were inaccessible).

A total of 947 occurrences of 27 target NNIP species were observed during field surveys. These occurrences are summarized in Appendix A, presented in Table A-1, and depicted on Figures A-1 through A-16.

2.2 PLANS FOR PREVENTION AND CONTROL OF NON-NATIVE INVASIVE PLANTS

While NNIP are widespread in the area and throughout California in general, there are species that are of certain concern to various regulators and advisors throughout the State. A list of target species for treatment under this IVMP was compiled by looking at the various NNIP that the CDFA, Cal-IPC, and USFS have recorded in the local area. This target species list for treatment will be concurrently updated with revisions from the previously listed agencies prior to survey activities during the term of the new license. Target species are outlined in Appendix A, Table A-1.

CDFA keeps track of NNIP for their invasiveness and potential to spread explosively in agricultural settings such as rangelands, row crop farms, and orchards. Cal-IPC maintains a separate list from CDFA for invasive plants in on online inventory (Cal-IPC 2018). Rather than focus on agricultural pests, Cal-IPC is concerned about NNIP species that have the potential for serious impacts to wildlands and native ecosystems. Additionally, USFS compiled a list of NNIP known, or suspected, to occur on NFS lands at a ranger district level (USFS 2015).

This IVMP complies with the direction contained within USFS Manual, Section 2900, Invasive Species Management (USFS 2011 or most current) in addition to the USFS document *Environmental Assessment, Santa Clara Watershed Invasive Plant Treatment Project* (USFS 2013b) for the Santa Clara Watershed (or most current National Environmental Policy Act [NEPA] for the ANF and LPNF). These documents include guidance with respect to initiating, coordinating, and sustaining actions to prevent and control priority infestations of invasive species in terrestrial areas of the NFS. These guidelines can be applied to areas that are potentially affected by Project O&M activities by using an integrated pest management approach.

The plan for control of NNIP within the Project boundary is based on five principal elements:

1. BMPs
2. Surveying and documentation
3. Control measures for existing NNIP infestations
4. Long-term monitoring
5. Adaptive Management

2.2.1 Best Management Practices

The BMPs described below will be utilized with the objective of minimizing the potential for the introduction and spread of NNIP by Project O&M activities. In addition, Project activities will be in compliance with the requirements of the applicable NEPA documents, and Biological Opinions for the treatment of invasive plants. Specifically, the BMPs will be used by the Licensees and their contractors working within the Project boundary. Note that exceptions may occur in unusual or time-sensitive circumstances – in particular in response to an emergency, defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, balancing authorities including the California Independent System Operator and LADWP, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.

BMPs used in other circumstances (i.e., construction, stormwater) may differ from those identified in this IVMP. The use of BMPs is dynamic and may change or be modified depending on the circumstances, present knowledge, and current technology.

1. Minimize ground disturbance (i.e., any activity that compacts or disturbs the ground within the Project boundary), especially during routine O&M activities. When soil must be moved or stockpiled, the Licensees will grade the soil to the extent practicable to match local contours (if the soil is not just being stockpiled temporarily), and, if necessary, mulch and/or reseed the disturbed areas with native plant seeds free of weeds.

2. Unless there is an emergency (as defined above), restrict travel to designated roads and avoid traveling through areas with known NNIP occurrences. Staging and laydown areas will be in areas known to be weed-free. If travel or staging within an NNIP infestation area cannot be avoided, to the extent feasible, conduct work in NNIP-free area(s) first and clean equipment after working in infestation areas. Any vehicles/equipment engaged in off-road travel, and

vegetation removal tools and equipment, will be cleaned prior to entering NFS lands and between work sites if NNIP are present. Personnel transport vehicles are exempt from this requirement as long as they have not engaged in off-road travel.

3. Weed-free material will be used for all construction, erosion control, or restoration needs. Gravel and sand from sources free of weeds (as directed by USFS on NFS lands) will be used.

4. Active stockpiles will be subject to erosion BMPs including silt fence and/or wattles and wetting down to prevent erosion from precipitation and dust from high winds. Inactive stockpiles left in place will be managed for weeds.

5. The Licensees will consult with USFS, CDFW, and USFWS, where agency consultation is appropriate, and will follow applicable procedures prior to ground disturbance to determine the appropriate plant material that will comply with current guidelines. For areas where fill is required, the Licensees will use fill from either onsite or offsite sources.

6. In general, a draft of site-specific revegetation activities will be developed before ground-disturbing actions larger than 1.0 acre. If the ground-disturbing actions occur on NFS lands, the Licensees will work with USFS to develop a revegetation plan if a revegetation plan has not been provided by USFS. Revegetation and seeding of disturbed areas, including topsoil piles and berms, will commence within 30 days following completion of construction or ground-disturbing activities related to Project O&M, or as soon as possible during the appropriate season, unless otherwise agreed to by USFS or CDFW. In some situations, seeding in the fall may be preferred due to timing of rainfall and the germination requirements of the seed mix species involved with revegetation activities.

7. Erosion control materials that do not pose a threat of entanglement to wildlife will be used. All fiber rolls and/or erosion control mesh will be made of loose-weave mesh that is not fused at the intersections of the weave, such as jute or coconut (coir) fiber, or other products without welded weaves. Non-welded weaves reduce entanglement risks to wildlife by allowing animals to push through the weave, which expands when spread. Biodegradable materials will be used for all netting or coverings on NFS lands, unless otherwise approved by USFS, so that it does not contribute to increased trash loads.

2.2.1.1 USFS Recommended Best Management Practices

In addition to the BMPs mentioned above, USFS has recommended BMPs outlined in the *National Best Management Practices for Water Quality Management on National Forest System Lands* (USFS 2012) that are to be utilized on NFS lands. These BMPs are described in Appendix B, with specifics for implementation of these BMPs found within the aforementioned document.

2.2.2 Surveying and Documentation Methodology

Information on locations and optimal timing for active management of target NNIP within the Project boundary was developed from comprehensive botanical surveys conducted in 2018 and 2019 (Appendix A, Table A-1, Figures A-1 through A-16). The NNIP surveys documented species' composition, location, and relative abundance. The Licensees will use the results of the NNIP surveys as an inventory of the target NNIP within the Project boundary. Because NNIP colonize new areas, these surveys will be repeated throughout the life of the license on a 10-year basis.

2.2.3 Control Measures for Existing NNIP Populations

Target NNIP will be designated for active management efforts aimed at control or eradication on lands within the Project boundary. In general, emphasis will be placed on the feasibility of successful control of a given NNIP species, and the threat posed by the occurrence. This will be determined on a case-by-case basis, as discussed at the Agency Consultation meetings (Section 6.2). For instance, it is not possible to completely eradicate a widespread species such as yellow star-thistle; therefore, control measures rather than elimination measures are the most feasible in this case. However, if yellow star-thistle occurs next to a special-status plant species, elimination measures may be more applicable to prevent the yellow star-thistle from outcompeting the special-status plant for resources.

Control measures may include but are not limited to manual methods (manual pulling, hoeing), mechanical methods (mowing, grubbing), and chemical methods (herbicides). Results and methods will be tracked and analyzed to help determine which methods are most successful for each target species. Results from monitoring data will be entered into a central database maintained by the Licensees and used to inform future management decisions. The Licensees will assess the use and appropriateness of control methods on a case-by-case basis.

Where contiguous NNIP occurrences extend beyond the Project boundary, the Licensees and USFS (when on NFS lands) will coordinate at the Agency Consultation Meeting (see Section 6.2) to develop a schedule and identify the appropriate level of control measures that the Licensees would undertake, if any, for existing populations of target NNIP in areas with high potential for disturbance and/or dispersal to areas beyond the existing occurrence.

All management activities will be consistent with State and federal laws, which will take precedence in the event any conflicts occur. Control and containment methods for NNIP will be reviewed at the Agency Consultation Meeting (see Section 6.2). Site-specific circumstances may dictate deviations from these guidelines.

2.2.4 Long-Term Monitoring

As described in Sections 1.5 and 2.1, comprehensive baseline botanical surveys were completed in 2018 and 2019. NNIP occurrences will be treated with herbicide or other appropriate control methods as discussed in Section 5.0. This treatment will be

conducted according to a schedule that treats NNIP occurrences in phases, with priority given to NNIP occurrences that pose the greatest threat to other resources and/or are most likely to facilitate the spread of NNIP species into other areas. This NNIP schedule and phasing plan will be developed within two years of license approval and will be discussed as part of the Agency Consultation Meeting (see Section 6.2).

Following initial treatment, occurrences where treatment takes place will be monitored on an annual basis for three years, beginning with the first year of application of control treatments (generally within 30 days of treatment). Monitoring will include qualitative measurements of cover for the target NNIP during the growing season.

During the three-year monitoring period, if monitoring results show a decline of at least 80 percent NNIP coverage or complete eradication of NNIP populations in the treatment area, the frequency of monitoring will be reduced or eliminated. Conversely, after three years, if monitoring results show no change or an increase of NNIP populations in the treatment area, the Licensees will identify and implement active management techniques. In addition, for populations on NFS lands, the Licensees will consult with USFS during the Agency Consultation Meeting (see Section 6.2) to identify feasible adaptive management techniques and implement them when treatment was unsuccessful.

The Licensees will update the NNIP inventory every ten years or if a major natural ground disturbance event (i.e., wildfire) has occurred. Surveys will include, but will not be limited to, areas where target NNIP populations have been confirmed in the past. Surveys will also include areas where there is high chance for disturbance and/or dispersal, such as recreation areas, roads, or areas that are disturbed by frequent Project O&M activities.

Weed management techniques will likely change over time in response to new data, techniques, and scientific research. New data from research and agency-developed methods will be incorporated into the decision-making process to identify the use and application of new techniques for this IVMP. Results from monitoring data, which includes the effectiveness of weed control measures, will be entered into a central database maintained by the Licensees and used to inform future management decisions. Where available, new, more efficient techniques will be incorporated into the NNIP management program. On USFS lands, these will be consistent with the most current NEPA documents for USFS projects.

This IVMP may be modified or amended as resources are added or removed from sensitive species lists, survey protocols are changed, or new survey technology emerges. Prior to implementing new techniques or modifications to this IVMP, changes will be discussed with the appropriate agencies (e.g., USFS and CDFW) at the Agency Consultation Meeting (Section 6.2). In order to maintain a complete dataset, data from new methods or technology will be compatible with data previously collected under this plan. All data will be stored in a central database maintained by the Licensees.

2.3 NNIP TREATMENT PROCEDURES ON NATIONAL FOREST LANDS

Approximately 44 percent of land within the Project boundary is managed by USFS; NNIP will be controlled on NFS lands within the Project boundary per the guidance set out in USFS' *Environmental Assessment, Santa Clara Watershed Invasive Plant Treatment Project* (USFS 2013b or most current) written for the Santa Clara River and its associated tributaries and headwaters (described below in Section 2.3.1). The LPNF is preparing a similar document, and once complete, it will be used to guide treatments on NFS lands within its jurisdiction. In addition, approvals for control efforts will follow other documents containing USFS guidance (USFS 1994, 2013a, or most current), in addition to all federal regulations relating to invasive vegetation removal, including herbicide applications.

2.3.1 Santa Clara Watershed Invasive Plant Treatment Project

Lands within the Project boundary contain numerous drainages that are considered headwaters of the Santa Clara River. The Santa Clara River has been severely degraded by NNIPs, which have increased in density and range over time (USFS 2013b). As a result, the Santa Clara River Invasive Plant Removal Project was implemented, which covers the entire Santa Clara River Watershed from the headwaters to the coast. CDFW, USFWS, and the State and federal water management agencies are all partners in this restoration effort, and these groups expressed support for USFS to manage NNIPs in the upper watershed. In 2013, USFS completed the *Environmental Assessment, Santa Clara Watershed Invasive Plant Treatment Project* (USFS 2013b) to facilitate NNIP management in the headwaters of the Santa Clara River.

Most of the Project boundary is located in the western portion of the Santa Clara River Watershed. In particular, Pyramid Lake, and Gorman Creek are major components of the headwaters of this watershed. Guidance from this IVMP is to be used in all areas of NFS within the Project boundary.

2.3.1.1 Implementation of the Santa Clara Watershed Invasive Plant Treatment Project Within the Project Boundary

Implementation of the Santa Clara Watershed Invasive Plant Treatment Project (SCWIP) within the Project boundary and on NFS lands includes adopting adaptive management strategy approaches that address changing conditions over time to allow for a rapid response for control and/or containment. This includes potential new treatment methods, including changes in concentrations or application methods of approved herbicides; biological control agents analyzed and approved for use by the U.S. Department of Agriculture and/or the California Department of Food and Agriculture; treatment of new species; and/or treatment of new and existing infestations within the Project boundary. As part of the NNIP control strategy, invasive plant treatments proposed on NFS lands will be discussed at the Agency Consultation meeting (Section 6.2). At each meeting, the proposed NNIP plan of work for the

upcoming two years will be reviewed, and any lessons learned from previous monitoring and implementation will be incorporated into future methods.

Prescriptions for treatment using the SCWIP would follow an approach using a combination of treatment methods that – when taken together – would eradicate, contain, control, or suppress an invasive plant species or infestation efficiently and effectively. This approach is species-specific, tailored to exploit the weaknesses of a given invasive plant species, site-specific, and designed to be practical with minimum adverse impacts to non-target organisms. Treatments are outlined in Appendix C.

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3.0 SPECIAL-STATUS PLANTS AND SENSITIVE NATURAL COMMUNITIES

3.1 SPECIAL-STATUS PLANTS AND SENSITIVE NATURAL COMMUNITIES SURVEYS

Between March 26 and September 13, 2018, and between April 1 and May 23, 2019, the Licensees conducted a comprehensive botanical inventory of lands within the Project boundary to identify the locations of special-status plant species. The surveys included: (1) determining the presence of any special-status plant locations; and (2) revising previously documented special-status plant locations. Results of the surveys are included in Appendix D.

Special-status plants were defined for the study as the following:

- Listed as a USFS sensitive species by the ANF and/or LPNF and occurs on NFS lands (USFS 2013c);
- Listed under the California Endangered Species Act (CESA) as an endangered, threatened, or rare plant;
- State-listed rare or a State candidate for listing species under the Native Plant Protection Act of 1977 (CDFW 2018a);
- Listed by the California Native Plant Society (CNPS) on its Inventory of Rare and Endangered Plants, including species that are rated as California Rare Plant Rank (CRPR) 1A through 4B; or
- Listed as federally threatened or endangered under the federal Endangered Species Act (ESA), or as candidates or species proposed for listing under the ESA.

Sensitive natural communities are defined as listed by CDFW as sensitive in the California Natural Community List (CDFW 2018b).

3.1.1 Study Area

The study area consisted of the land area within the Project boundary, excluding lands overlying the Angeles Tunnel on which the Licensees do not perform any Project O&M. The study area includes staging areas; construction areas; upstream maintenance areas above reservoirs; fuel modification requirement areas; areas cleared for access to transmission line poles and access routes to these areas; Lower Quail Canal, Quail Lake, and associated maintenance roads/areas and recreational features; and Gorman Bypass Channel and associated maintenance roads/access. The study area was synonymous with the area within the Project boundary, excluding lands overlying the Angeles Tunnel but with consideration of the Angeles Tunnel. The study area for Study 4.1.5 was the same as the study area for Study 4.1.6 (Non-Native Invasive Plants).

Study 4.1.6 occurred in conjunction with the comprehensive botanical inventory of the study area performed under Study 4.1.5. The study area for Study 4.1.5 is illustrated in Figure 3.1-1.

3.1.2 Survey Frequency

3.1.2.1 Baseline Botanical Inventory Surveys

Between March 26, 2018 and April 19, 2018, the Licensees conducted a comprehensive early season botanical inventory of the study area. Between May 29 and September 13, 2018, the Licensees conducted a comprehensive late season botanical inventory of the study area. Additionally, between April 1, 2019 and May 23, 2019, the Licensees conducted a follow-up comprehensive early season botanical inventory of the study area. The field methods followed applicable protocol methodology described in the botanical survey section of CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Population and Natural Communities (2009). This protocol uses systematic sampling techniques to ensure thorough coverage of plant communities that could be considered sensitive natural communities and/or support special-status plant species. The CDFW protocol states that "the level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified" (CDFW 2009).

3.1.2.2 Future List Review and Surveys

Beginning in the second calendar year after license issuance, an annual desktop review of current special-status plants potentially occurring within the Project boundary will be conducted by the Licensees. If a currently listed species status changes, appropriate resource protection measures will be implemented accordingly. In the event a new special-status plant is listed, the Licensees will determine if the species is likely to occur within the Project boundary. If a newly listed special-status species is likely to occur within the Project boundary, the Licensees will assess the potential for the species to be affected by Project activities, including recreation use, Primary Project Road use, and planned maintenance or other ground-disturbing activities, and will relay the results of this review to appropriate agencies (e.g., USFS, CDFW). The necessity for appropriate surveys and/or resource protection measures will then be evaluated.

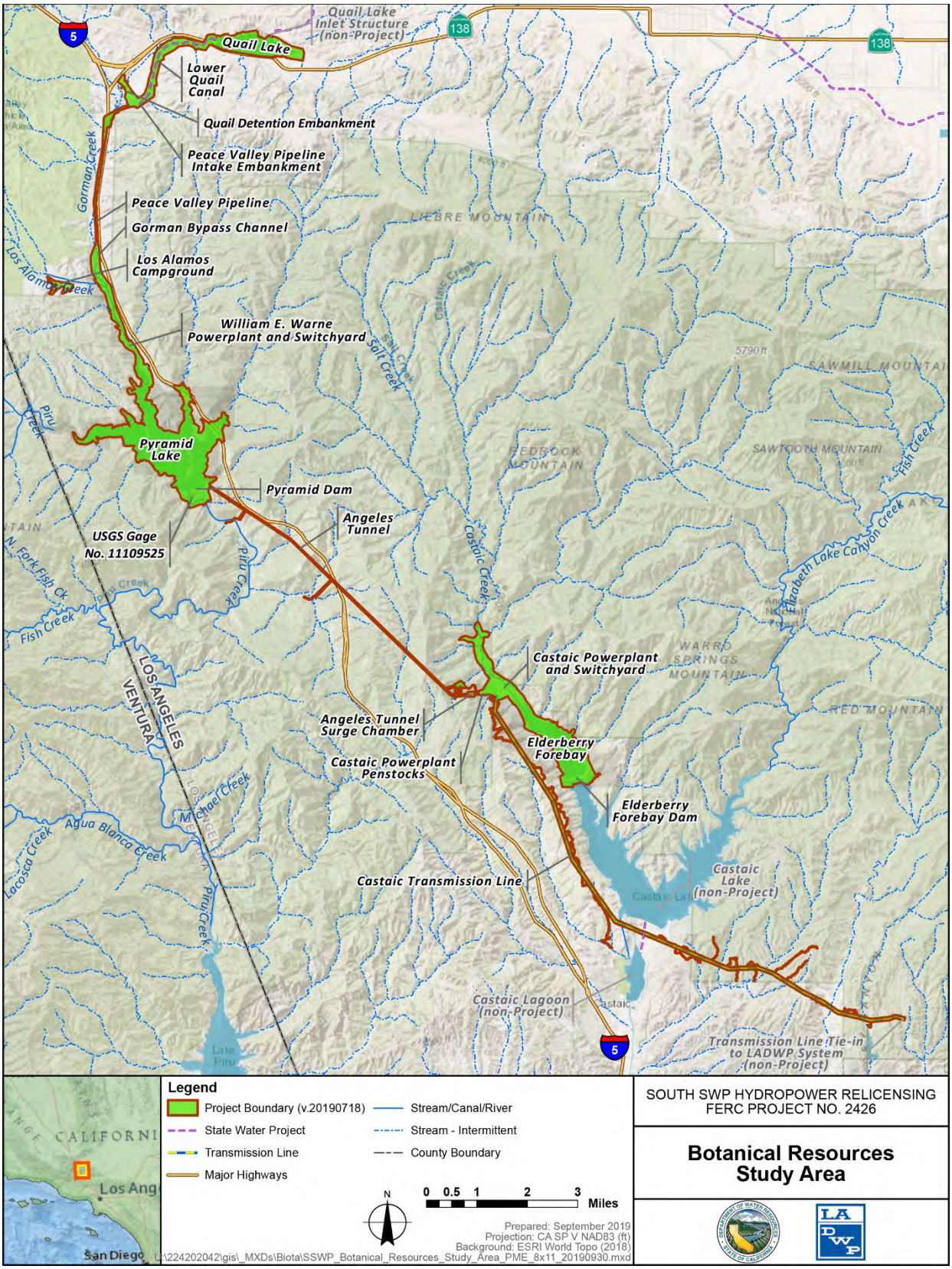

Figure 3.1-1. Study Area in the Project Boundary for Botanical Resources (Excluding Lands Overlying the Angeles Tunnel)

3.1.2.3 Incidental Observations

Incidental observations of special-status plants and sensitive natural communities during NNIP monitoring, the Licensees' and contractors' observations, or pre-construction/pre-disturbance surveys will be recorded to identify if any resources are within areas potentially impacted by Project activities. In the event that a special-status species is observed, the location (latitude and longitude), number of individuals, and percent cover will be recorded. If the observed species is not located within an area potentially impacted by Project activities, the location will be noted in a central database maintained by the Licensees. If the observation is within an area potentially impacted by Project activities, surveys will be conducted to determine the extent of the newly observed special-status plant species or sensitive natural community. Procedures outlined in Section 3.3.2 will be implemented to ensure the occurrence is not adversely impacted by Project activities.

3.2 SPECIAL-STATUS PLANTS AND SENSITIVE NATURAL COMMUNITIES WITHIN THE PROJECT BOUNDARY

There were 180 occurrences of five special-status plant species observed during relicensing field surveys in 2018 and 2019, as summarized in Appendix D and depicted in Figures D-1 through D-12. None of the species are listed under ESA or CESA, or are FSS plants. These species qualify as special-status plant species due to their CRPR as outlined above in Section 3.1. All incidental observations of special-status plants encountered during the Licensees' comprehensive botanical relicensing studies were mapped and recorded.

Seven sensitive natural communities were identified in 2018 and 2019 within the Project boundary. These are as follows: desert riparian, montane riparian, valley oak woodland, valley foothill riparian, desert wash, fresh emergent wetland, and wet meadows. Acreages of these communities in the study area are presented in Table E-1 and in Figures E-1 through E-9 of Appendix E.

This IVMP only includes active protection and management of plants with CNPS CRPRs of 1 and 2, and plants that fall within one or more of the other categories of special-status plants defined in Section 3.1 of this IVMP. In the event that a species currently listed with a CRPR of 3 or 4 is elevated to a CRPR of 1 or 2 or one of the other categories of special-status plants defined in Section 3.1 of this IVMP, they would then be actively managed in the manner described in this IVMP. If new special-status plant occurrences are documented, they will also be actively managed in a manner described in this IVMP.

3.3 PROJECT DISTURBANCE MONITORING

3.3.1 Routine Known Disturbance Activities

As of the 2018-2019 surveys, no special-status plants listed under the ESA, CESA, FSS, or sensitive natural communities have been documented in areas that would be disturbed by recreation, road use, or regular Project O&M activities. Therefore, no

effects are expected to occur to ESA, CESA, and FSS or sensitive natural communities due to continued recreation, road use, and Project O&M activities.

During the life of the license, new listings or occurrences could be documented in the Project area and at risk for impacts associated with Project activities. If a newly protected species or occurrence is documented within the Project boundary, the Licensees will assess the potential for the species to be affected by Project activities as described in Section 3.1.2.2.

3.3.2 Procedures for Future Scheduled Disturbance Activities

For future scheduled O&M activities that include vegetation removal or ground disturbance that will be conducted near documented special-status plant or sensitive natural community occurrences, including riparian/wetland zones, a pre-construction survey and construction monitoring will be conducted. The planned disturbance areas will be defined, mapped, and cross-referenced with the known sensitive resource locations. The pre-construction survey will be conducted within 15 days of ground disturbance and will evaluate the documented resource to determine the extent and boundaries of that resource. To avoid and minimize impacts to special-status plants and communities documented within the area to be affected by the Project activity, the following actions will be implemented:

- A protective buffer with flagging will be installed around sensitive plants and natural communities within the area to be affected by the Project activity and no vegetation removal activities will take place within the buffer. Buffer sizes for documented communities include:
    - 10 feet for CNPS ranked plants 1A through 2B
    - 25 feet for upland sensitive natural communities
    - 100 feet for riparian, wetland, and wet meadow habitats
- For the short-jointed beavertail (a CNPR List 1B.2 species) population observed at the Los Alamos Campground, more permanent physical barriers (e.g. artificial rope, or natural blockades such as tree logs) will be put in place.

Although no FESA, CESA, or FSS species were identified during surveys, in the event that a plant with the above listings is incidentally identified or identified during a pre-construction survey and is within an area that will be disturbed by O&M, a 25-foot buffer of protective flagging will be installed and no vegetation removal or disturbance activities will be performed within the buffer.

Disturbance areas near sensitive areas will be monitored daily during the Project activity to reduce the potential impacts arising from such disturbance to special-status plant populations, sensitive natural communities, or riparian/wetland zones. In the unlikely event of resource disturbance, documentation of the disturbance will be included as part of the monitoring activities and reported to the appropriate agency. In areas of ground

disturbance that are proposed for revegetation, revegetation efforts will begin within 30 days or as soon as feasible, depending on weather, seasonality, or other considerations affecting the success of the effort. Post-construction revegetation monitoring will commence within 30 days of construction and will continue on a yearly basis for up to three years to determine if restoration objectives have been met. The annual monitoring will take place during the time when the resource is identifiable (i.e., blooming period). Monitoring will occur at resource locations that are within or adjacent to the disturbance activity, as identified by qualified staff in the most recent comprehensive surveys. Post-construction revegetation monitoring may be coordinated with other surveys if they take place concurrently.

If the disturbance and associated revegetation monitoring coincides with the blooming period of the documented resource (or the area is reassessed within one year to capture the appropriate time of year), recorded information will include:

- Quantitative assessment of the population or vegetation community's health, viability, or changes from observations during previous comprehensive survey(s)

- Measured changes in size of the population or vegetation community (geographic extent or number of individuals)

If the disturbance and associated revegetation monitoring is conducted outside of the blooming period of the documented resource (or at a time when the resource is either not identifiable or present above-ground), data collected will follow the same measures, to the extent feasible, given the phenology.

If a previously unknown sensitive resource is observed during vegetation management planning or implementation, depending on the species involved and the land ownership, the appropriate agencies (e.g., USFS, CDFW) will be notified as soon as reasonably possible.

3.4 SPECIAL-STATUS PLANTS AND SENSITIVE NATURAL COMMUNITIES PROTECTION

Multiple measures will be used to protect special-status plants, sensitive natural communities, and riparian/wetland zones within the Project boundary during O&M activities, including vegetation management, and ensure that significant adverse effects are avoided or minimized. Specifically:

- On NFS lands USFS will be consulted in the development of specific usage plans (i.e., recreation, proposed work) for areas surrounding known occurrences of special-status plants or sensitive natural communities.

- Flagging will be installed to facilitate avoidance of sensitive areas within a site and resource-specific buffer prior to any ground disturbance or vegetation management activities, including management for target NNIP.

- Manual activities (e.g., utilizing hand tools) will be encouraged, where reasonable, in sensitive areas.

For work that has been declared an emergency, it may not be possible to implement all of the pre-construction surveys and measures. Emergency repairs include those that require a reasonable amount of planning where delay of a project or activity would result in substantial impacts to life, safety, or property. However, the Licensees will implement these measures to the extent possible and then work with CDFW and/or USFS (if applicable) to ensure that routine vegetation management occurs with implementation of these protection measures. In addition, as soon as the emergency has been addressed, regular sensitive resource protection measures will resume. Where it is not possible to implement these measures during emergencies, any known sensitive botanical resource issues will be reported to the appropriate resource agencies within three days by phone, with detailed reporting and/or any applicable reports submitted as soon as possible. The reports will include the location and types of emergency activities that were conducted within sensitive resource areas. If disturbance occurs within a sensitive resource area, the Licensees will work with the appropriate agency to determine any necessary mitigation measures.

Emergency projects do not include specific actions necessary to prevent or mitigate an emergency, unless such an emergency is expected to be imminent in the near future without taking such actions. Emergency projects or activities do not include short- or long-term projects undertaken for the purpose of preventing or mitigating a situation that has a low probability of occurrence in the short-term.

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4.0 VEGETATION MANAGEMENT RELATED TO PROJECT OPERATIONS AND MAINTENANCE

Excluding the Castaic Transmission Line which is discussed in Section 4.2.3, this section discusses revegetation protocol, including those areas subject to revegetation; evaluating sites for revegetation; and revegetation planning, methods, and monitoring. This section also addresses routine vegetation management, including facility management, road maintenance, and recreation site management.

4.1 REVEGETATION

Revegetation is the process of reestablishing vegetation cover in disturbed areas and is a standard component of Project O&M and other construction activities. Revegetation may include erosion control, site restoration, and replanting. The main functions of revegetation are to conserve native plant resources, prevent the introduction/spread of NNIP, reduce soil erosion, and restore wildlife habitat.

Certain Project areas, such as the Peace Valley Pipeline, must remain free of vegetation and will not undergo revegetation. In addition, some public use areas and other developed areas that contain existing ornamental landscaping and hardscape will not be revegetated with native plants. Sites that are subject to continual disturbance (e.g., berm roads) or sites where bare ground needs to be maintained (e.g., firebreak clearances around transmission poles) will not be subject to revegetation under this IVMP. Sites subject to disturbances that are not Project-related will not be revegetated by the Licensees. In addition, areas that are not deliberately kept unvegetated but have not naturally revegetated prior to license issuance, will not be subject to revegetation.

4.1.1 Areas Subject to Revegetation

The Licensees will evaluate areas of ground disturbance within the Project boundary caused by Project O&M and construction activities on a site-by-site basis to determine if revegetation is necessary or appropriate. Areas subject to revegetation include but are not limited to:

- Areas over 0.25 acres treated for NNIP that have resulted in bare ground or limited vegetation growth
- Areas over 0.5 acres subject to ground disturbance by Project O&M activities

For routine O&M not affecting sensitive resources, not involving target NNIP infestations, and lacking ground disturbance larger than 0.5 acres, the Licensees will follow the revegetation guidelines presented in Section 4.1.4 of this IVMP without further consultation.

If a revegetation site is located within an area where the preferred methods and success criteria are not feasible (e.g., steep slopes), the site will be addressed within the revegetation plan (see Section 4.1.3, Revegetation Planning) and alternative options will be utilized if mutually agreed upon at the Agency Consultation Meeting (Section

6.2). When applicable, BMPs will be used to protect soil and water resources. Rills created by Project-related work will be eliminated immediately to reduce potential for erosion and the delivery of sediment to channels. If it is not feasible to eliminate the rills, BMP measures will be implemented to ensure the rills do not deliver sediment to nearby channels and/or other aquatic features.

Areas over 0.25 acres treated for NNIP may require revegetation, as NNIP removal often creates gaps or patches of bare soil and can promote further invasion by the same NNIP species or other undesirable plants. Passive revegetation (i.e., allowing revegetation to occur from the native vegetation already present at the site) may be appropriate if the bare patches are small and the adjacent areas are void of NNIP cover. However, if the treatment site is severely degraded and native plants are absent or in low abundance, active revegetation efforts may be needed to promote recovery of the native plant community. NNIP treatment sites requiring revegetation will be identified following the site evaluations detailed in Sections 4.1.2 through 4.1.5 of this IVMP.

4.1.2 Evaluating Sites for Revegetation

Prior to ground disturbance within the Project boundary and once the Licensees have determined a disturbed area may be subject to revegetation (post-disturbance activity), the Licensees will assess the area to determine size, percent vegetation cover of both native and non-native species, erosion potential, and adjacent plant community composition (i.e., reference site species composition). This will include the following information that will be utilized in Section 4.1.3, Revegetation Planning:

- General site conditions, including slope, terrain, soils, land use, access, and proximity to water
- Proximity to target NNIP occurrences/likelihood of new infestations
- Vegetation community specifics, including species composition, richness, and density
- Site complexity, including the variety of landforms
- Presence of other sensitive resources that require buffers, monitors, or seasonal restrictions

Once this assessment is completed, the following criteria will be used to determine if revegetation is necessary:

- Slow rate or low likelihood of propagation or spread of nearby native plant species;
- Little or no evidence of successful reproduction of nearby native plant species;
- Low composition or cover of native plant species in the area;

- High percentage of NNIP in the area (15 percent or greater relative cover);
- Adjacent sites within the Project boundary are disturbed as a result of Project O&M; or
- Soil compaction.

If one or more of the above criteria are met, then a plan will be developed for revegetating the site within the Project boundary. If none of the criteria are met, then revegetation at the site will be deemed unnecessary. If the site has reached the revegetation objectives, then the site will be considered successfully revegetated and no further actions will be initiated. If the site has not reached the objectives, then the Licensees will consult with the appropriate resource agency to implement adaptive management. If target native cover is unattainable, the site will be re-evaluated and discussed at the Agency Consultation Meeting (Section 6.2).

For events that are determined to be outside of the Licensees' control that affect vegetation (e.g., wildfires), where the Licensees are performing active revegetation in that area the Licensees will no longer be required to continue revegetation in that area. Further, in such events, the Licensees will have no obligations to conduct revegetation due to the event.

4.1.3 Revegetation Planning

Immediately after revegetation of a site has been deemed necessary, and prior to ground disturbance, a draft Revegetation Plan will be developed. Information collected in the initial site assessment (Section 4.1.2) will be used to develop this plan. It differs from this overall plan as the Revegetation Plan will be site specific and include information on desired conditions, species to be planted, methods for revegetation, site design, soil treatment, success criteria, monitoring plan, target NNIP management, and a schedule of activities. Revegetation plans not on NFS lands will not be provided to USFS for review.

For non-routine sites on NFS lands (i.e., sites larger than 0.5 acres), a Revegetation Plan will be developed for USFS review. The plan will include site-specific desired conditions, species to be planted, methods for revegetation, site design, soil treatment, success criteria, monitoring plan, target NNIP management, schedule of activities, and remedial actions.[1] USFS will have at least 15 days to review the plan and comment. Comments will be addressed and the final plan will be submitted to USFS for approval, and then it will be implemented. If no response is received from USFS within 15 days, the Revegetation Plan will be implemented as written. It should be noted that the timeframe specified above assumes that this timeline is feasible; shorter deadlines may be needed and negotiated to complete FERC-mandated repairs or maintenance, as dictated by the specific orders or mandates.

[1] USFS currently has site-specific desired condition statements for NFS land, which will be followed in the Revegetation Plans.

For sites smaller than 0.5 acres on NFS lands, the Licensees will develop a list of revegetation actions, including species to be planted, methods of revegetation, target NNIP management, and an implementation schedule. The list of actions will be submitted to USFS for approval within 15 days of any scheduled revegetation action, or within an agreed upon timeframe prior to any scheduled revegetation action. If approved, revegetation will proceed; otherwise, the actions will be revised and resubmitted for approval. If there is no response from USFS within 15 days, the Licensees will implement the revegetation actions as written.

4.1.4 Revegetation Methods

On NFS lands, revegetation will be consistent with USFS guidelines for revegetation (USFS 1994, 2013a, 2013b, or most current). On all lands, revegetation efforts will commence within 30 days of the completion of ground disturbance activities or as soon as feasible depending on weather, seasonality, or other considerations affecting the success of the effort. Revegetation will begin with site preparation, which, if necessary, may include breaking up soils to reduce compaction and ease seeding and planting. At sites where compaction may be a problem, topsoil (approximately the upper 12 inches of soil, when present) may be removed and salvaged in such a manner as to keep it usable for replanting. If topsoil is to remain in place for longer than one month, it will be stored in a manner to maintain soil microbe health and prevent NNIP establishment. At some sites, amendments, such as compost or fertilizer, may be added to the soil and will be discussed and approved in specific Revegetation Plans. In sites that are being seeded, seeding will take place a few days after topsoil is replaced, or as soon thereafter as reasonably practicable during the appropriate season (i.e., prior to the rainy season).

The selection of appropriate species for revegetation is dependent upon a number of different factors, including site-specific management objectives, physical characteristics of the site, seed availability and cost, genetic makeup, and species morphology and ecology. The Licensees will consult with the appropriate agency on the proposed plant palettes (if applicable), and will use commercially available weed-free native seed mixes composed of regionally similar species as those being disturbed by the Project.

The Licensees will use a native seed mix that includes species that are representative of the native vegetation within the Project impacted area. The seed mix will be reviewed by USFS during the Agency Consultation Meeting if being used on NFS lands. A mixture of seeding techniques may be used and will be described in the individual Revegetation Plans or actions. Seeding techniques will have a history of demonstrated success, and, when used on NFS lands, will require USFS approval. For some sites, it may be feasible to use salvaged plants or seed and stock collected onsite ahead of time. Where salvage is not feasible, purchased native plants may be used. Plant stock brought into the Project area by the Licensees will be certified as free from all disease, in particular Sudden Oak Death (*Phytophthora* spp.). Nursery sources will be identified and there should be certification confirming their facility is free from Sudden Oak Death. When applicable, the final approval on use of plants from nurseries will be discussed at the Agency Consultation Meeting (Section 6.2). Specifics will be described in detail in

the site-specific Revegetation Plans. All plant materials will be handled as little as reasonably possible and protective features for planted vegetation will be installed where necessary.

Seeding of all areas subject to revegetation, including topsoil piles and berms, will commence within 30 days following construction or ground-disturbing activities, or as soon as feasible depending on weather, seasonality, or other considerations affecting the success of the effort.

4.1.5 Revegetation Monitoring

Each revegetation site will be monitored annually for up to three years until criteria from developed actions or plans (per the Agency Consultation Meeting) are met. If, after three years of monitoring, the success criteria are not met, consultation with the appropriate agencies will take place to determine if modifications to the revegetation strategy are needed.

Success criteria will be based on the revegetation areas' developing vegetative cover, diversity, and species dominance that is similar to the naturally occurring habitat in adjacent areas of the Project. Revegetation objectives include the following:

- Revegetation sites will meet the native canopy cover percentages of the baseline coverage or better. Baseline coverage will be taken from similar sites in the adjacent, undisturbed areas. Non-native species canopy cover composition will be that of the recorded baseline coverage if under 20 percent. If baseline studies show non-native cover being over 20 percent, the performance standard will remain at no more than 20 percent coverage.

- Sites with baseline data will be considered successfully restored when an approved botanist concurs that the native cover is at or better than the baseline cover percentage and non-native cover is at or lower than the baseline cover percentage (unless the baseline showed cover over 20 percent) during the monitoring period of up to three years.

Monitoring of revegetation projects will include assessing vegetation cover, species richness, survivorship, and native and invasive tree and shrub species counts. Photos documenting the site conditions will be used to monitor the revegetation progress. At the Annual Consultation Meetings (see Section 6.2), a revegetation monitoring update will be provided to USFS in the form of a running spreadsheet that shows the status of revegetation projects on NFS lands. The spreadsheet will include the start date of the project, the initial vegetation cover, species richness, survivorship, native and invasive tree and shrub species counts, and how those data have changed throughout the monitoring period. Revegetation monitoring updates will be prepared and submitted to USFS prior to the Agency Consultation Meeting in those years when revegetation monitoring was conducted. Comments on the revegetation monitoring report will be discussed at the Agency Consultation Meeting.

Based on past wildfire events, it is possible that a revegetation site may be burned from a local wildfire. In the event that a site in the process or designated for revegetation is burned from a wildfire, the revegetated areas will be re-evaluated and active revegetation activities would most likely be abandoned.

4.2 ROUTINE VEGETATION MANAGEMENT

A variety of routine vegetation management activities will be conducted, often driven by regulatory requirements. These measures ensure safe and continued Project operations and include the continued implementation of ongoing fire protection measures to comply with applicable codes and safeguard Project assets. This includes, for example, creating a defensible space around Project structures (see Section 4.2.4, California Vegetation Treatment Program). Routine vegetation management activities are enacted while protecting sensitive resources and preventing/minimizing the introduction, establishment, and/or spread of NNIP (see Section 2.0, Non-Native Invasive Plant Management, and Section 3.0, Special-Status Plants and Sensitive Natural Communities). Examples of routine vegetation management include facility and transmission line management, road maintenance, hazard tree removal, and recreation site management. Vegetation management activities will be conducted in a manner that ensures they will not spread or increase the NNIP species present.

4.2.1 Facility Management

Vegetation will be routinely controlled for safety and compliance in the immediate vicinity of Project facilities, including powerhouses, access roads, support facilities, access trails, tunnels, conduits, overchutes, diversions, gages, dam faces, and reservoirs. Activities typically include vegetation trimming or clearing, ditch cleaning, and spraying herbicides. To maintain vegetation control at Project facilities and adjacent areas, mechanical or chemical methods will be utilized. The necessary permissions will be obtained from USFS prior to applying herbicides on NFS lands. Any documented occurrences of special-status plants or sensitive natural communities will be protected from vegetation management at facilities (see Section 3.0, Special-Status Plants and Sensitive Natural Communities). In addition, vegetation slated for removal will be surveyed and monitored for wildlife usage (e.g., nesting birds specified in the Migratory Bird Act) per the Licensees' Sensitive Aquatic and Terrestrial Wildlife Management Plan included as part of the Licensees' Application for New License.

4.2.2 Road Maintenance

Project O&M activities conducted along roads typically include landslide and debris removal, road grading, vegetation trimming and clearing, and culvert cleaning. Except in the case of an emergency, by needing immediate action to avoid the loss of life or property, the timing of these activities will be coordinated such that any scheduled surveys for NNIP or special-status plant species will be completed prior to vegetation clearing and NNIP treatments. Vegetation that occurs along roadsides frequently encroaches into those roads and requires trimming and/or mowing. The Licensees will take measures to prevent cross contamination of equipment used to manage roadside

vegetation (free of target NNIP) and target NNIP. Equipment will be cleaned after cutting/mowing the target NNIP and prior to moving into other areas where these same NNIP do not occur. When areas of dense shrubs are cut/mowed, they will be chipped onsite. No documented population of a target NNIP will be chipped.

When mulch is needed for erosion control during road maintenance activities, it is preferable to use mulch from onsite native materials (e.g., chipped trees/slash). Materials should not pose an entanglement risk to wildlife, and the placement should be such that it does not pose as an obstacle to wildlife movement. If mulch from onsite materials is unavailable, then a certified weed-free rice straw can be used.

Any documented occurrences of special-status plants or sensitive natural communities will be protected from vegetation management during road maintenance activities (see Section 3.0, Special-Status Plants and Sensitive Natural Communities). In addition, vegetation slated for removal will be surveyed and monitored for wildlife usage (e.g., nesting birds specified in the Migratory Bird Act) per the Licensees' Sensitive Aquatic and Terrestrial Wildlife Management Plan included as part of the Licensees' Application for New License.

4.2.3 Castaic Transmission Line

All work performed on the Castaic Transmission Line is consistent with the implementation steps outlined in North American Electric Reliability Corporation Reliability Standard FAC-003-4. In addition, any work performed on the Castaic Transmission Line on land not owned by LADWP is coordinated with the landowner. LADWP receives required approvals by the landowner before commencing work. Projects and maintenance done on NFS lands are authorized by USFS under the existing Special Use Permit (SUP) before proceeding with the work.

4.2.4 Recreation Site Management

At Project recreation sites, vegetation management activities include the removal of vegetation, hazardous branches, and hazard trees, as identified by the Licensees or USFS, to facilitate recreation activities, protect public safety, and reduce fire hazards. Hazard trees will be surveyed and monitored for wildlife usage (e.g., nesting birds specified in the Migratory Bird Act, roosting special-status bat species, or ringtail (*Bassariscus astutus*)). Unless immediate removal is necessary to protect life and property, all vegetation with nests/nesting cavities or roosting bats will be left undisturbed until monitoring confirms the birds have fledged or the bats are no longer using the tree as a roost. Exceptions may be made for hazard tree or branch removal, but require coordination with CDFW if protected resources are detected. Any documented occurrences of special-status plants or sensitive natural communities at Project recreation facilities will be protected from recreation site vegetation management activities (see Section 3.0, Special-Status Plants and Sensitive Natural Communities).

4.2.5 California Vegetation Treatment Program

The California Vegetation Treatment Program (CalVTP) directs implementation of fire-related vegetation treatments within the California Department of Forestry and Fire Protection's (CAL FIRE) State Responsibility Area (SRA), composed of 31 million acres of open space and the urban-open space interface surrounding urban areas within the State of California. The purpose of the program is to serve as one component of the State's range of actions to reduce wildfire risk, reduce fire suppression efforts and costs, and protect natural resources from wildfire. The CalVTP Preliminary Environmental Impact Report (PEIR) composed for this program streamlines the environmental process for activities that qualify under this program within specific areas of the SRA.

Of the 31 million acres of the SRA, approximately 20.3 million acres were identified that may be appropriate for fire-related vegetation treatments that would qualify under the PEIR for this program. This area is called the "treatable landscape," and generally occurs around urban, rural, and infrastructure areas at risk of fire. Based on the PEIR, the majority of the area within the Project boundary is within the CALFIRE treatable landscape (within that 20.3 million acres specified above) and contains elements of key power infrastructure for southern California (BOF 2019).

4.2.5.1 Implementation of the CalVTP in the Project Boundary

Implementation of the CalVTP would consist of vegetation treatment activities carried out by CAL FIRE on private or public land as well as public agencies and organizations funded by CAL FIRE grants. In addition, entities other than CAL FIRE, such as private landowners, USFS, and the Licensees, may also implement vegetation treatments within the treatable landscape under guidance from the PEIR. Treatment activities undertaken by the Licensees that would qualify under the PEIR include the treatment types proposed under the CalVTP and described below. These will be proposed at the annual Agency Consultation Meeting (see Section 6.2). The CalVTP treatment types are:

- Wildland-Urban Interface (WUI) Fuel Reduction: Located in WUI-designated areas, fuel reduction would generally consist of strategic removal of vegetation to prevent or slow the spread of non-wind driven wildfire between structures and wildlands, and vice versa. This is known colloquially as "defensible space."

- Fuel Breaks: In strategic locations, fuel breaks create zones of vegetation removal and ongoing maintenance, often in a linear layout, that support fire suppression by providing responders with a staging area or access to a remote landscape for fire control actions. While fuel breaks can passively interrupt the path of a fire or halt or slow its progress, this is not the primary goal of constructing fuel breaks.

- Ecological Restoration: Generally, outside of the WUI in areas that have departed from the natural fire regime as a result of fire exclusion, ecological restoration would focus on restoring ecosystem processes, conditions, and

resiliency by moderating uncharacteristic wildland fuel conditions to reflect historic vegetative composition, structure, and habitat values.

The WUI fuel reduction, fuel break, and ecological restoration treatment types would be implemented using various treatment activities, including prescribed burning, mechanical treatment, manual treatment, prescribed herbivory, and herbicides. All prescribed burning on NFS lands will require a Burn Plan and approval by USFS before implementation. It should be noted that these activities do not require active revegetation. In addition, vegetation slated for removal will be surveyed and monitored for protected wildlife resource usage (e.g., nesting birds specified in the Migratory Bird Act) per the Licensees' Sensitive Aquatic and Terrestrial Wildlife Management Plan included as part of the Licensees' Application for New License.

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5.0 HERBICIDE BEST MANAGEMENT PRACTICES

Excluding the Castaic Transmission Line which is discussed in Section 5.2.1, this section discusses herbicides use on the Project.

5.1 APPLICATION AND SCHEDULE

Treatment in areas that are required to be void of vegetation may require a range of treatments, including the use of herbicides, which is the Licensees' preferred safe and practical method to meet FERC-mandated conditions required for the protection and inspection of hydroelectric facilities. Although this is the preferred method, other reasonable and practicable methods for vegetation treatment will be evaluated prior to proposing herbicides. The choice of methods will be based on an analysis of potential environmental impacts and anticipated effectiveness, along with site characteristics, security, safety and health, and economics. Site-specific measures will be identified and implemented to protect non-target plants and animals, soils, water quality, and other sensitive resources. Proposed vegetation management treatments on NFS lands will be part of the Agency Consultation Meeting (see Section 6.2) between the Licensees and USFS. Additionally:

- Any herbicides used on the Project will be limited to products registered with the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation. On NFS lands, herbicide use will be approved by the USFS and a Pesticide Use Proposal will be discussed during the Agency Consultation Meeting.

- Herbicides will be applied according to label instructions and use restrictions by qualified pesticide applicators, under recommendation from a certified pesticide advisor.

- Any USFS conditions relating to herbicide use on NFS lands will be referenced during development of site-specific applications for herbicide use.

During the Agency Consultation Meeting, a request for approval of planned uses of herbicides on NFS lands for the upcoming year will be submitted. These will be submitted in a pesticide use form, with the following information:

- Specific locations of use

- Specific herbicides proposed for use

- Application rates

- Dose and exposure rates

- Safety risk and timeframes for application

- Explanation of why herbicide applications are essential for use on NFS lands

Exceptions to this schedule may be allowed only when unexpected outbreaks of NNIP require control measures that were not anticipated at the time the report was submitted and will be coordinated with USFS before herbicide application, including a pesticide use form requiring USFS approval. Schedule details will be developed with the application proposal to USFS for NFS lands, but generally spring and fall applications are most effective due to botanical physiological activity.

5.2 LOCATIONS FOR HERBICIDE APPLICATION

Specific locations for herbicide application are generally associated with Project facilities where bare ground is required. For the Project, these locations include but are not limited to:

- Project powerhouses
- Access roads
- Gaging stations
- Land beneath overhead powerlines

For management of vegetation in these areas, herbicide application is the Licensees' preferred safe and practical method to meet FERC-mandated conditions required for the protection and inspection of hydroelectric facilities. Most of these locations are not on NFS lands. Specific locations will be included when proposals for herbicide application on NFS lands are submitted to USFS.

Additional locations may be associated with invasive weed control. See Appendix A, Figures A-1 through A-16, for currently known locations of invasive weeds. In some cases, NNIP locations may be outside the Project boundary, but still have a high potential for dispersal into the Project boundary. Any such NNIP populations occurring on NFS lands will be discussed during the Agency Consultation Meeting and will be managed in a coordinated effort by the Licensees and USFS.

5.2.1 Herbicide Application in the Castaic Transmission Line Corridor

Any herbicide application under the Castaic Transmission line on land not owned by LADWP is coordinated with the landowner, applied consistent with manufacturer recommendations. LADWP receives any required approvals by the landowner before commencing work.

5.3 APPLICATION ON NATIONAL FOREST SYSTEM LANDS

Prior to the Agency Consultation Meeting, a request for approval of planned treatment methods, including manual use of herbicides on NFS lands, will be submitted to USFS, as described in Section 5.1 above. This needed approval would occur before a decision is made. In addition, treatment methods will be implemented as outlined in the SCWIP, described in Section 2.3.1 above.

Proposed NNIP treatment methods from the SCWIP (see Appendix C) include manual/mechanical, fire wilting, and herbicide. These treatment methods are divided up further into specific types of treatment methods and are summarized in the Environmental Assessment, Invasive Plant Treatment Project (USFS 2013b). The timing of herbicide treatments depends on a variety of factors, such as the invasive plant species, location of the population, temperature extremes, restrictions for species and sensitive resource protection, as well as wind and rain restrictions (which vary by herbicide).

5.4 METHODS

Prior to each site-specific treatment, the Licensees' decision process for selecting one or more invasive weed control method will consider the following:

- Site access
- Physical size and characteristics of the area to be treated, including soils, general terrain, and slopes
- Extent of native vegetation and native plant communities to be avoided during treatment when feasible
- Potential effects on special-status plants and animals, and how adverse effects will be avoided or minimized
- Seasonal conditions affecting plant growth, including temperature, wind, and precipitation
- Proximity to surface water bodies and potential for run-off
- Proximity to recreational use areas
- Economics
- Control goals

Only herbicides registered in California will be used within the Project boundary. If the application site is on NFS lands and once permission is obtained from USFS, all USFS policies and practices relating to herbicide use will be followed.

Any herbicides used on the Project will be applied by licensed and certified herbicide applicators. Only herbicides registered for aquatic use by the California Department of Pesticide Regulation will be utilized within or adjacent to streams, reservoirs, riparian and wetland vegetation, and other aquatic habitats per label instructions and streamside management zone buffers. Label instructions will be followed in the preparation and application of herbicides and disposal of excess product and containers. Site-specific recommendations will be prepared by a licensed Pest Control Advisor for herbicide applications and with any USFS and USFWS requirements, when applicable. All

chemical application staff will be qualified, trained, and licensed, and will adhere to rules, regulations, and reporting requirements.

Table 5.4-1 below describes the proposed herbicides the Licensees may use for vegetation management within the Project boundary. If similar, safer, or more effective herbicides become available, the Licensees will consult with the USFS at the Agency Consultation Meeting to obtain approval for its use on NFS lands.

Table 5.4-1 Proposed Herbicides for Use on NFS Lands

Aminopyralid (e.g. Milestone®, Milestone VM®)
Bromacil (Hylar®)
Chlorsulfuron (e.g. Telar DF®, Glean®, Corsair®)
Glyphosate (e.g. Accord®, Roundup®, Aquamaster®, Rodeo®)
Imazapyr (e.g. Arsenal®, Chopper®, Stalker®, Habitat®)
Oxyfluoren (Cleantraxx®)
Sulfometuron (Oust®)
surfactant
Triclopyr (e.g. Garlon®, Access®, Renovate 3®, Vastlan®)

6.0 FUTURE CONSULTATION AND PLAN REVISIONS

This section will discuss future agency consultation and FERC reporting, and the protocols that will be followed if any plan revisions are made.

6.1 AGENCY CONSULTATION MEETINGS AND ANNUAL FERC REPORTING

The second calendar year after license issuance, a consultation meeting with USFS and other applicable resource agencies (i.e., CDFW) regarding this IVMP will be held. During this consultation, USFS and any other appropriate agencies will be notified of all planned vegetation management activities to be conducted within their respective lands in the coming year and will provide the results of prior activities. In addition, the Licensees will present results from current year monitoring of noxious weeds and special-status species.

The goals of this meeting are to share information, mutually agree upon planned maintenance activities, identify concerns regarding activities and their potential effects on sensitive resources, and determine measures needed to avoid or mitigate potential effects. At each biennial Agency Consultation Meeting, the Licensees will: (1) review with USFS, as appropriate, vegetation management activities (including treatment of target NNIP infestations, current BMPs and any updates to the current BMPs, and necessary revegetation planning or monitoring) planned for the calendar year on NFS lands, (2) identify any IVMP revisions needed for these activities, and (3) make adjustments to the IVMP or schedule for these activities, as deemed appropriate.

6.2 PLAN REVISIONS

The Licensees will evaluate the requirements of this IVMP during the life of the new license and may modify those requirements in consultation with USFS and CDFW. The Licensees will provide USFS and CDFW with 30 calendar days to provide written comments on the draft updated IVMP, including any recommendations for the updated IVMP. The Licensees will include all relevant documentation of consultation with USFS and CDFW in the response to be filed with FERC. If the Licensees do not adopt a particular written recommendation by USFS or CDFW, the response to FERC will include reasoning for the decision.

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7.0 REFERENCES

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Appendix A

Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys

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Table A-1. Non-Native Invasive Plant Species Occurrences Within the Project Boundary, Excluding Lands Overlying the Angeles Tunnel, Documented During 2018 and 2019 Field Surveys

Scientific Name[1]	Common Name	CDFA Rating[2]	Cal-IPC Rating[3]	ANF Invasive Species Non-Native Plant Species List Rating[4]	LPNF Invasive Species Non-Native Plant Species List Rating[4]	ANF Presence[5]	LPNF Presence[5]	Number of Occurrences Within the Project Boundary[6]
****Acacia* sp.**	Acacia	B	--	--	--	No	No	3
****Ailanthus altissima**	Tree of heaven	C	Moderate	Y	Y	Yes	No	2
****Arundo donax**	Giant reed grass	B	High	Y*	A	Yes	Yes	11
***Atriplex semibaccata**	Saltbush	--	Moderate	--	Y	Yes	No	9
***Brassica tournefortii**	African mustard	--	High	--	--	No	No	1
****Cardaria (Lepidium) draba/pubescens**	Hoary cress/Whitetop	B	Moderate	--	Y	Yes	No	2
****Carduus pycnocephalus**	Italian thistle	C	Moderate	--	Y	Yes	No	17
****Centaurea melitensis**	Tocalote	C	Moderate	--	Y	Yes	Yes	227
****Centaurea solstitialis**	Yellow star thistle	C	High	Y	Y	Yes	Yes	73
****Cirsium arvense**	Canada thistle	B	Moderate	--	--	Yes	Yes	6
****Cirsium vulgare**	Bull thistle	C	Moderate	--	Y	Yes	Yes	55
****Cortaderia jubata/selloana**	Pampas grass	B	High	--	Y	Yes	Yes	9
***Foeniculum vulgare**	Fennel	--	Moderate	--	Y	Yes	No	1
****Halogeton glomeratus**	Halogeton	A	Moderate	--	--	No	No	1

Table A-1. Non-Native Invasive Plant Species Occurrences Within the Project Boundary, Excluding Lands Overlying the Angeles Tunnel, Documented During 2018 and 2019 Field Surveys (continued)

Scientific Name[1]	Common Name	CDFA Rating[2]	Cal-IPC Rating[3]	ANF Invasive Species Non-Native Plant Species List Rating[4]	LPNF Invasive Species Non-Native Plant Species List Rating[4]	ANF Presence[5]	LPNF Presence[5]	Number of Occurrences Within the Project Boundary[6]
***Lepidium latifolium*	Perennial pepperweed	B	High	--	Y	Yes	No	7
**Marrubium vulgare*	horehound	--	Limited	--	--	Yes	Yes	20
**Nicotiana glauca*	Tree tobacco	--	Moderate	Y	Y	Yes	Yes	9
**Prunus cerasifera*	Cherry plum	--	Limited	--	--	No	No	1
**Ricinus communis*	Castorbean	--	Limited	Y	--	No	No	1
**Robinia pseudoacacia*	Black locust	--	Limited	Y	Y	Yes	No	9
**Rosmarinus officianalis*	Rosemary	--	--	--	--	No	No	2
***Salsola tragus*	Russian thistle	C	Limited	Y	Y	Yes	Yes	206
**Schinus molle*	Peruvian pepper tree	--	Limited	--	--	Yes	No	11
***Spartium junceum*	Spanish broom	C	High	Y	Y	Yes	Yes	102
**Stipa miliacea* var. *miliacea*	Smilo grass	--	Limited	--	--	Yes	Yes	10
***Tamarix ramosissima*	Saltcedar	B	High	--	--	Yes	Yes	147
***Tribulus terrestris*	Puncture vine	C	Limited	--	--	No	No	5
Total:	**27 Species**							**947**

Sources (see the Final License Application for full references cited):

DWR 2018b

Notes:
[1]For species that are not listed by CDFA (identified with one asterisk), data were collected in accordance with USFS protocols (USFS 2014) only for occurrences on USFS lands. For species identified with two asterisks (species that have a CDFA Rating of A, B, or C), occurrence data were collected wherever they were observed.
[2]CDFA Ratings (CDFA 2018):
A = An organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine regulation, containment, rejection, or other holding action.
B = An organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner. OR An organism of known economic importance subject to state endorsed holding action and eradication only when found in a nursery.
C = An organism subject to no state enforced action outside of nurseries except to retard spread. At the discretion of the county agricultural commissioner. OR An organism subject to no state enforced action except to provide for pest cleanliness in nurseries.
[3]Cal-IPC Ratings (Cal-IPC ratings are provided for reference but were not a criteria in determining which species were target species) (Cal-IPC 2018):
Limited = These species are invasive, but their ecological impacts are minor on a Statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
Moderate = These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
High = These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
[4]ANF and LPNF Designation (USFS 2005c):
Y = Present on forest
Y = Forest is currently treating, in process of treating or has treated in past*
A = adjacent or near Forest, reasonable to expect invasion on Forest lands within next 5 years
? = plants are adjacent or near and highly likely to be present but not documented
 # = plant added to CDFA noxious weed list 8/2003, pest rating not finalized but "C" rating expected
[5]ANF and LPNF occurrences were determined based on congressional boundaries.
[6]These occurrences exclude lands overlying the Angeles Tunnel. In addition, no NNIP occurrences were noted on BLM land.
Key:
ANF = Angeles National Forest
BLM = U.S. Department of the Interior, Bureau of Land Management
Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Agriculture
LPNF = Los Padres National Forest
NNIP = non-native invasive plant
USFS = U.S. Department of Agriculture, Forest Service

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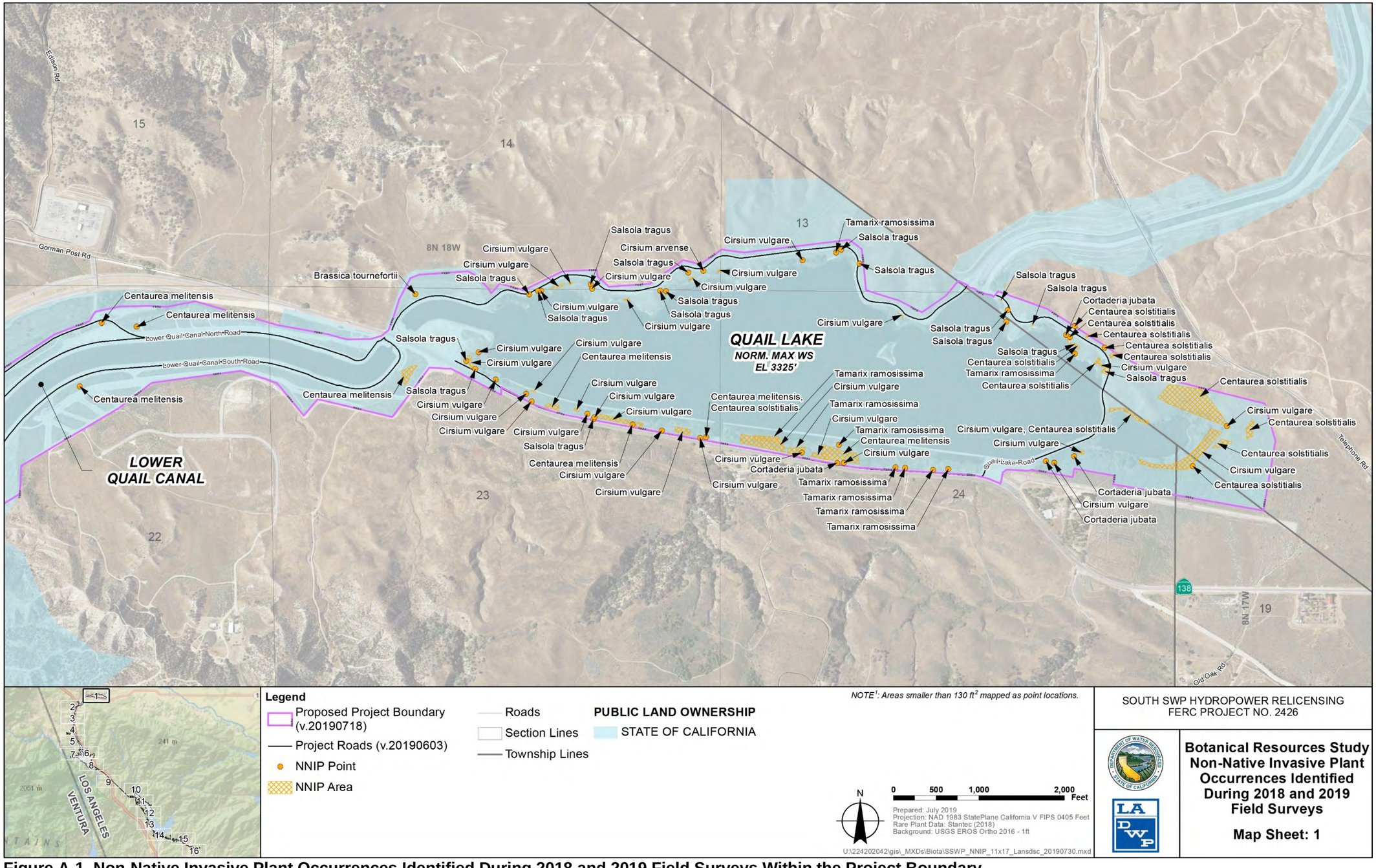
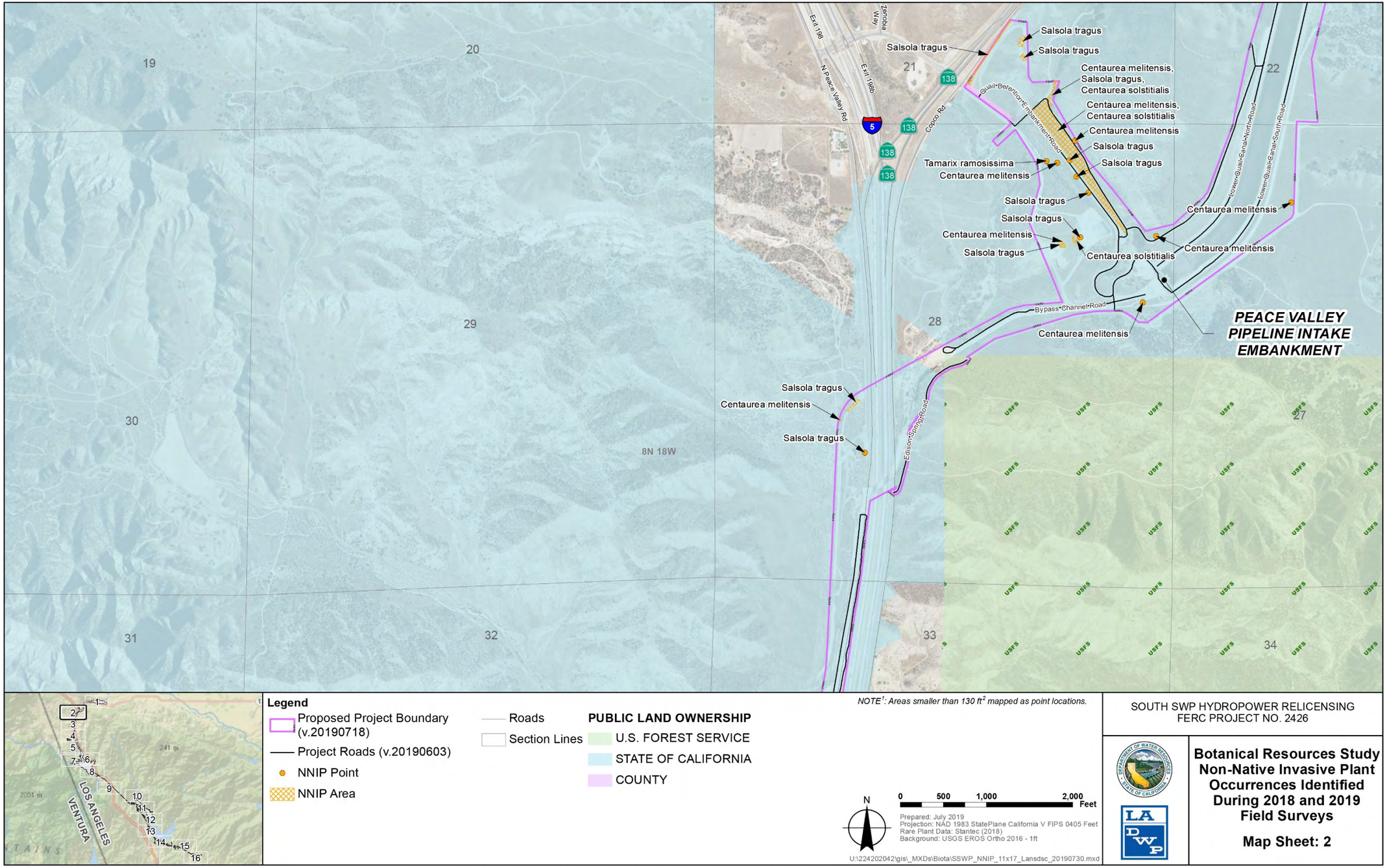


Figure A-1. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary



Legend

- Proposed Project Boundary (v.20190718)
- Project Roads (v.20190603)
- NNIP Point
- NNIP Area
- Roads
- Section Lines

PUBLIC LAND OWNERSHIP

- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- COUNTY

NOTE[1]: Areas smaller than 130 ft² mapped as point locations.

N

0 500 1,000 2,000 Feet

Prepared: July 2019
Projection: NAD 1983 StatePlane California V FIPS 0405 Feet
Rare Plant Data: Stantec (2018)
Background: USGS EROS Ortho 2016 - 1ft

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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

Botanical Resources Study Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys

Map Sheet: 2

Figure A-2. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

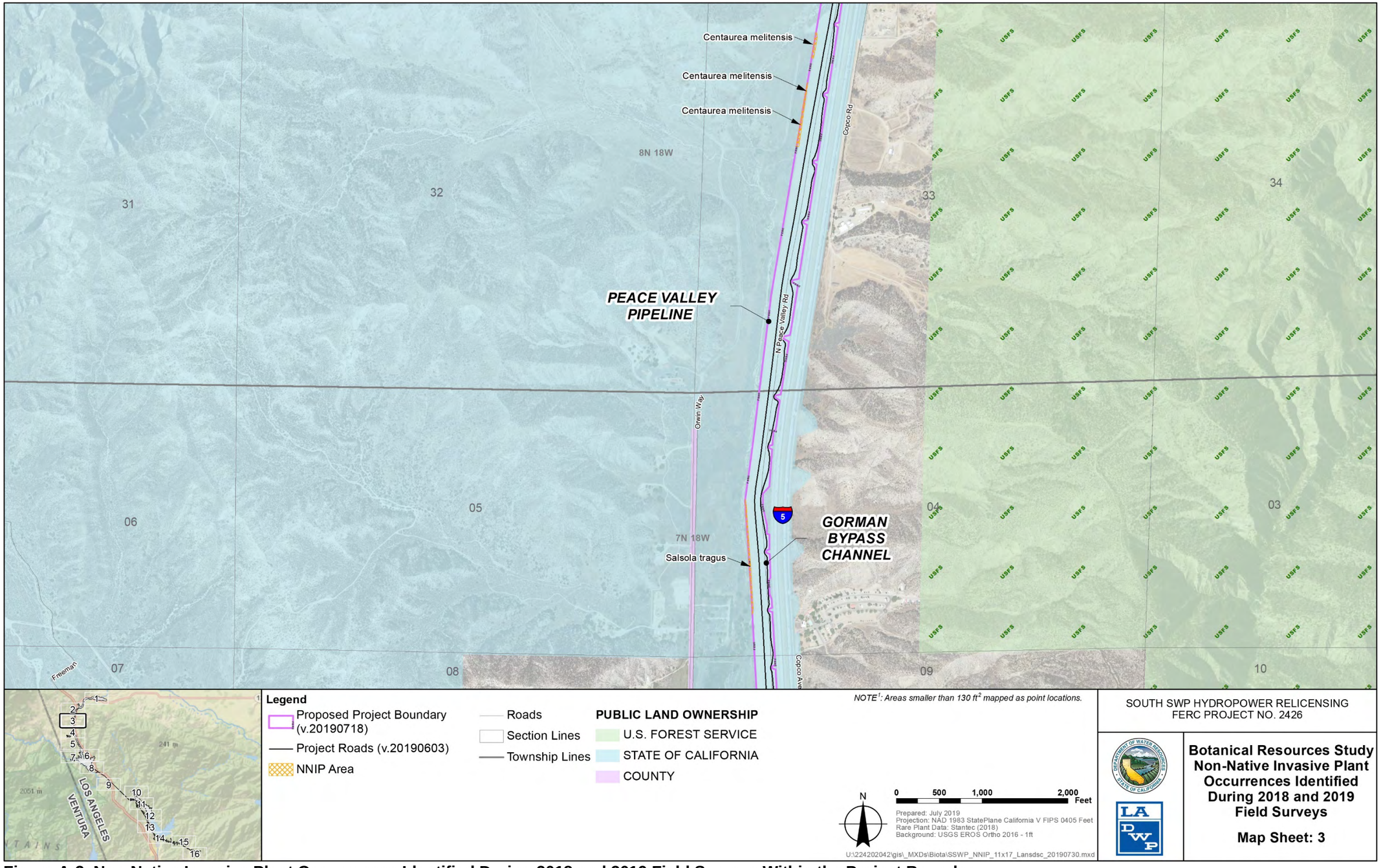


Figure A-3. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

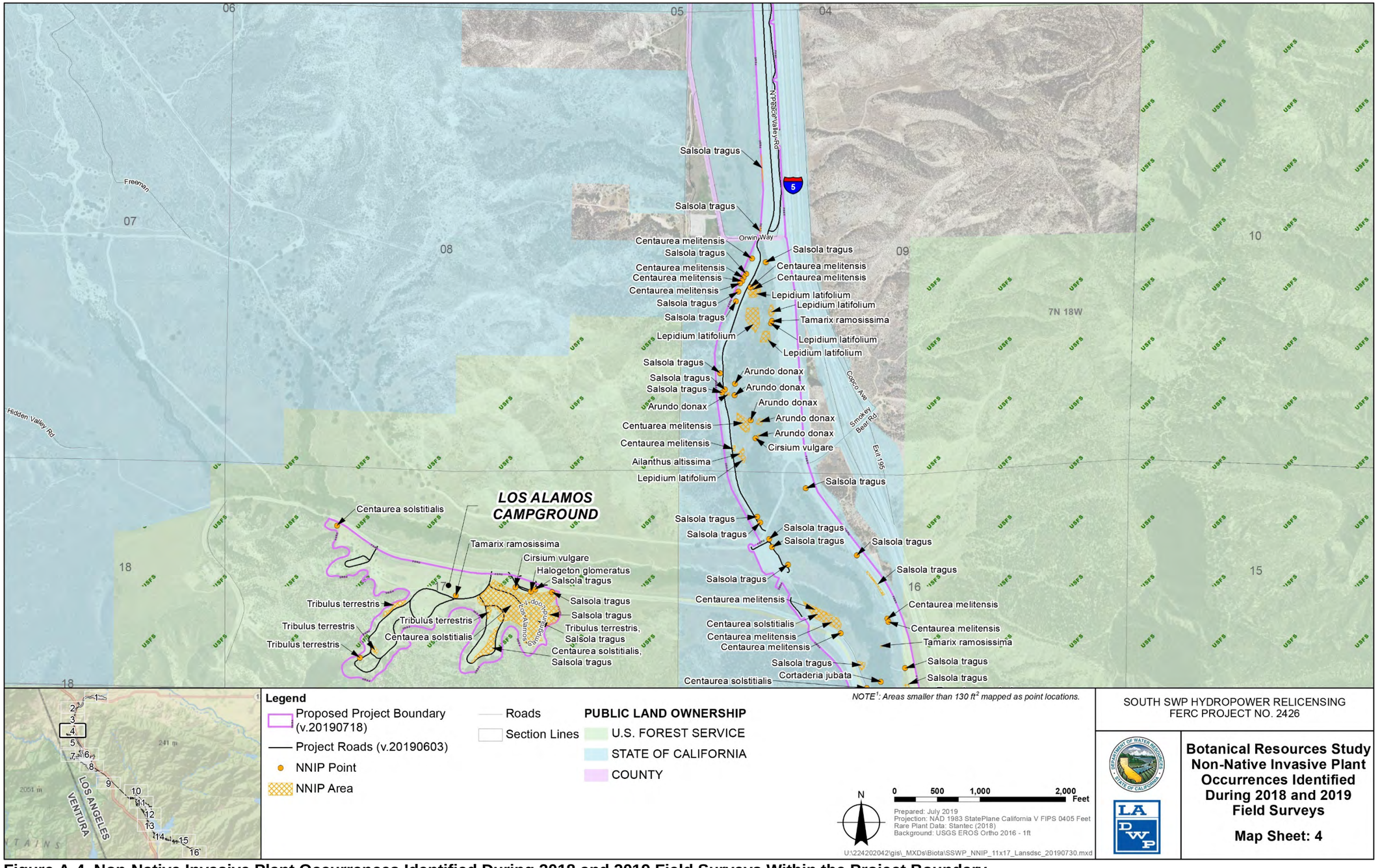


Figure A-4. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

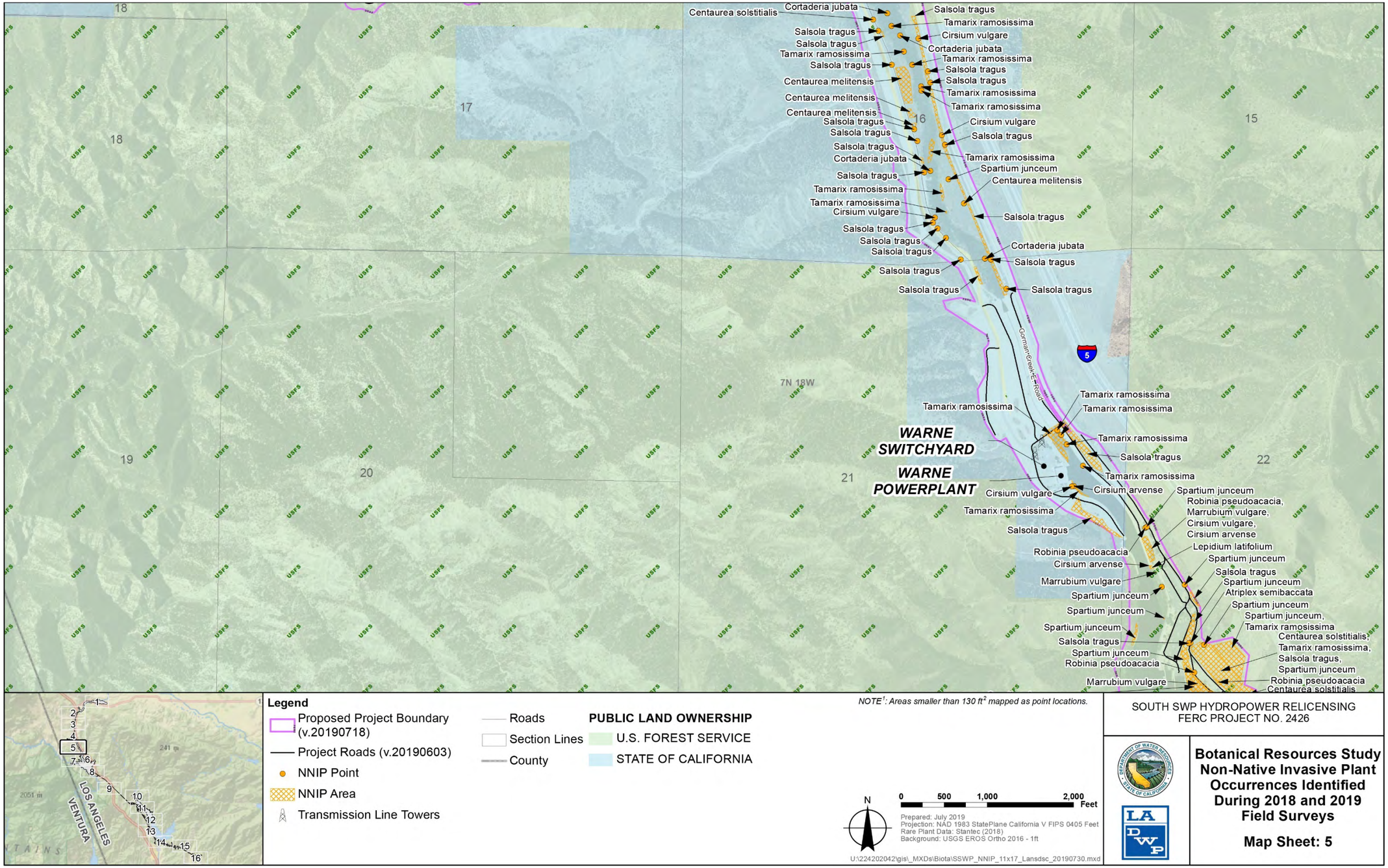


Figure A-5. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

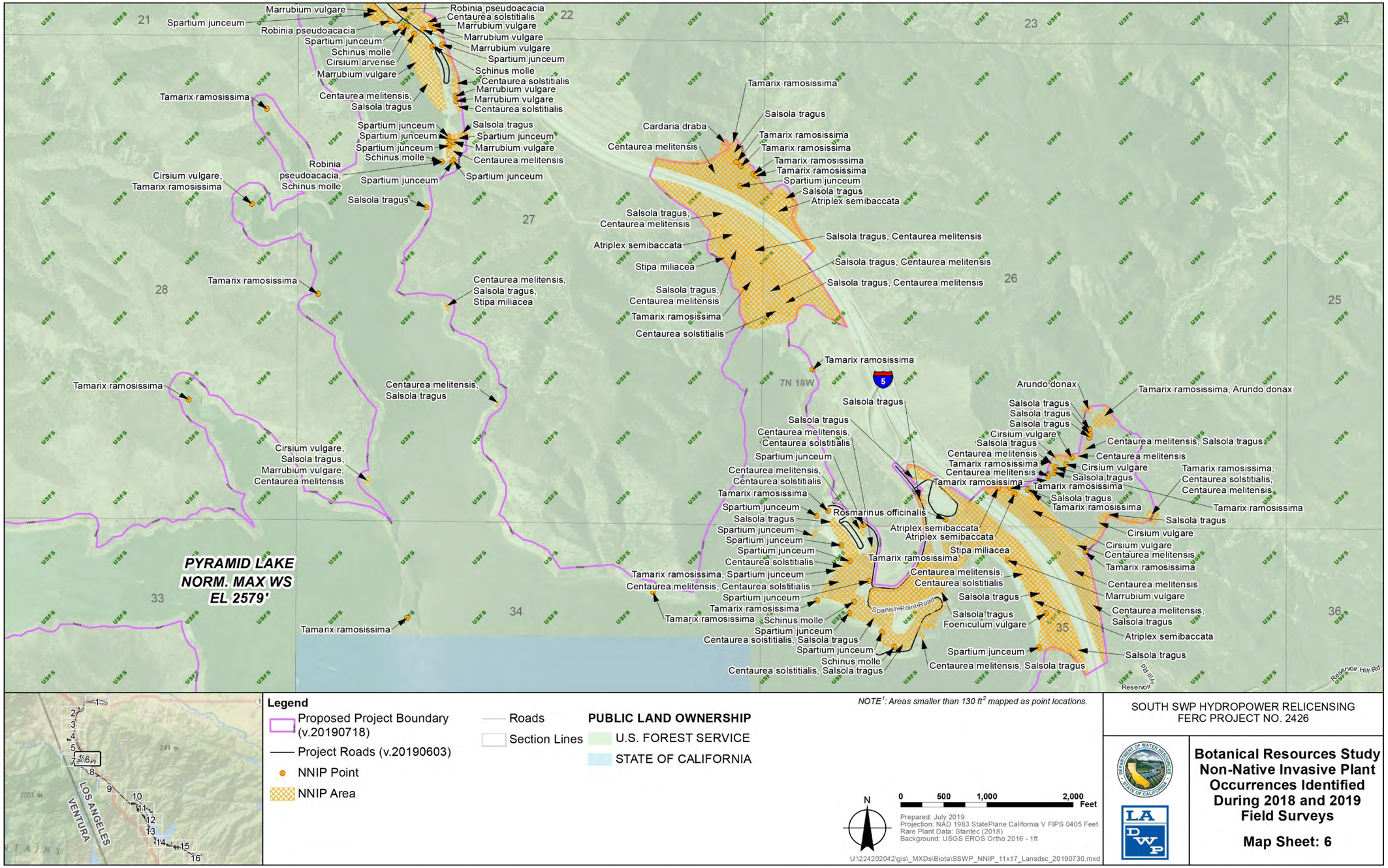


Figure A-6. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

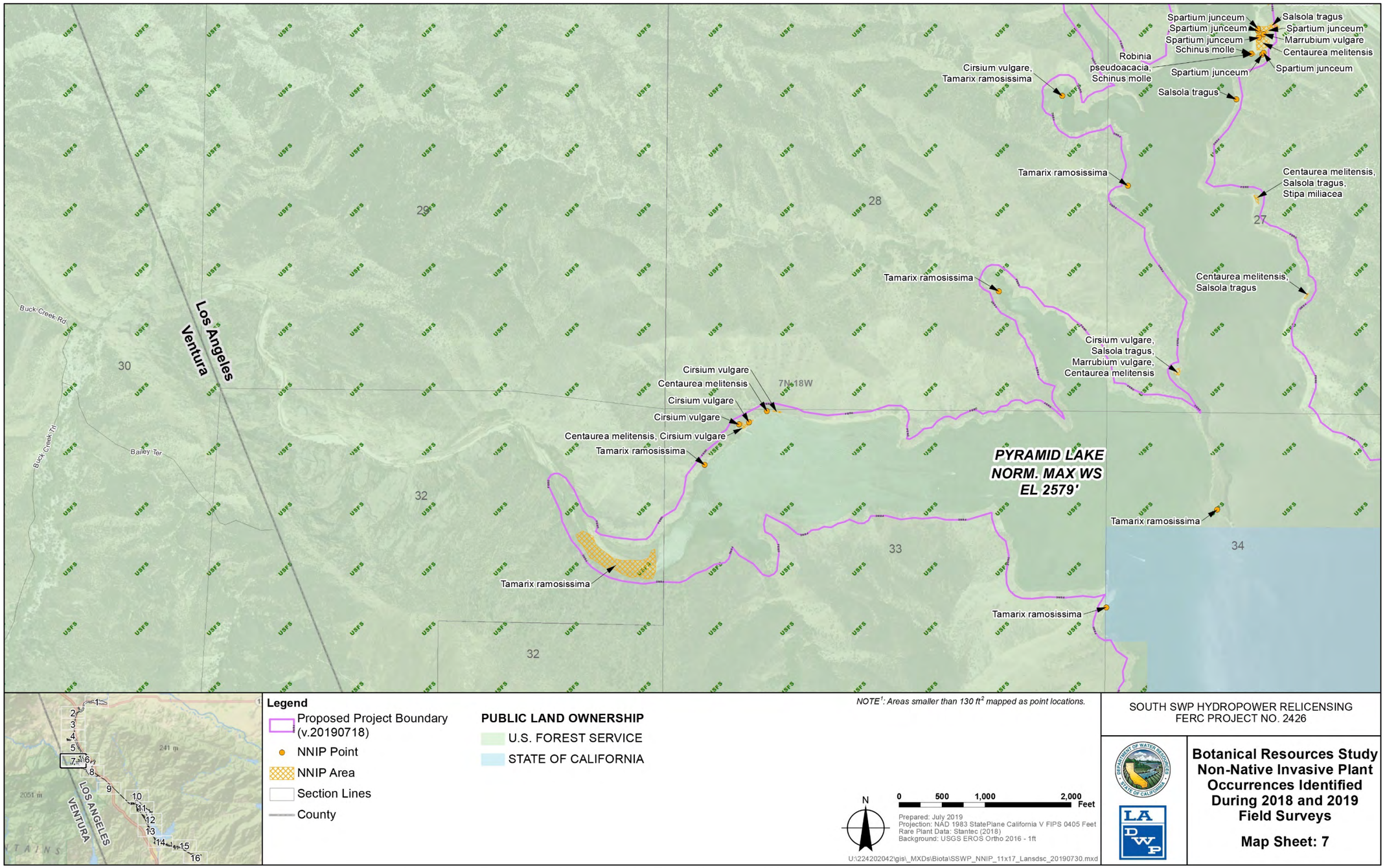


Figure A-7. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

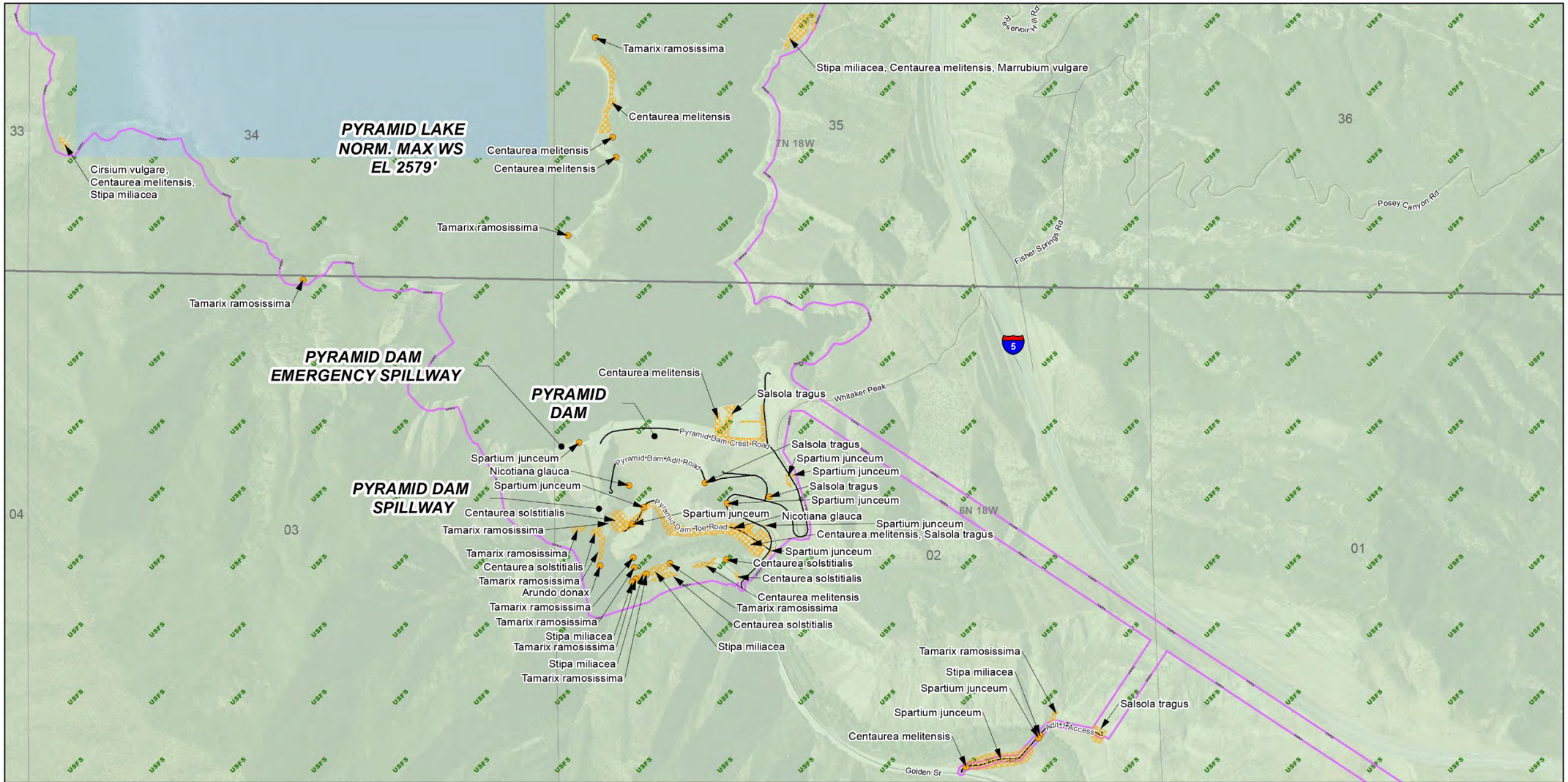


Figure A-8. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

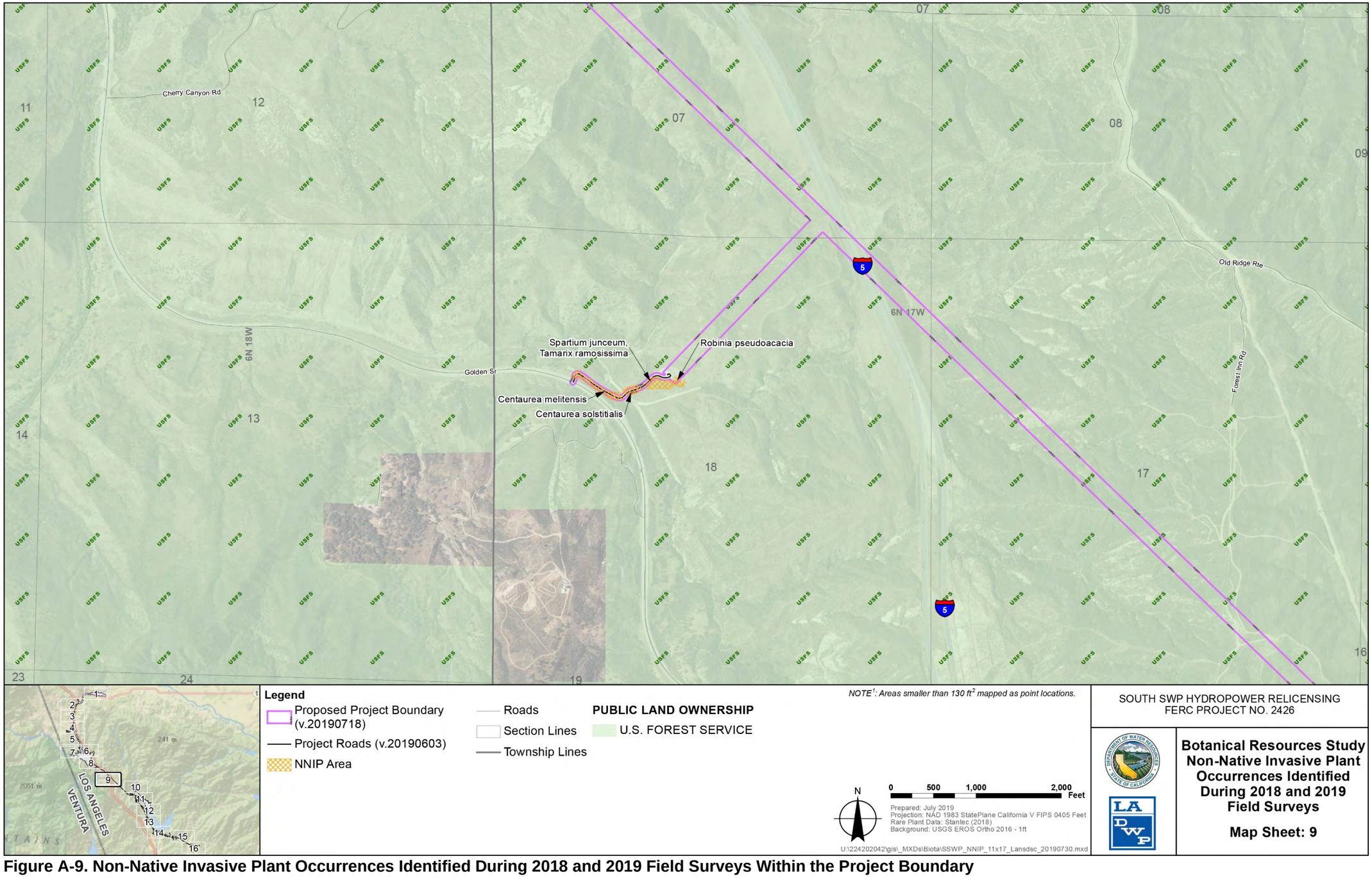


Figure A-9. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

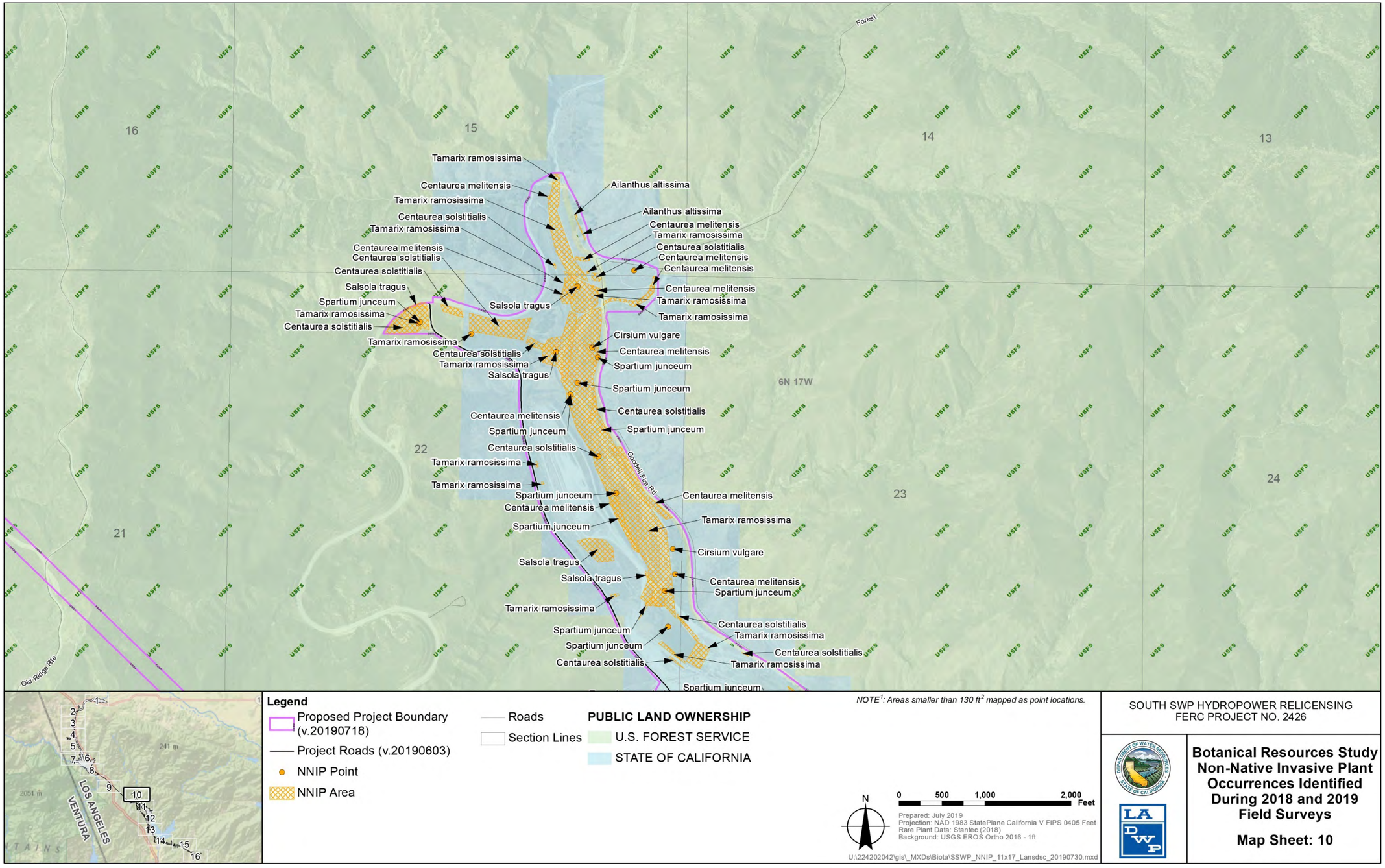


Figure A-10. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

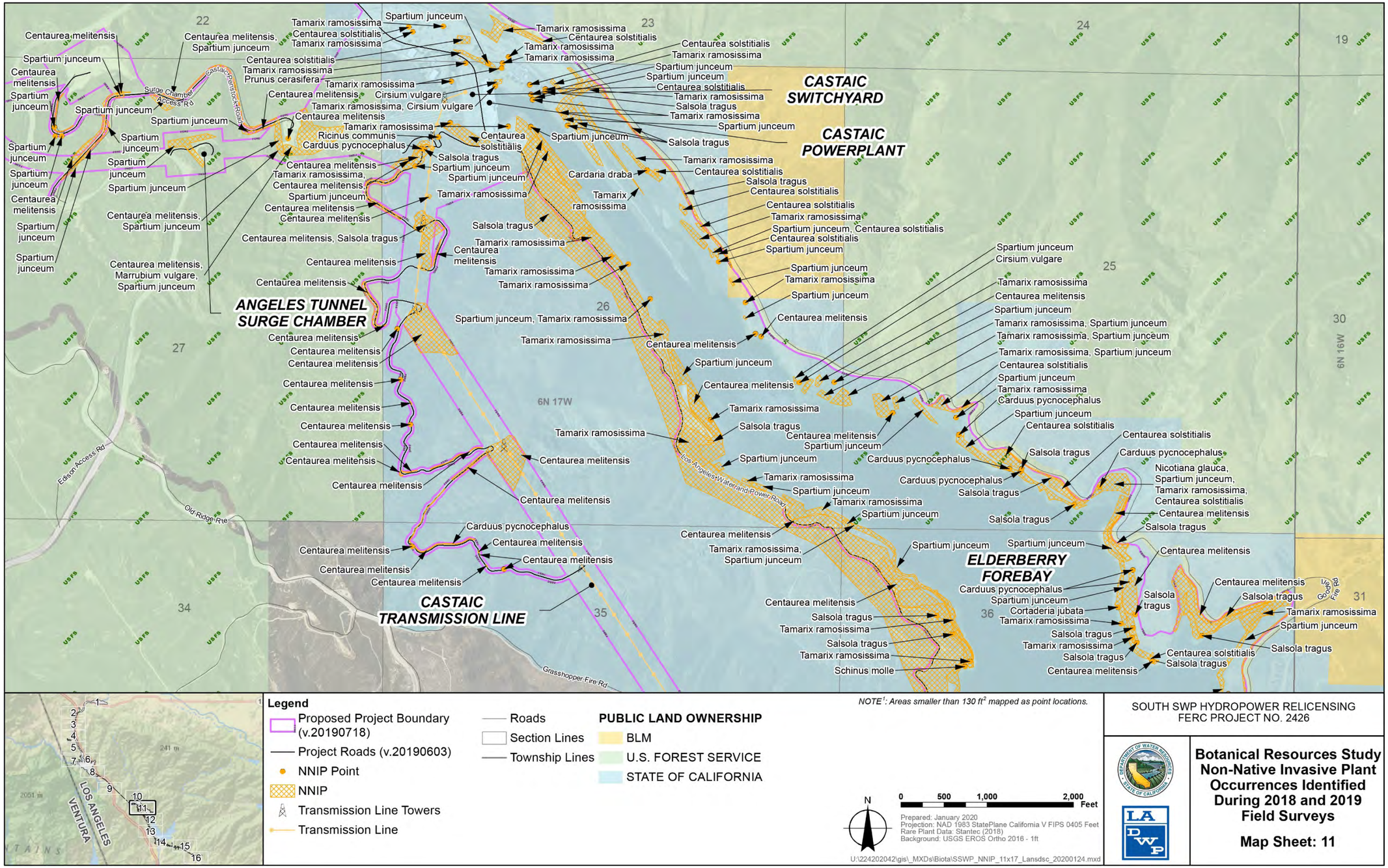


Figure A-11. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

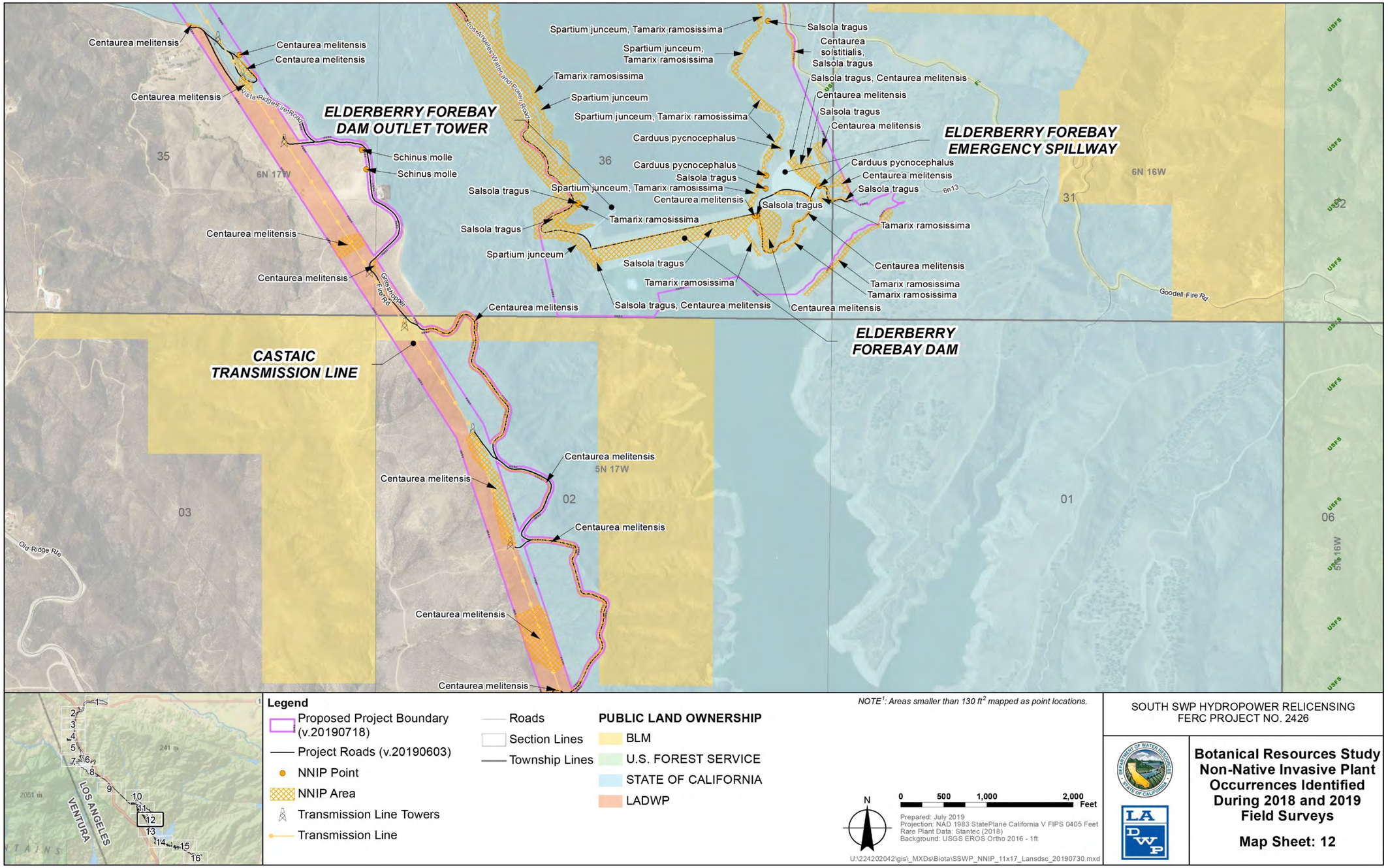


Figure A-12. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

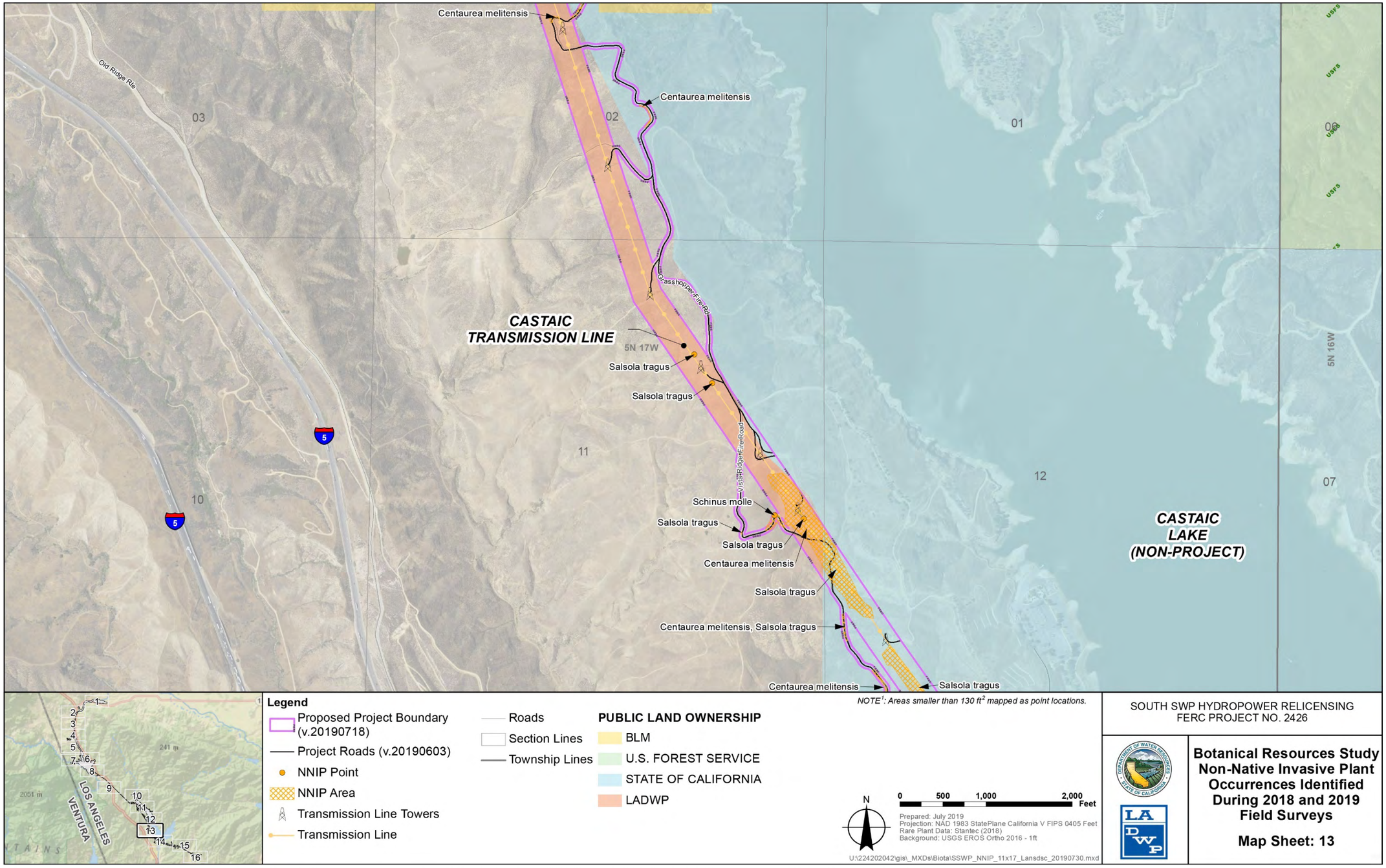


Figure A-13. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

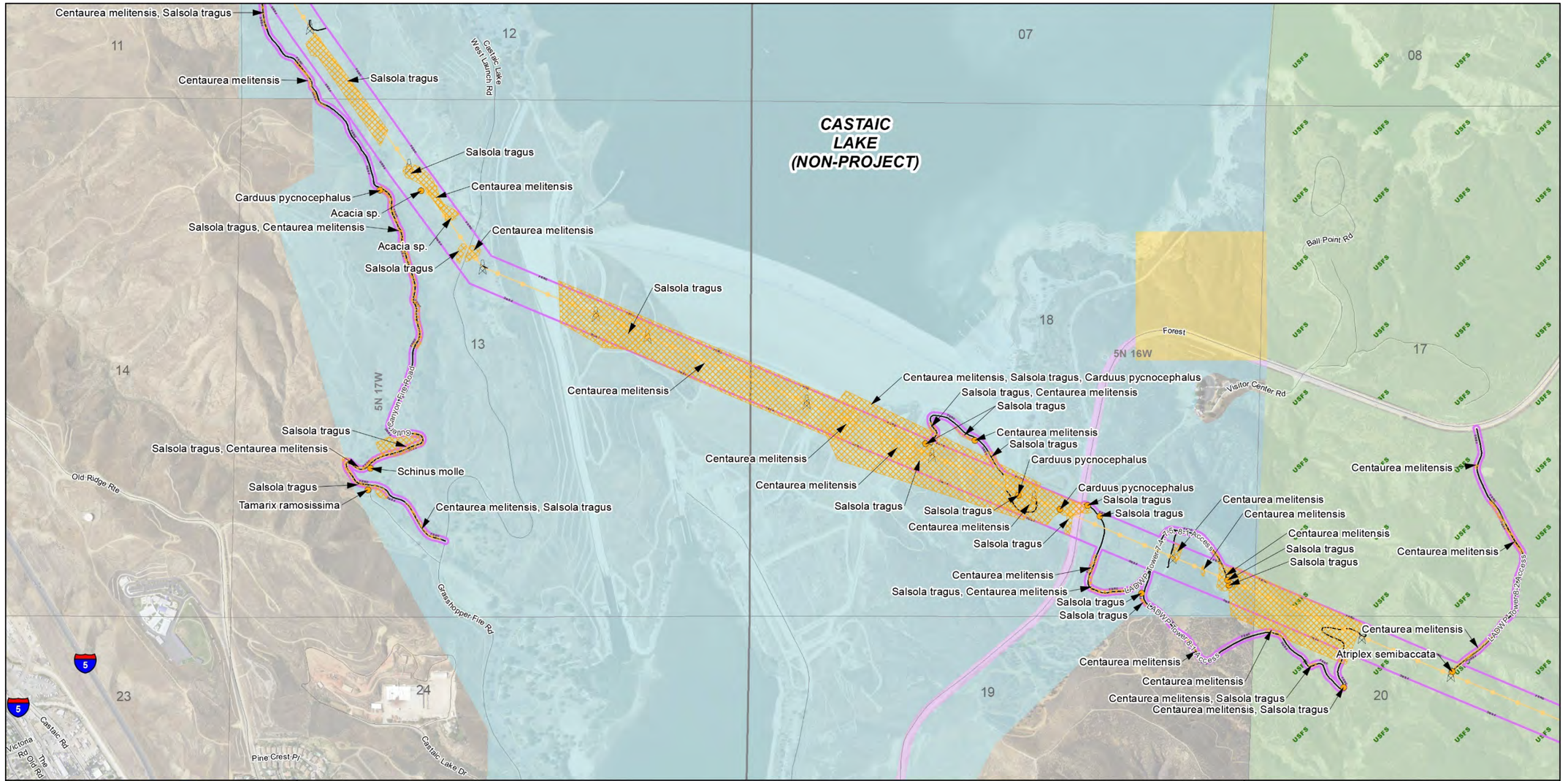


Figure A-14. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

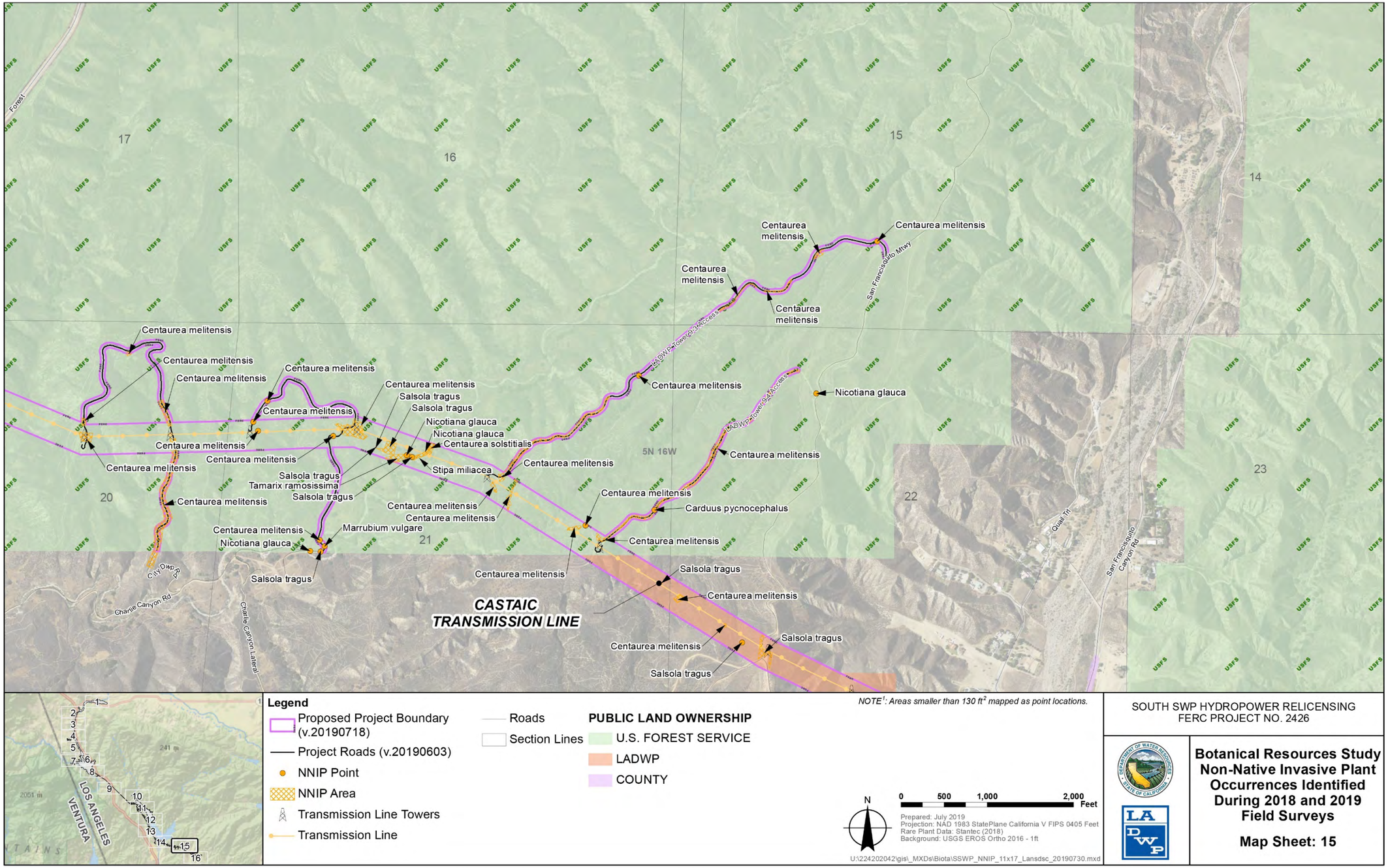
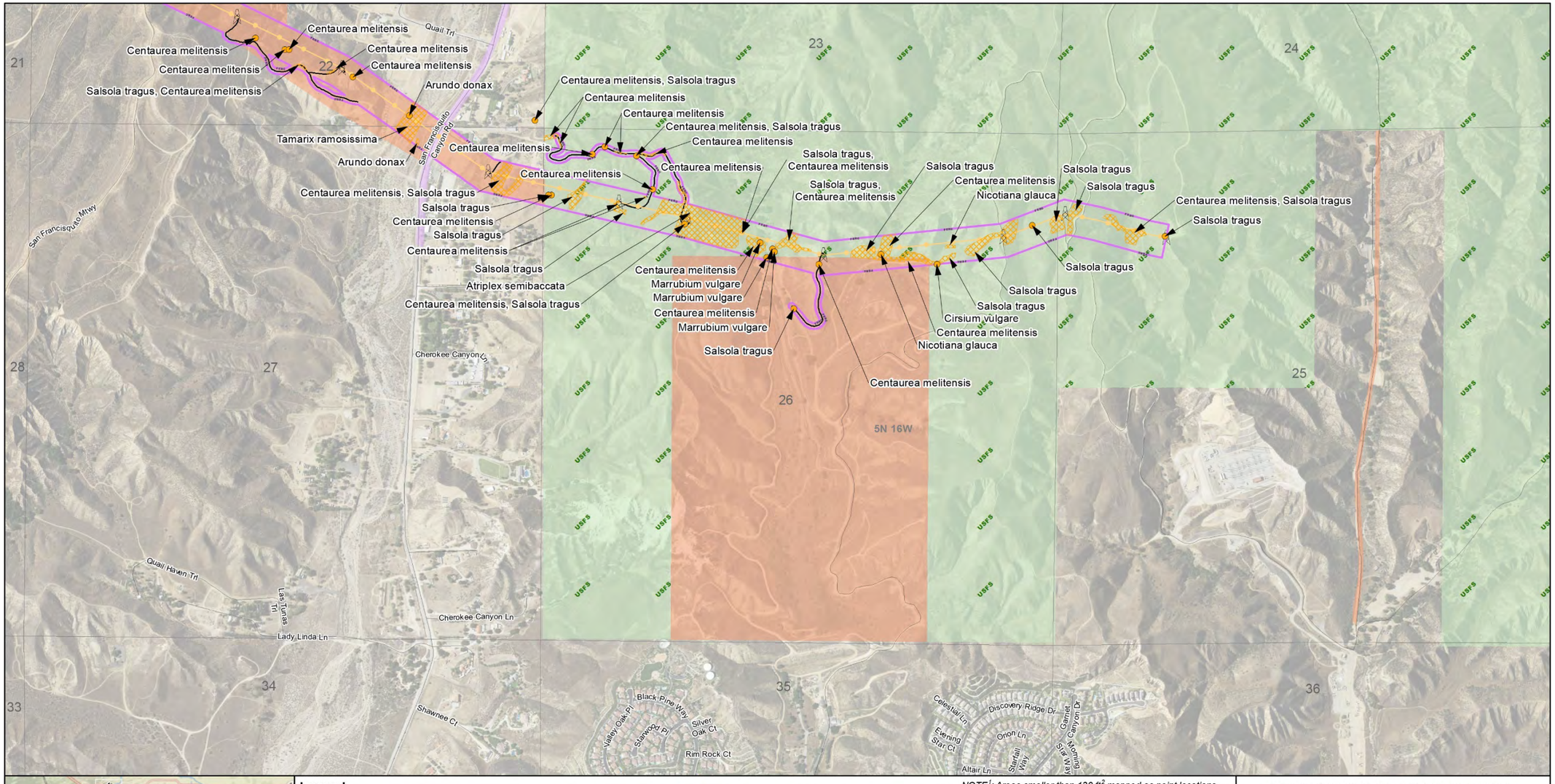
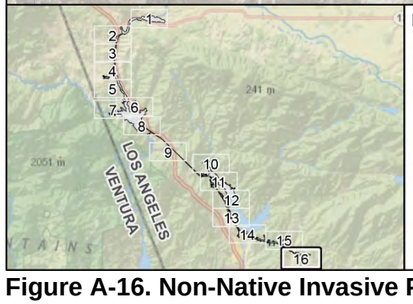


Figure A-15. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary





Legend

- Proposed Project Boundary (v.20190718)
- Project Roads (v.20190603)
- NNIP Point
- NNIP Area
- Transmission Line Towers
- Transmission Line
- Roads
- Section Lines

PUBLIC LAND OWNERSHIP

- U.S. FOREST SERVICE
- LADWP
- COUNTY

NOTE[1]: Areas smaller than 130 ft² mapped as point locations.

N

0 500 1,000 2,000 Feet

Prepared: July 2019
Projection: NAD 1983 StatePlane California V FIPS 0405 Feet
Rare Plant Data: Stantec (2018)
Background: USGS EROS Ortho 2016 - 1ft

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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

**Botanical Resources Study
Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys**

Map Sheet: 16

Figure A-16. Non-Native Invasive Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

Appendix B

USFS Recommended BMPs

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Road Management Activities

Road-4. Road Operations and Maintenance. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.

Road-7. Stream Crossings. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.

Road-9. Parking and Staging Areas. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.

Road-11. Road Storm-Damage Surveys. Monitor road conditions following storm events to detect road failures; assess damage or potential damage to waterbodies, riparian resources, and watershed functions; determine the causes of the failures; and identify potential remedial actions at the damaged sites and preventative actions at similar sites.

Mechanical Vegetation Management Activities

Veg-1. Vegetation Management Planning. Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.

Veg-2. Erosion Prevention and Control. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.

Veg-3. Aquatic Management Zones. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities around and adjacent to waterbodies.

Veg-8. Mechanical Site Treatment. Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment.

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Appendix C

Summary of NNIP Treatment Methods Proposed from the Santa Clara Watershed Invasive Plant Treatment Project

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Table C-1. Summary of NNIP Treatment Methods from the Santa Clara Watershed Invasive Plant Treatment Project

Method	Description
Biological Control Method	
Biological Control Agents	Biological control agents are normally insects or pathogens that attack specific invasive plant species. Prior to allowing use, US Department of Agriculture, Agriculture Plant Health and Insect Service (APHIS) is required to complete NEPA analysis and documentation. There is only one potential biological control agent [sic] that has this required analysis completed, *Eustenopus villosus*. It is the only species which will be used for this project [sic]. Use of this method would comply with the APHIS NEPA document and decision. Biological control would only be used to target yellow starthistle. Advantages and disadvantages –suppresses the spread of infestations but would not likely eradicate the invasive plant populations. If successful, can provide permanent, widespread control with a favorable cost:benefit ratio.
Manual/Mechanical Methods	
Hand Pulling	Pulling or uprooting plants can be effective against some shrubs, tree saplings, and herbaceous invasive plants. Annuals and tap-rooted plants are particularly susceptible to control by hand pulling. It is not as effective against many perennial invasive plants with deep underground stems and roots that are often left behind to resprout. The advantages of pulling include its initial small ecological impact, minimal damage to neighboring plants, and little (or no) cost for equipment or supplies. Normally effective with small populations and/or where a large pool of volunteer labor is available. The key to effective hand pulling is to remove as much of the root as possible while minimizing soil disturbance. For many species, any root fragments left behind have the potential to re-sprout, and pulling is not effective on plants with deep and/or easily broken roots. Disadvantages are that this method is labor and time intensive. Often times there are low mortality rates, which require repeated re-treatments to be effective, which could increase the project cost and frequency of disturbance to the treatment area.
Pulling Using Tools	Most plant-pulling tools are designed to grip the plant stem and provide the leverage necessary to pull its roots out. Tools vary in their size, weight, and the size of the invasive plant they can extract. The Root Talon is inexpensive and lightweight, but may not be durable or effective as the all-steel Weed Wrench, which is available in a variety of sizes. Both work best on firm ground as opposed to soft, sandy, or muddy substrates and in small areas with easy access. Advantages are initial small ecological impact and minimal damage to neighboring plants. Normally effective with small populations and/or where a large pool of volunteer labor is available. Disadvantages include both tools can be cumbersome and difficult to carry to remote sites, this method can be labor and time intensive, often requires repeated re- treatments to be effective, which could increases the project cost and frequency of disturbance to the treatment area. Could spread invasive plants to other sites if equipment is not cleaned before leaving an infected site.

Table C-1. Summary of NNIP Treatment Methods from the Santa Clara Watershed Invasive Plant Treatment Project (continued)

Method	Description
Clipping and Cutting	"Clipping and Cutting" requires cutting a portion of the invasive plant stem, generally cutting the bole of the tree/plant with cutting tools such as chainsaws, weed wacker/whip/eater. Advantages and disadvantages are similar to the "pulling using tools" method as noted above. Another disadvantage is that many species can resprout from the base.
Girdling	For trees (e.g. tamarisk), the main trunk of the trees would be stripped of the bark (consisting of secondary phloem tissue, cork cambium, and cork) around a tree's outer circumference, causing its death. Death occurs from the inability of the leaves to transport sugars (primarily sucrose) to the roots. Advantages to this treatment method are minimal ground disturbance and effective in killing larger sized trees. A disadvantage is that it takes time for the tree to die and during that time the tree can still produce seed. Another disadvantage is that some species can resprout from the base.
Tarping	Invasive plants would be cut back within inches of the ground and opaque thick tarps or pond liners would be staked or weighed down over the treatment area. The tarp(s) would be applied in late spring/early summer and remain for up to 5 months, usually from June to November. This treatment is best used in small areas (less than 0.25 acres) where there is not an intermix of native plants. Advantages to this treatment method are minimal ground disturbance and it has been known to be effective in small areas. Disadvantages are limited size of treatment area, could damage soil microorganisms, and high monitoring needs in high public use areas to ensure the tarp is left in place.
Fire-wilting Method	
Flaming Weed Torch	The weed torch is a treatment method that utilizes a propane torch to kill individuals but not ignite them. This treatment is known as flaming, wilting, or blanching and the equipment can carried by an individual. The weed torch would only be used during times of low fire danger and in areas where there is low potential to carry fire. The most effective application is for the control of small diameter woody vegetation (one inch in diameter or less) such as French broom, other broom species and gorse, seedlings, and nonwoody grasses and forbs. To reduce potential for wildfire, 'flaming' is typically only undertaken when vegetation is very wet- either during or immediately after a rain event, or when vegetation is damp from fog and on low wind days (less than 5 mph is preferable). An advantage to this form of treatment is that it has very minimal environmental impact. A disadvantage is the limited window of opportunity for treatment.

Table C-1. Summary of NNIP Treatment Methods from the Santa Clara Watershed Invasive Plant Treatment Project (continued)

Method	Description
Herbicide Methods	
Hand/Selective	Treatment of individual plants to avoid spraying other desirable plants. There is a low likelihood of drift or delivery of herbicides away from treatment sites. This method is used in sensitive areas, such as near water, to avoid getting any herbicide on the soil or in the water. Specific methods include: a) Foliar Application (including basal bark) – These methods apply herbicide directly to the leaves and stems/trunk of a plant. An adjuvant or surfactant is often needed to enable the herbicide to penetrate the plant cuticle, a thick, waxy layer present on leaves and stems of most plants. These applicators range from backpack sprayer, to hand-pumped spray or squirt bottles, which can target very small plants or parts of plants. b) Spot spraying – Spot spraying is similar to foliar spraying but would be for larger sized plants and/or population of plants. The focus still is on treating individual plants (instead of broadcast spraying) but over a larger area. Applicators would typically be backpack sprayers. Because of the potential to treat larger areas and larger sized vegetation, this method has a slightly higher potential for drift. c) Frill or Hack and Squirt – The frill method, also called the "hack and Squirt" treatment, is often used to treat woody species with large, thick trunks. The tree is cut using a sharp knife, saw, or ax, or drilled with a power drill or other device. Herbicide is then immediately applied to the cut with a backpack sprayer, squirt bottle, syringe, or similar equipment. d) Cut-Stump – This method is often used on woody species that normally resprout after being cut. Cut down the tree or shrub, and immediately spray or squirt herbicide on the exposed cambium (living inner bark) of the stump. The herbicide must be applied to the entire inner bark (cambium) within minutes after the trunk is cut. The outer bark and heartwood do not need to be treated since these tissues are not alive, although they support and protect the tree's living tissues. The cut stump treatment allows for a great deal of control over the site of herbicide application; therefore, has a low probability of affecting non-target species or contaminating the environment. It also requires only a small amount of herbicide to be effective. e) Cut, Resprout, and Spray or Paint/Daub – Cut 1-2 months prior to spraying. Apply herbicide when resprouts are 2-4 feet tall, but most effective in early fall through winter when plant chlorophyll is transferred to roots. Herbicide should be applied on dry days and during low winds. f) Stem Injection – Herbicides can be injected into stems using a needle, syringe, or special cutting tools, such as basal injectors or breast height injectors. g) Basal Bark Treatment - Herbicide is applied to the base of individual woody plants or stems - individual plant treatment. The herbicide penetrates through the bark to the cambium, where it translocates to roots and stems for complete control. Used for trees less than 6 inches in diameter and trees that are too tall for foliar application. h) Wicking application - applying a herbicide consists of a wick or rope soaked in herbicide from a reservoir attached to a handle. The wetted wick is used to wipe or brush herbicide over the weed. Advantages include little soil disturbance, highly selective and effective with little risk of drift of herbicide onto non-target species. Disadvantages include labor intensive and weather conditions must be suitable for herbicide application (and for stem injections, equipment could be expensive). For immediate herbicide treatment after cutting, coordinating cutting and herbicide application in a timely fashion would be difficult. A disadvantage of herbicide treatment is the potential for toxicity effects from the chemicals used.

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Appendix D

Special-Status Plant Species Occurrences Identified During 2018 and 2019 Field Surveys

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Table D-1. Special-Status Plant Species Occurrences Within the Project Boundary Identified During 2018 and 2019 Field Surveys

Scientific Name	Common Name	Federal Listing Status	State Listing Status[1]	USFS Ranking[1]	BLM Ranking[2]	CNPS Ranking[3]	Number of Occurrences in Study Area[5]	Location of Occurrences	Site Quality	Threats
Calochortus clavatus var. *gracilis*	slender mariposa lily	None	S3	S	S[4]	1B.2	37	Throughout the study area (see maps) occurrences were found on NFS-owned lands	6 excellent, 19 good, 12 fair	Encroachment of non-native invasive plants, road and vehicle use, and human use via recreation
Calystegia peirsonii	Peirson's morning glory	None	S4	None	None	4.2	93	Throughout the study area (see maps) occurrences were found on NFS-owned lands	48 good, 39 fair, 6 poor	Encroachment of non-native invasive plants, road and vehicle use, and human use via recreation
Delphinium parryi ssp. *purpureum*	Mt. Pinos larkspur	None	S4	S	None	4.3	1	Occurrence found in the Castaic Transmission Line area on NFS-owned lands	1 good	Road and vehicle use
Juglans californica	southern California black walnut	None	S4	None	None	4.2	2	One occurrence found in Castaic Creek and one occurrence found in the Castaic Transmission Line area; both occurrences were not found on NFS-owned lands	1 good and 1 fair	Encroachment of non-native invasive plants and road and vehicle use
Opuntia basilaris var. *brachyclada*	short-joint beavertail	None	S3	S	S[4]	1B.2	47	Throughout the study area (see maps) occurrences were found on NFS-owned lands	1 excellent, 10 good, 29 fair, 7 poor	Encroachment of non-native invasive plants, and human use via recreation
						Total	**180**	**--**	**--**	**--**

Sources (see the Final License Application for full references cited):
[1]CDFW 2018c
[2]BLM 2010
[3]CNPS 2018; DWR 2018a
Notes:
[4]California BLM policy on sensitive plants (California BLM Manual Supplement 6840.06 and Handbook 6840.1) automatically affords sensitive status to plants on List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) of the California Native Plant Society's most recent Inventory of Rare and Endangered Plants, unless the State Director decides on a case-by-case basis that a particular List 1B species does not warrant sensitive status (BLM 2010).
[5]The lands overlying the Angeles Tunnel were not a part of the Botanical Resources Study Area and were not assessed for botanical resources.
CDFW State Listing Ranks:
S3 = Vulnerable – Vulnerable in the State 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 the State.
S4 = Apparently Secure – Uncommon but not rare in the State; some cause for long-term concern due to declines or other factors.
CNPS Plant Ranks:
1B = Plants rare, threatened, or endangered in California and elsewhere
4 = Watch List: Plants of limited distribution
CNPS Threat Ranks:
0.2 = Moderately threatened in California (20-80 percent occurrences threatened / moderate degree and immediacy of threat)
0.3 = Not very threatened in California (less than 20 percent of occurrences threatened / low degree and immediacy of threat)
USFS and BLM Plant Ranks:
S = Sensitive
Key:
BLM = U.S. Department of the Interior, Bureau of Land Management
CDFW = California Department of Fish and Wildlife
CNPS = California Native Plant Society
NFS = National Forest System
USFS = U.S. Department of Agriculture, Forest Service

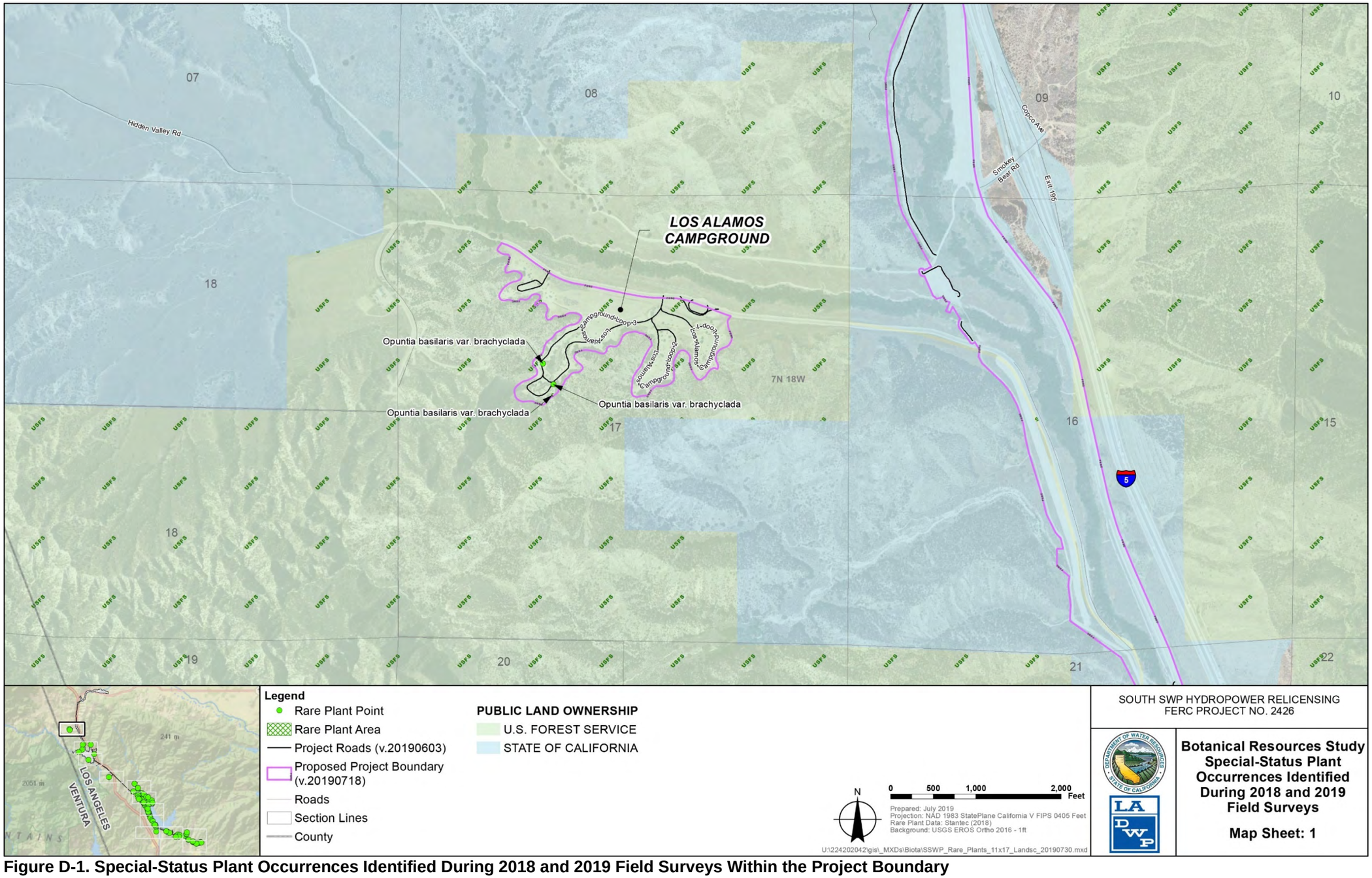
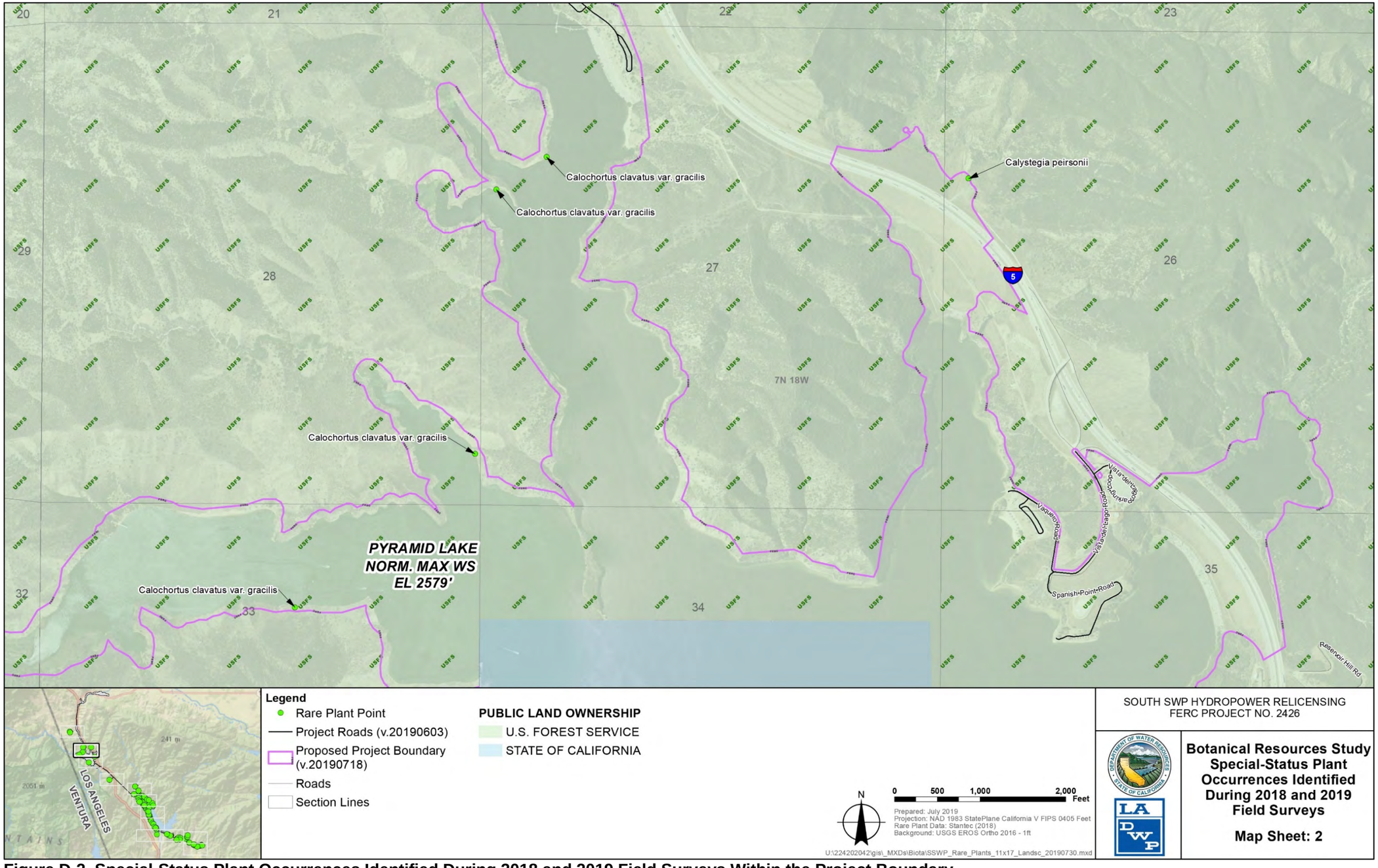


Figure D-1. Special-Status Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary



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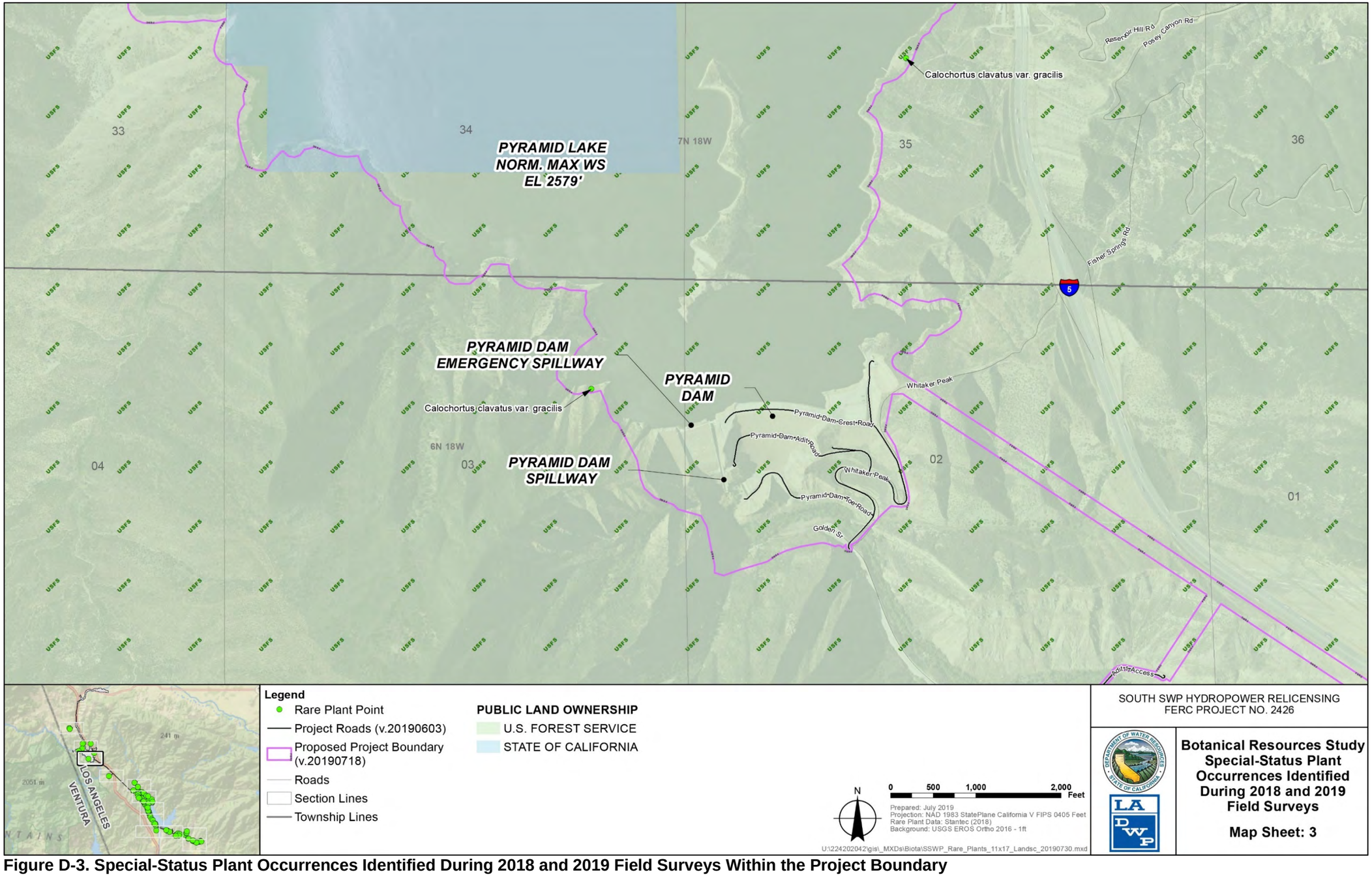

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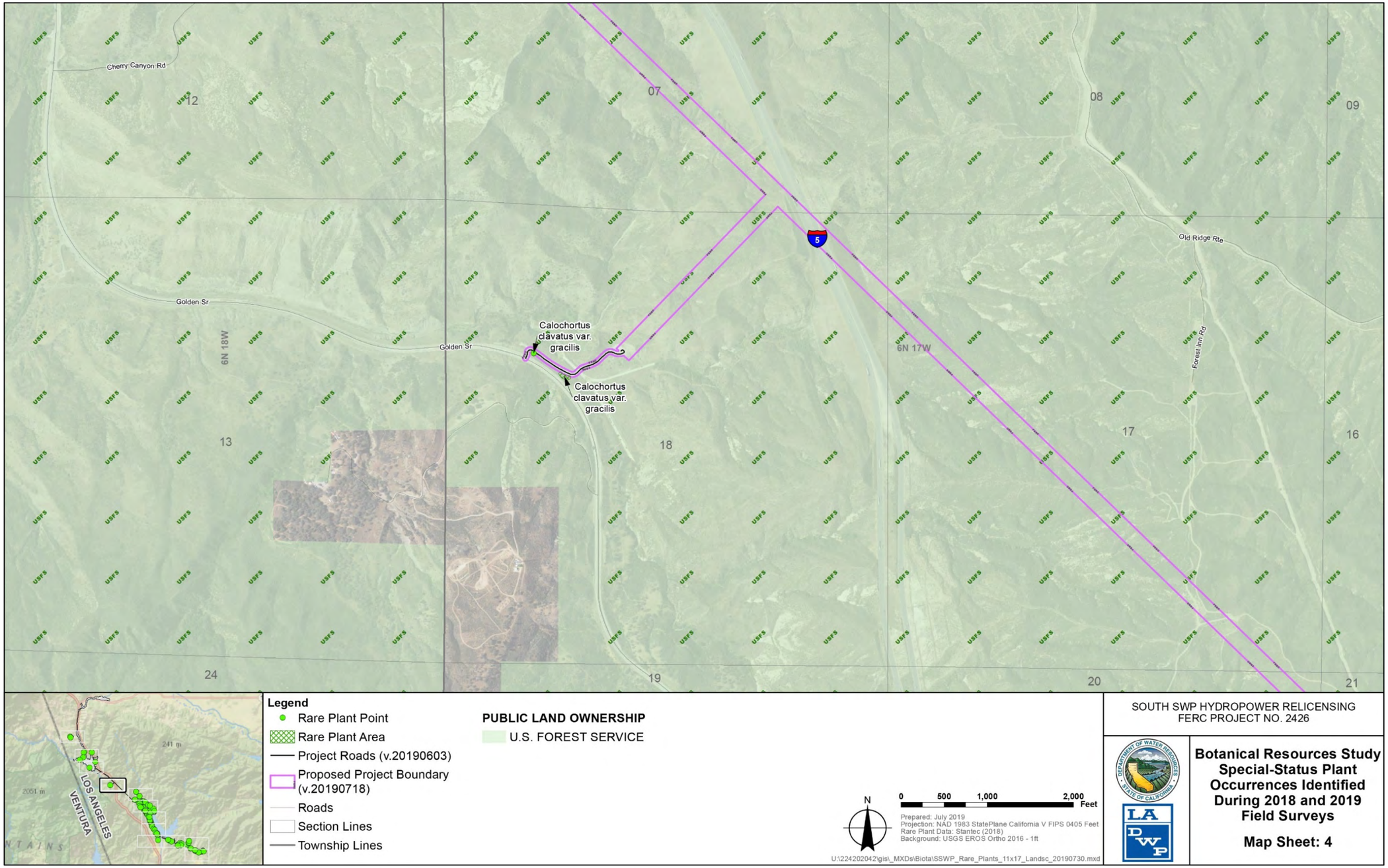

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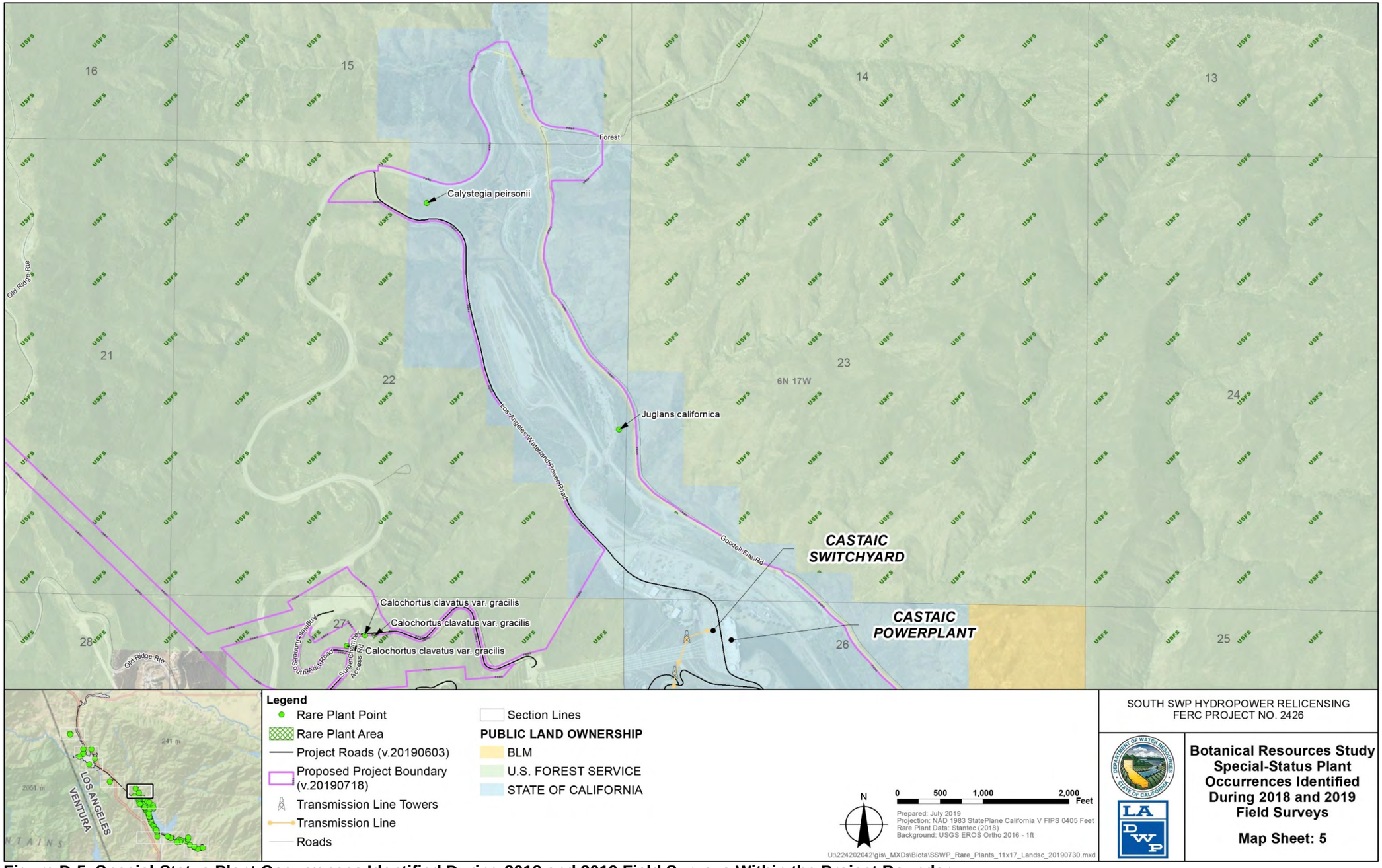

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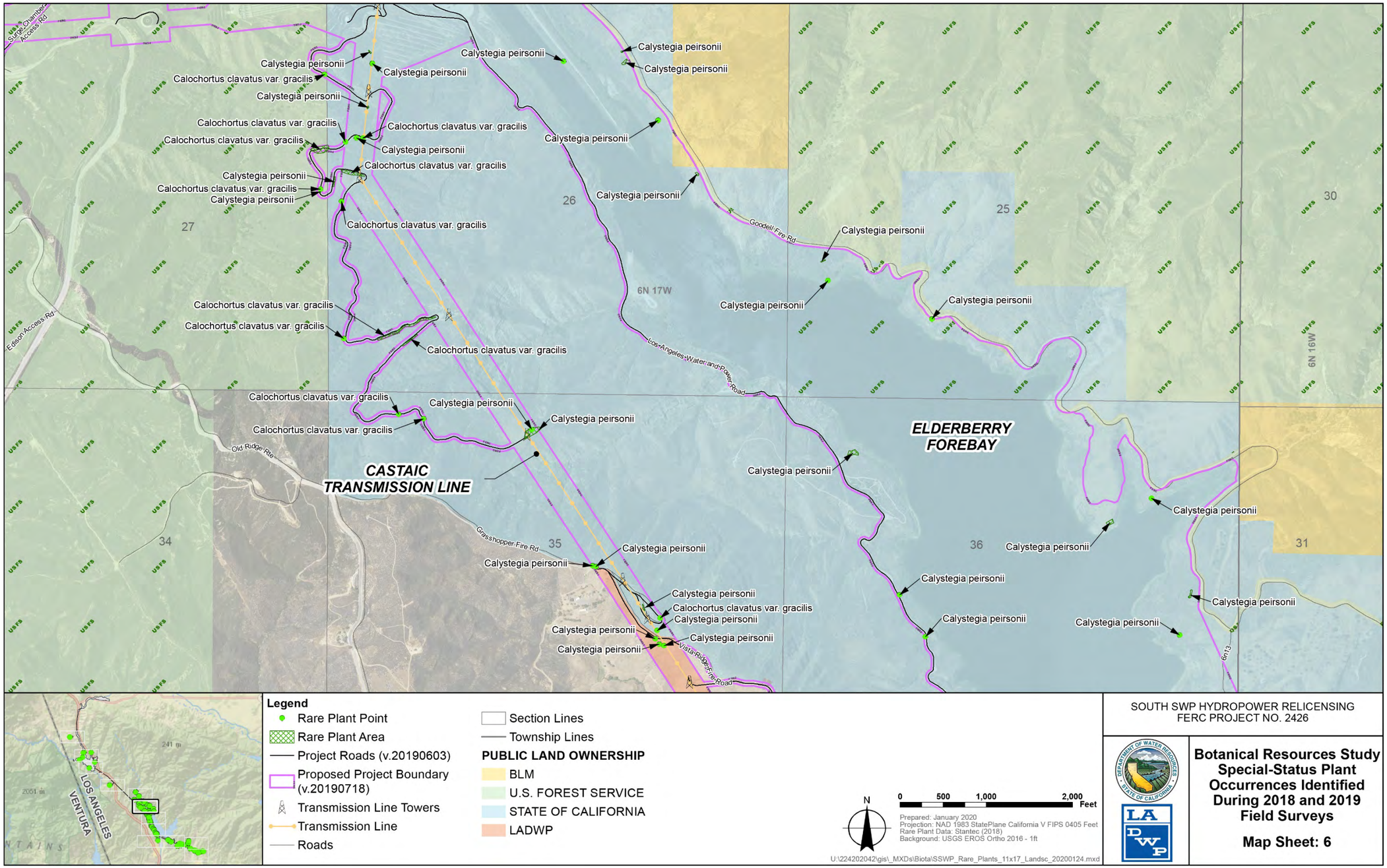

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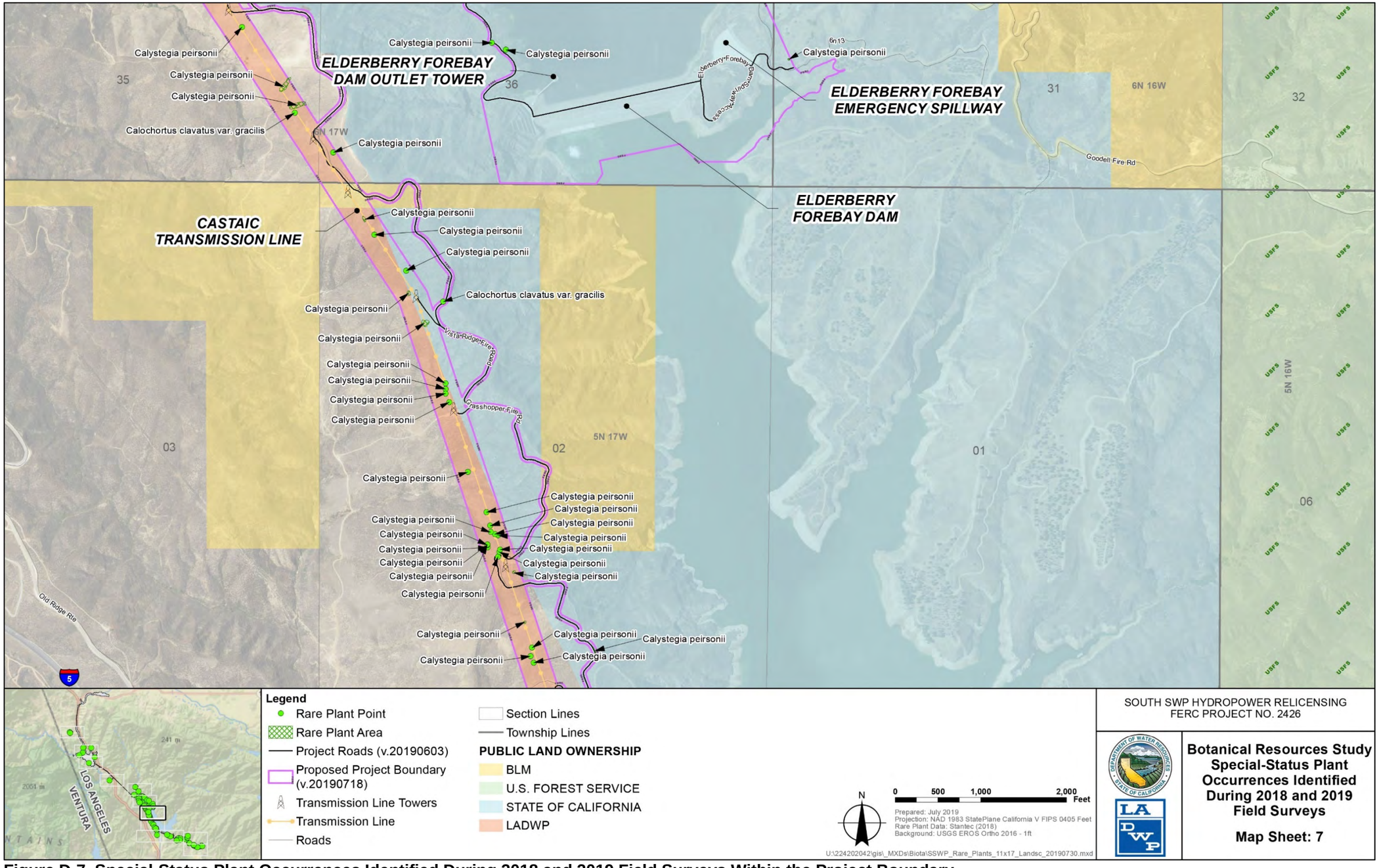

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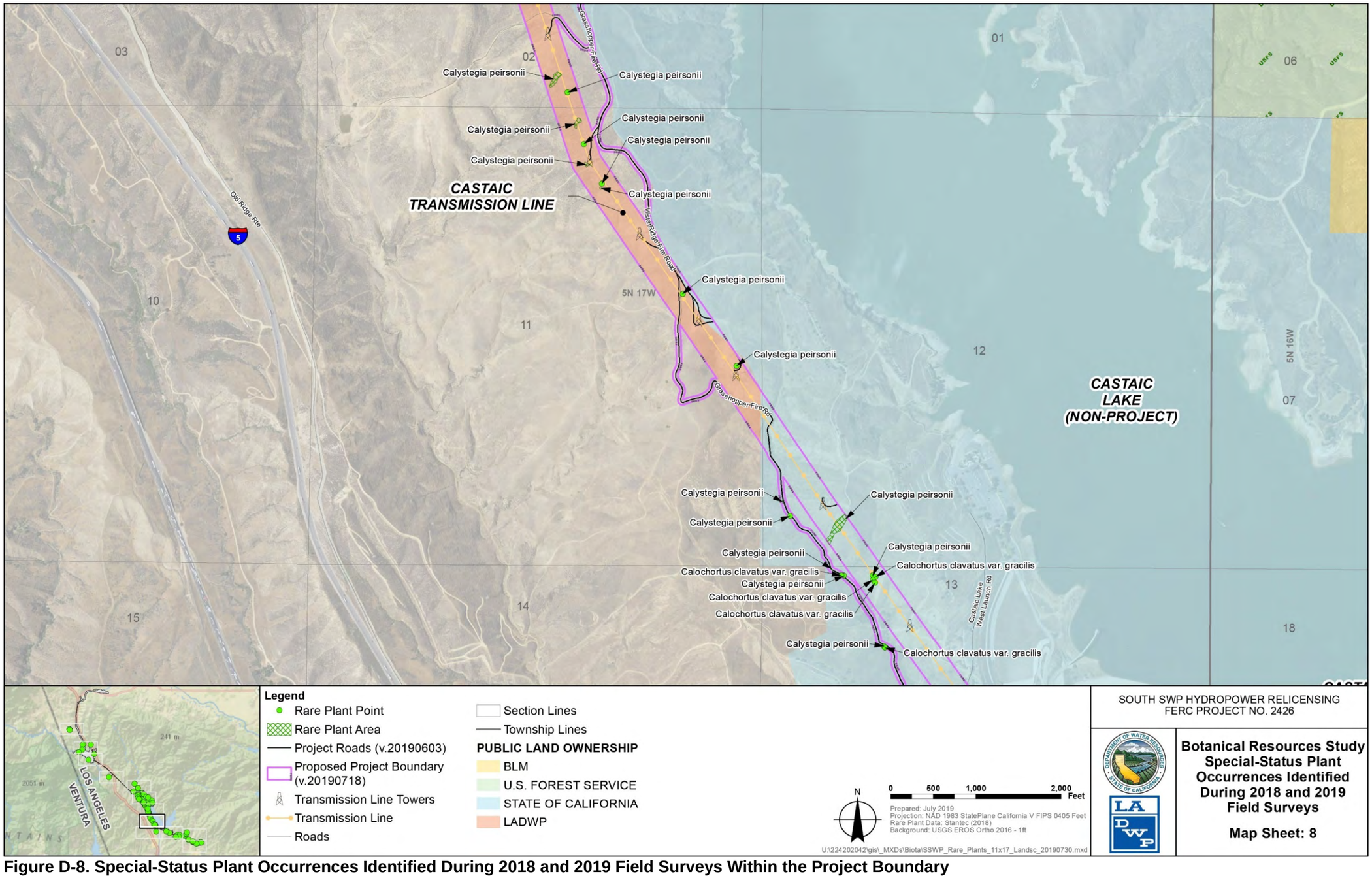

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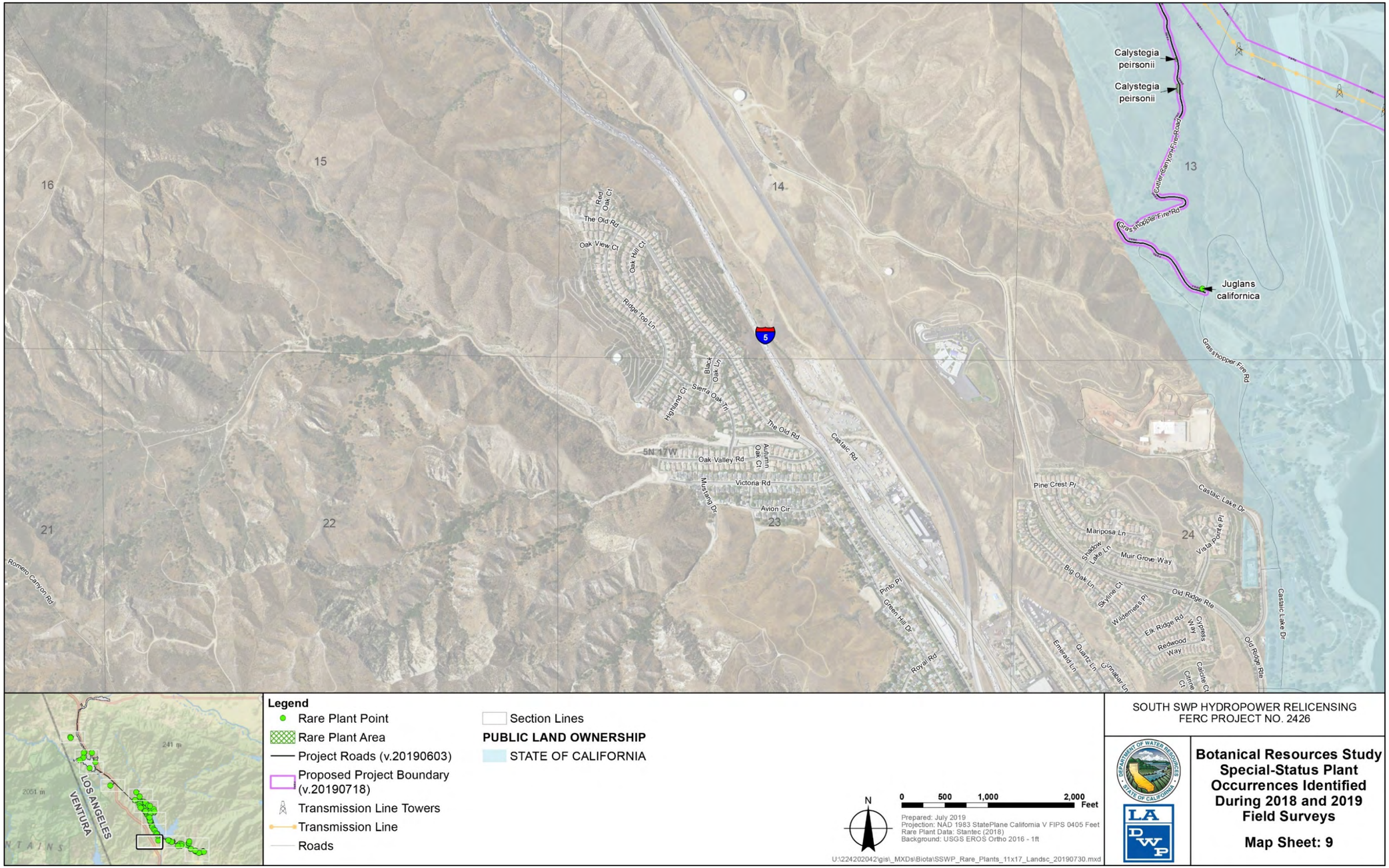

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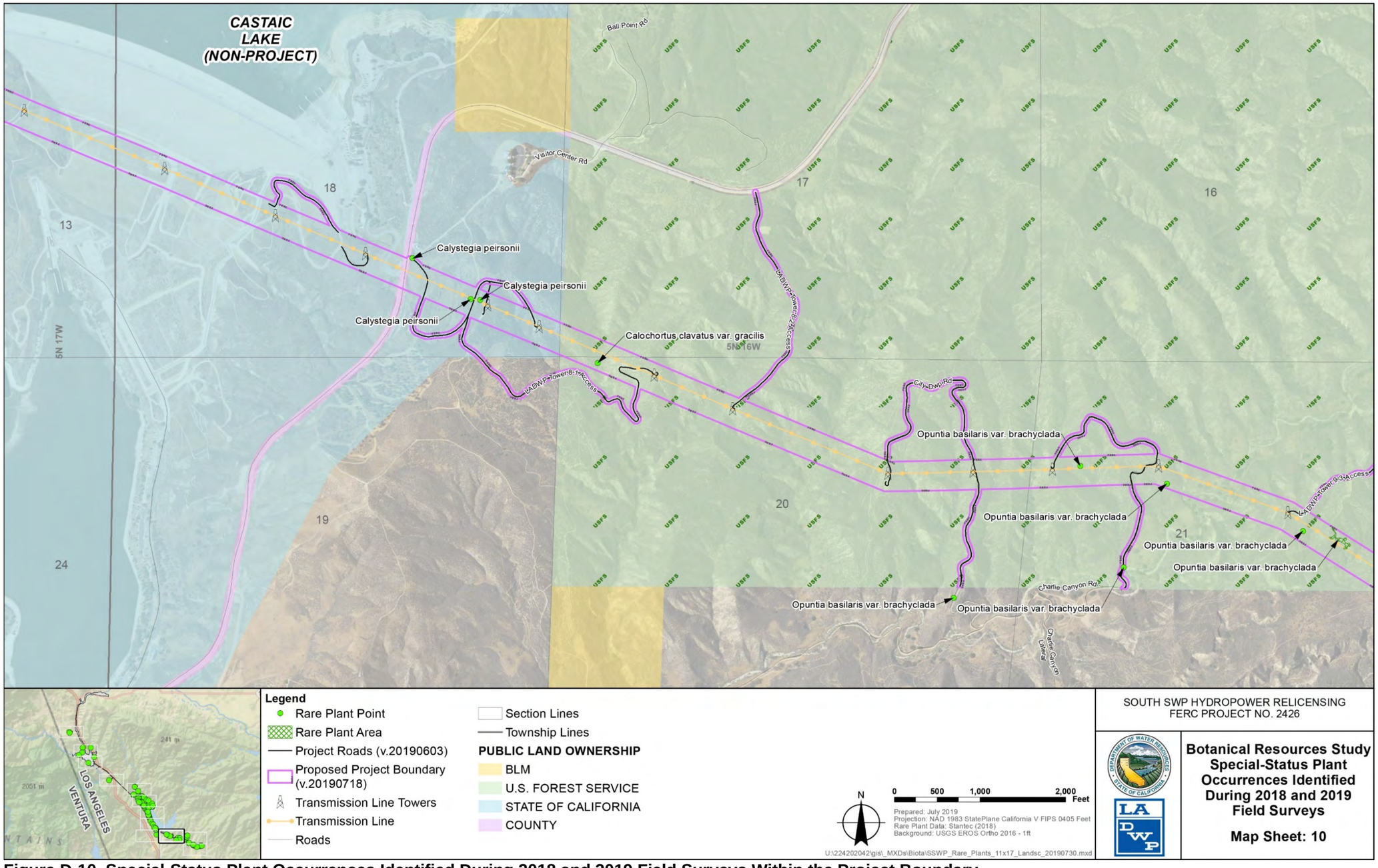

Figure D-10. Special-Status Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

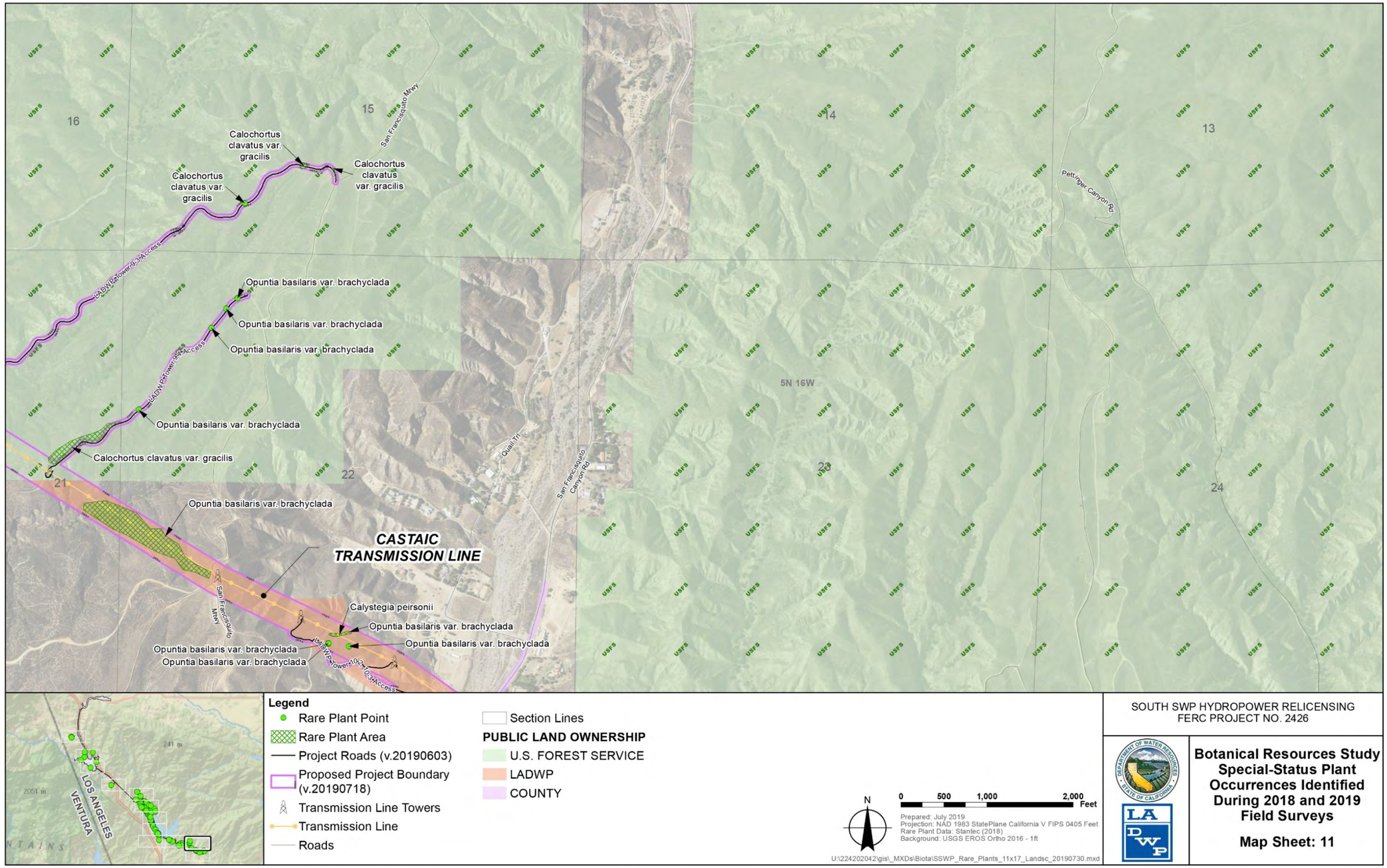

Figure D-11. Special-Status Plant Occurrences Identified During 2018 and 2019 Field Surveys Within the Project Boundary

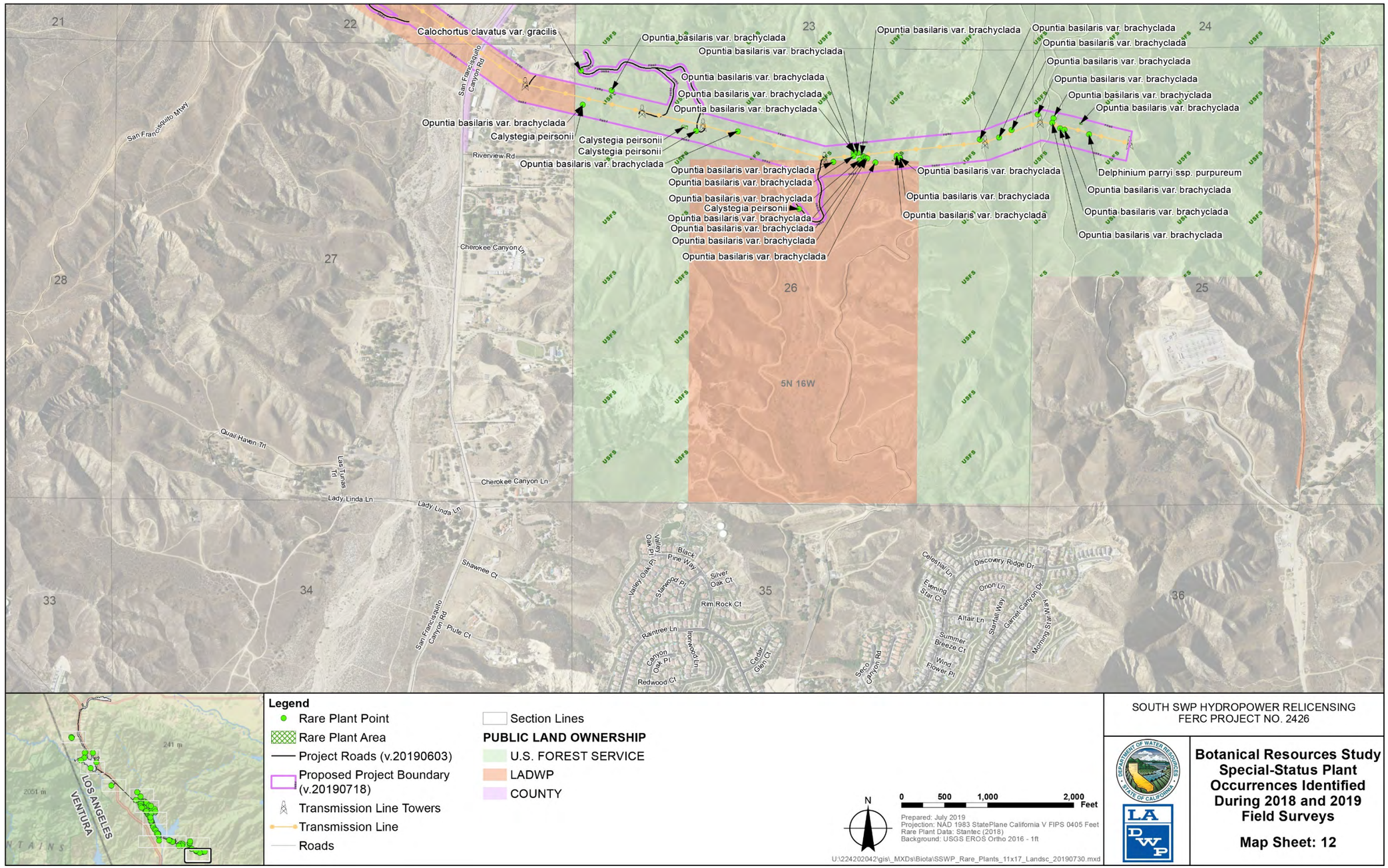

Figure D-12. Special-Status Plant Occurrences Identified During 2018 and 2019 Field Survey Within the Project Boundary

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Appendix E

California Wildlife Habitat Relationship Habitat Types Within Project Boundary

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Table E-1. California Wildlife Habitat Relationship and CalVeg Classification Acreages Within the Project Boundary and Study Area

California Wildlife Habitat Relationship Type	CalVeg Classification	Planned Number of Sampling Points[1]	Actual Number of Sampling Points[2]	Acreage on BLM Land within Project Boundary[3]	Acreage on NFS Land within Project Boundary[3]	Acreage on Other Private/Public Land within Project Boundary[3]	Total Acreage within Project Boundary[3]	Percentage of Project Boundary	Total Acreage in Study Area	Percentage of Study Area
TREE-DOMINATED HABITATS										
Blue Oak - Foothill Pine (BOP)	Gray Pine	2	2	-	-	0.5	0.5	0.01	610.7	0.7
Blue Oak Woodland (BOW)	Blue Oak, Gray Pine, Interior Live Oak	1	1	-	-	-	-	-	381.1	0.4
Coastal Oak Woodland (COW)	Coast Live Oak, Coastal Mixed Hardwood	2	2	-	2.5	0.3	2.8	0.06	264.0	0.3
Desert Riparian (DRI)[4]	Fremont Cottonwood	1	2	-	5.2	46.3	51.5	1.2	65.4	0.08
Joshua Tree (JST)[4]	Joshua Tree	1	1	-	-	0.2	0.2	0.005	5.4	0.01
Juniper (JUN)[5]	California Juniper (shrub)	2	0	-	-	-	-	-	144.5	0.2
Montane Hardwood - Conifer (MHC)	Bigcone Douglas-Fir, Singleleaf Pinyon Pine	1	2	-	-	-	-	-	90.4	0.1
Montane Hardwood (MHW)[6]	Canyon Live Oak, Gray Pine, Interior Mixed Hardwood, Bigcone Douglas-Fir	2	0	-	0.5	-	0.5	0.01	329.3	0.4
Montane Riparian (MRI)[4],[7]	Fremont Cottonwood, Willow (Shrub)	2	0	-	-	-	-	-	12.1	0.0
Pinyon - Juniper (PJN)[8]	Singleleaf Pinyon Pine	3	0	-	3.1	0.1	3.2	0.08	572.3	0.7
Sierran Mixed Conifer (SMC)[9]	Bigcone Douglas-Fir, Coulter Pine	1	0	-	-	-	-	-	80.1	0.1
Valley Oak Woodland (VOW)[4]	Gray Pine, Valley Oak, Interior Live Oak	2	2	-	-	-	-	-	307.0	0.4
Valley Foothill Riparian (VRI)[4]	California Sycamore, Riparian Mixed Hardwood, Riparian Mixed Shrub, Willow (Shrub), Willow (Tree), Fremont Cottonwood, Bigcone Douglas-Fir	2	5	0.3	15.7	80.3	96.3	2.2	516.4	0.6
SHRUB-DOMINATED HABITATS										
Chamise - Redshank Chaparral (CRC)	Chamise	5	6	<0.1	75.2	60.2	135.5	3.1	9,391.8	11.0
Coastal Scrub (CSC)	California Sagebrush, Soft Scrub Mixed Chaparral	6	9	2.7	106.9	435.4	545.1	12.4	13,784.0	16.2
Desert Wash (DSW)[4]	Riversidean Alluvial Scrub, Scalebroom	2	1	-	-	2.5	2.5	0.06	215.2	0.25
Mixed Chaparral (MCH)	Birchleaf Mountain Mahogany, Buckwheat, Lower Montane Mixed Chaparral, Manzanita Chaparral, Scrub Oak, Singleleaf Pinyon Pine, Sumac Shrub, Tucker / Muller Scrub Oak, Fremont Cottonwood (VRI, DRI), Bigcone Douglas-Fir, Canyon Live Oak, Singleleaf Pinyon Pine	6	8	-	336.3	51.4	387.7	8.8	37,881.8	44.5

Table E-1. California Wildlife Habitat Relationship and CalVeg Classification Acreages Within the Project Boundary and Study Area (continued)

California Wildlife Habitat Relationship Type	CalVeg Classification	Planned Number of Sampling Points [1]	Actual Number of Sampling Points [2]	Acreage on BLM Land within Project Boundary[3]	Acreage on NFS Land within Project Boundary[3]	Acreage on Other Private/Public Land within Project Boundary[3]	Total Acreage in Project Boundary[3]	Percentage of Project Boundary	Total Acreage within Study Area	Percentage of Study Area
Montane Chaparral (MCP)[10]	Great Basin - Mixed Chaparral Transition	1	0	-	-	-	-	-	46.2	0.1
Sagebrush (SGB)[11]	Basin Sagebrush, Great Basin Mixed Scrub, Rabbitbrush	4	8	-	14.2	266.6	280.8	6.4	3,490.6	4.1
HERBACEOUS-DOMINATED HABITATS										
Annual Grassland (AGS)[12]	Annual Grasses and Forbs	3	7	1.9	76.1	119.0	197.0	4.5	8,616.1	10.1
Fresh Emergent Wetland (FEW)[4]	Tule - Cattail	2	3	-	2.8	52.5	55.3	1.3	55.3	0.1
Pasture (PAS)[13]	Pastures and Crop Agriculture	1	0	-	-	-	-	-	-	-
Perennial Grassland (PGS)	Perennial Grasses and Forbs	2	1	-	-	-	-	-	9.7	0.01
Wet Meadows (WTM)[4]	Wet Meadows	3	1	-	8.7	12.2	20.9	0.5	30.2	0.04
DEVELOPED HABITATS										
Urban (URB)	Non-Native/Ornamental Conifer, Non-Native/Ornamental Grass, Non-Native/Ornamental Hardwood, Non-Native/Ornamental Shrub, Urban/Developed (General)	2	3	-	118.3	293.2	411.5	9.3	3,592.9	4.2
NON-VEGETATED HABITATS										
Barren (BAR)	Barren, Urban-related Bare Soil	2	1	1.4	64.2	157.0	222.6	5.1	645.4	0.8
AQUATIC HABITATS										
Lacustrine (LAC)[14]	Water (General), Reservoir	0	0	0.1	942.1	1,050.8	1,993.0	45.2	4,021.3	4.7
OTHER										
Unknown (UNK)[15]	Unmapped	5	0	-	-	-	-	-	-	-
Total[15]		**66**	**65**	**6.5**	**1,771.6**	**2,628.5**	**4,406.6**	**100.00**	**85, 159.2**	**100.00**

Source (see Final License Application for full references cited): U.S. Forest Service (USFS) 2018 and field data
Notes:
1 Represents the number of sample points planned for each habitat type based on acreage in study area and value to wildlife
2 Represents the number of sample points actually collected for each habitat type. Difference from planned number of points due to incorrect CalVeg mapping and inaccessibility resulting from private property or unsafe conditions. In some cases of limited access, a sampled point had limited data collected (Habitat Element Checklist only, no vegetation plots). This is clarified in the habitat descriptions section below.
3 All acreages exclude Angeles Tunnel lands.
4 Considered a Sensitive Natural Community by CDFW (CDFW 2018b).
5 Reasoning for zero points sampled: (1) one JUN sample point was completely inaccessible and removed from study; (2) other sample point incorrectly mapped by CalVeg. Other areas mapped as JUN were inaccessible and not directly observable, so were assumed to be correctly mapped.
6 Both MHW sample points were determined to be incorrectly mapped by CalVeg. Other areas mapped as MHW were inaccessible and not directly observable, so were assumed to be correctly mapped. These areas were primarily outside of the Project boundary.
7 Both MRI sample points were determined to be incorrectly mapped by CalVeg. Other areas mapped as MRI were inaccessible and not directly observable, so were assumed to be correctly mapped. These areas were primarily outside of the Project boundary.
8 All PJN sample points were determined to be incorrectly mapped by CalVeg. Other areas mapped as PJN were inaccessible and not directly observable, so were assumed to be correctly mapped. These areas were primarily outside of the Project boundary.
9 Single SMC sample point was determined to be incorrectly mapped by CalVeg. Other areas mapped as SMC were inaccessible and not directly observable, so were assumed to be correctly mapped. These areas were primarily outside of the Project boundary.
10 Single MCP sample point was determined to be incorrectly mapped by CalVeg. Other areas mapped as MCP were inaccessible and not directly observable, so were assumed to be correctly mapped. These areas were primarily outside of the Project boundary.
11 Three of the five sample points located in Unknown (UNK) areas previously unmapped by CalVeg were determined to be SGB.
12 Two of the five sample points located in Unknown (UNK) areas previously unmapped by CalVeg were determined to be AGS.
13 All areas mapped as PAS were sampled, and determined to be incorrectly mapped. This is the only habitat that was able to be excluded from the study area.
14 LAC not sampled.
15 Unknown (UNK) areas were portions of the study area previously unmapped by CalVeg. Categorized as UNK before the field effort, then characterized in the field and found to be a mix of AGS and SGB.
16 Due to rounding, totals may not align perfectly with the sum of acreages presented by habitat type.
Key:
< = less than
BLM = U.S. Department of the Interior, Bureau of Land Management

CalVeg = USFS Classification and Assessment with Landsat of Visible Ecological Groupings
NFS = National Forest System

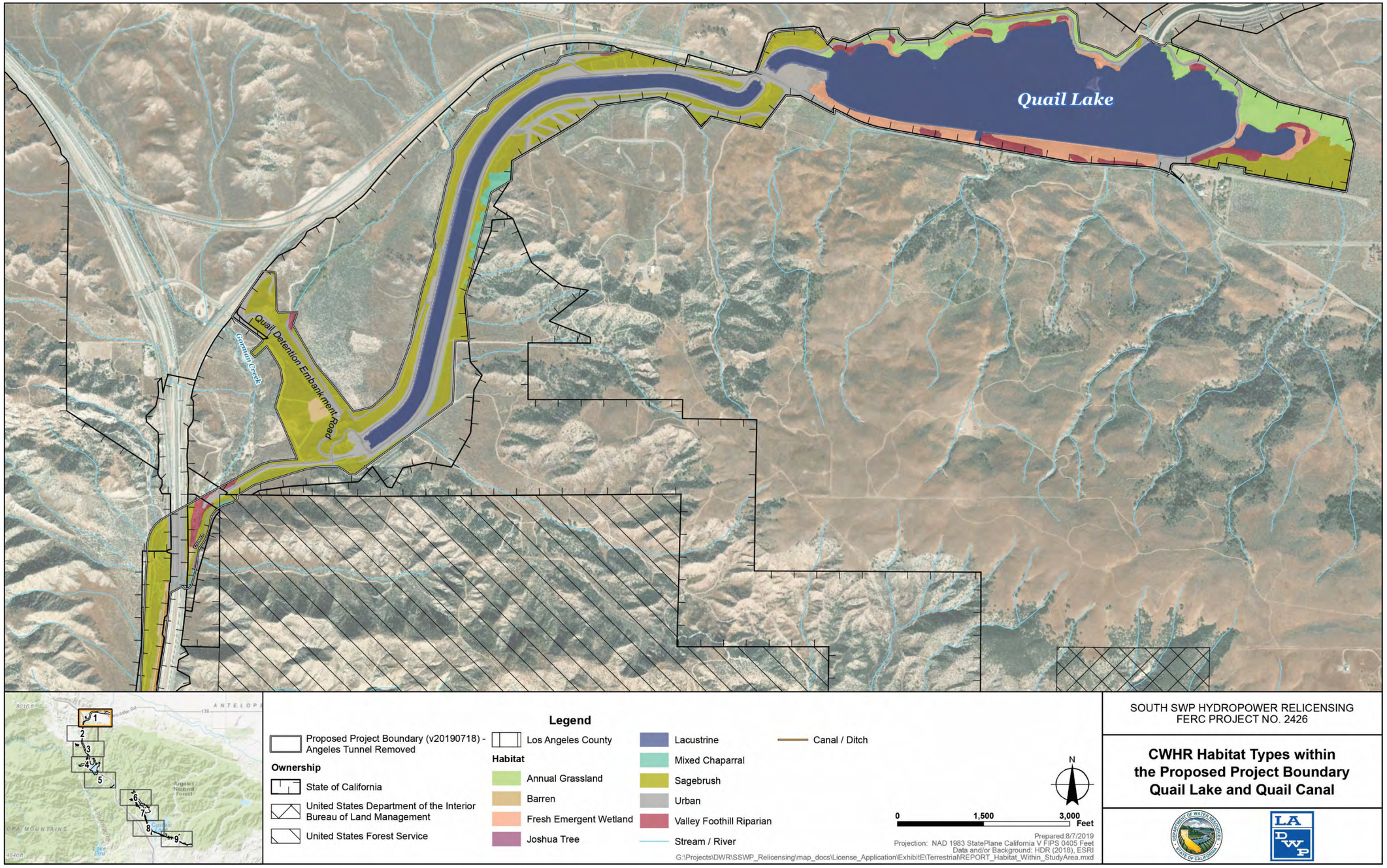

Figure E-1. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

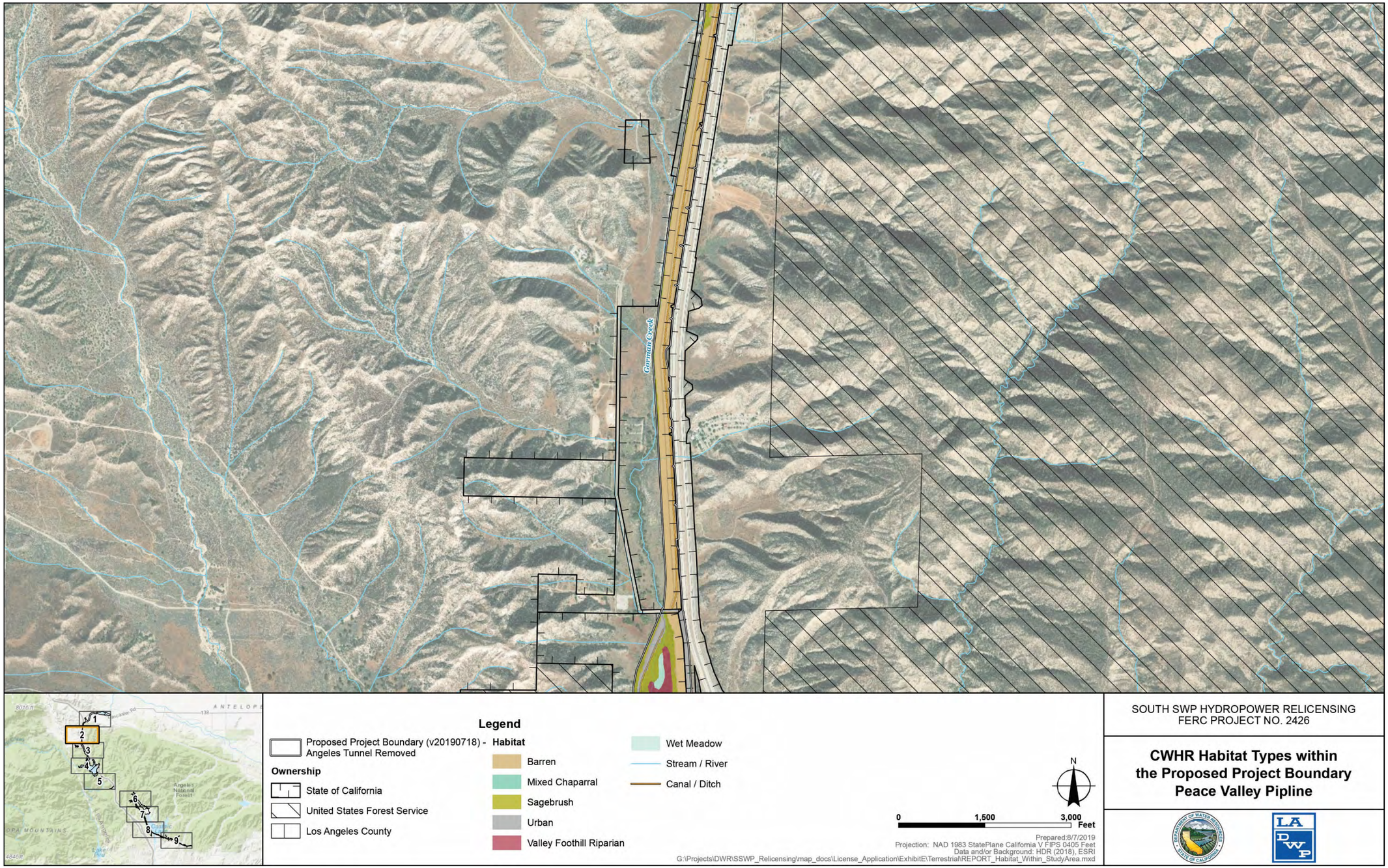

Figure E-2. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

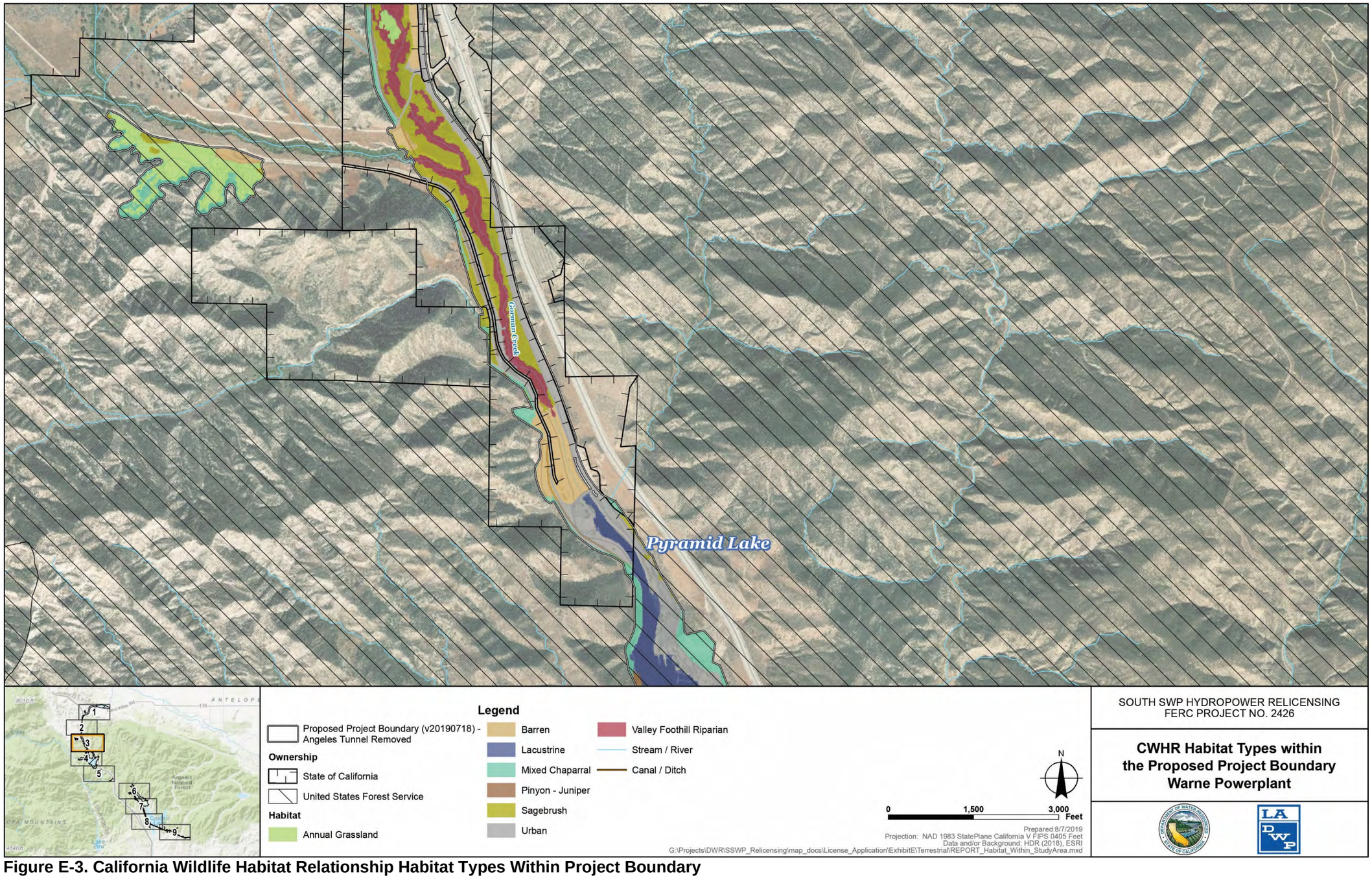

Figure E-3. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

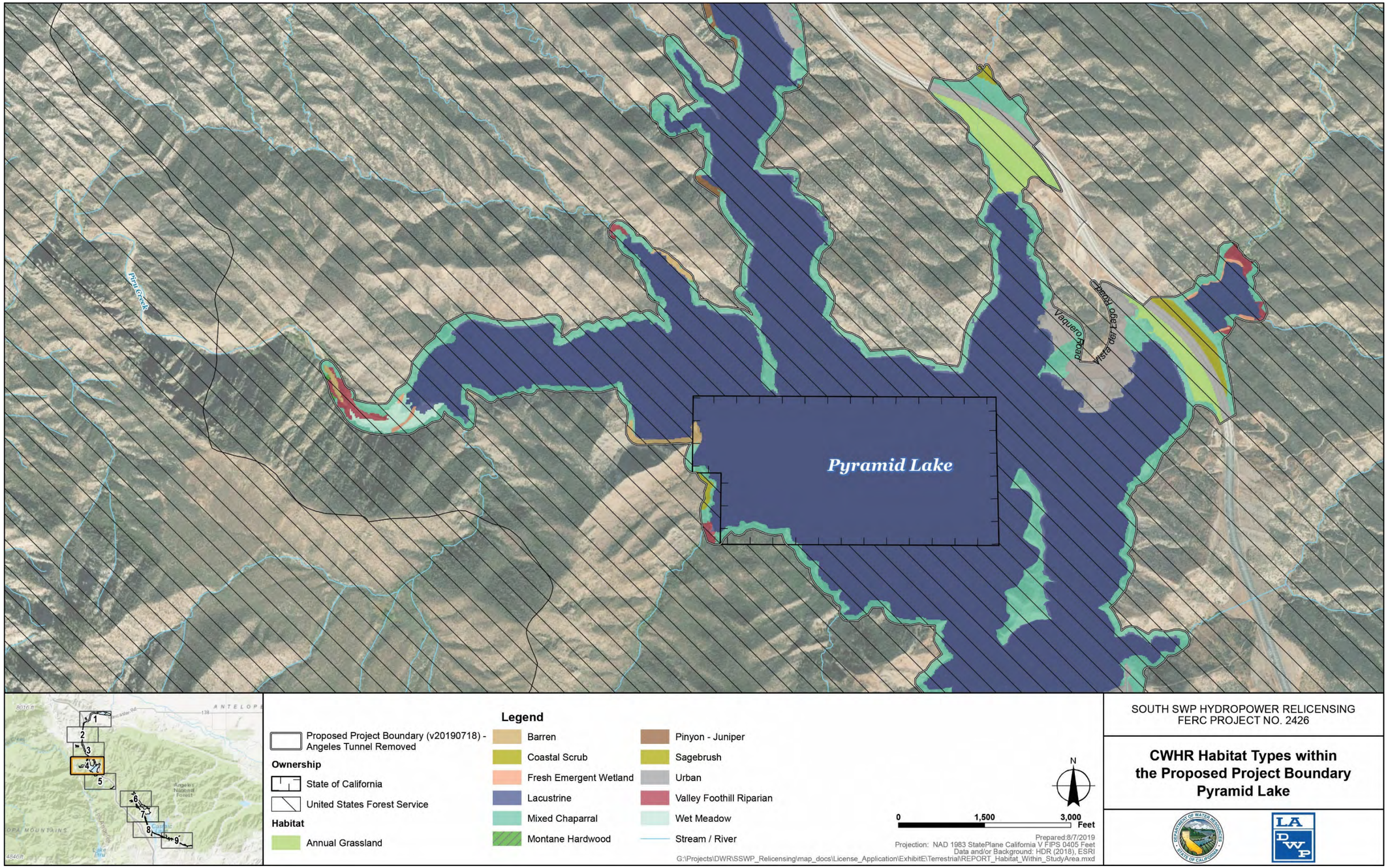

Figure E-4. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

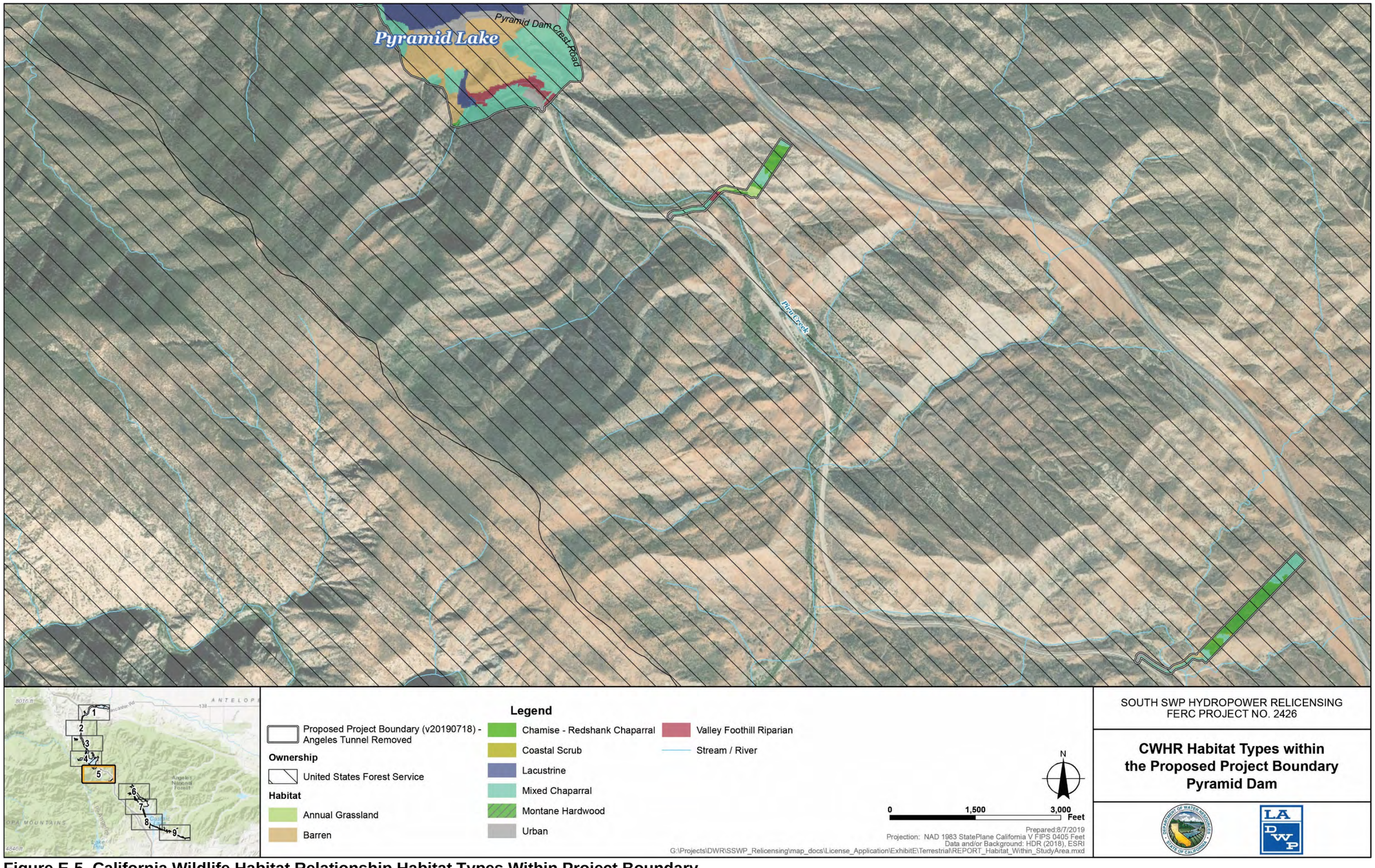

Figure E-5. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

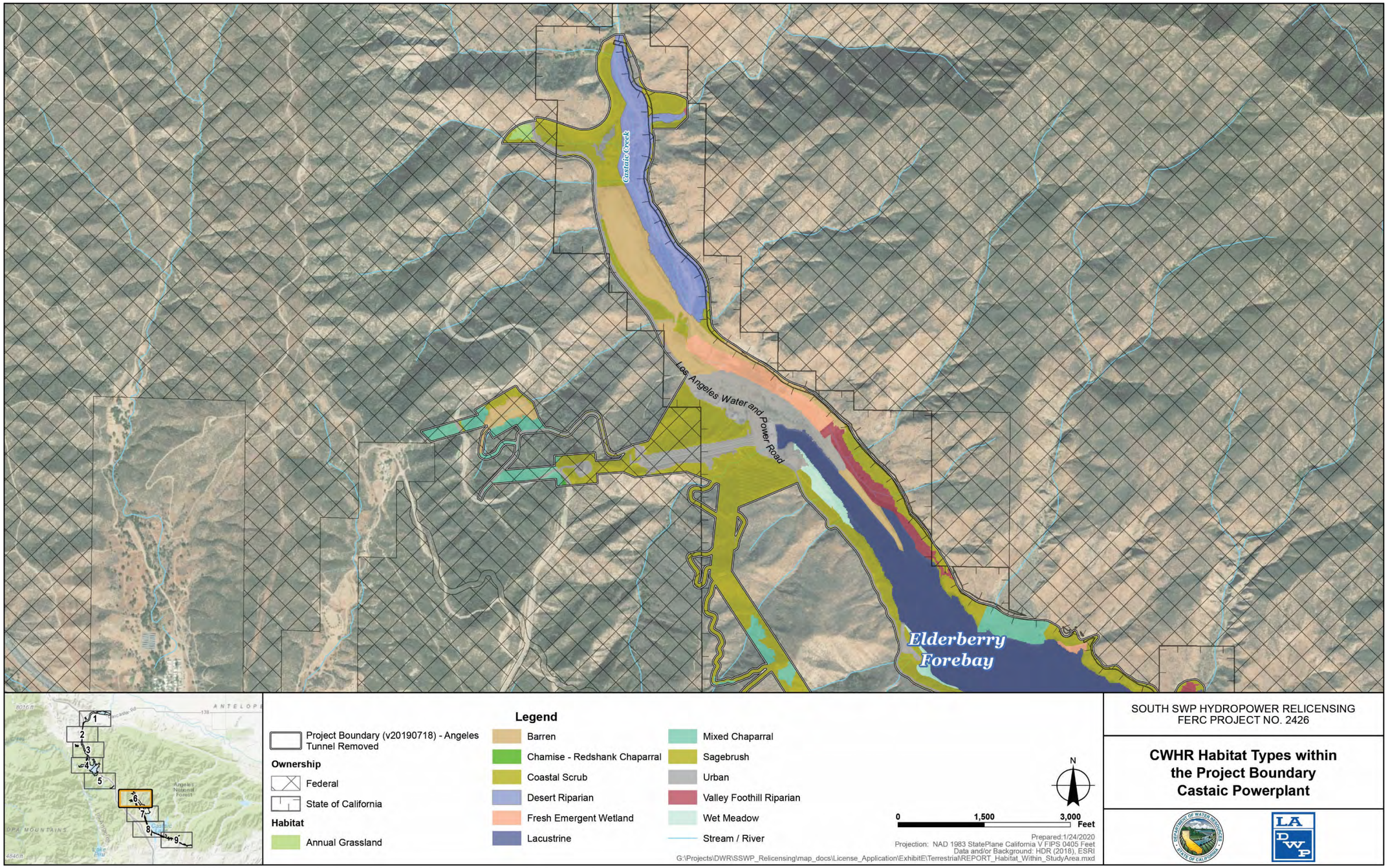

Figure E-6. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

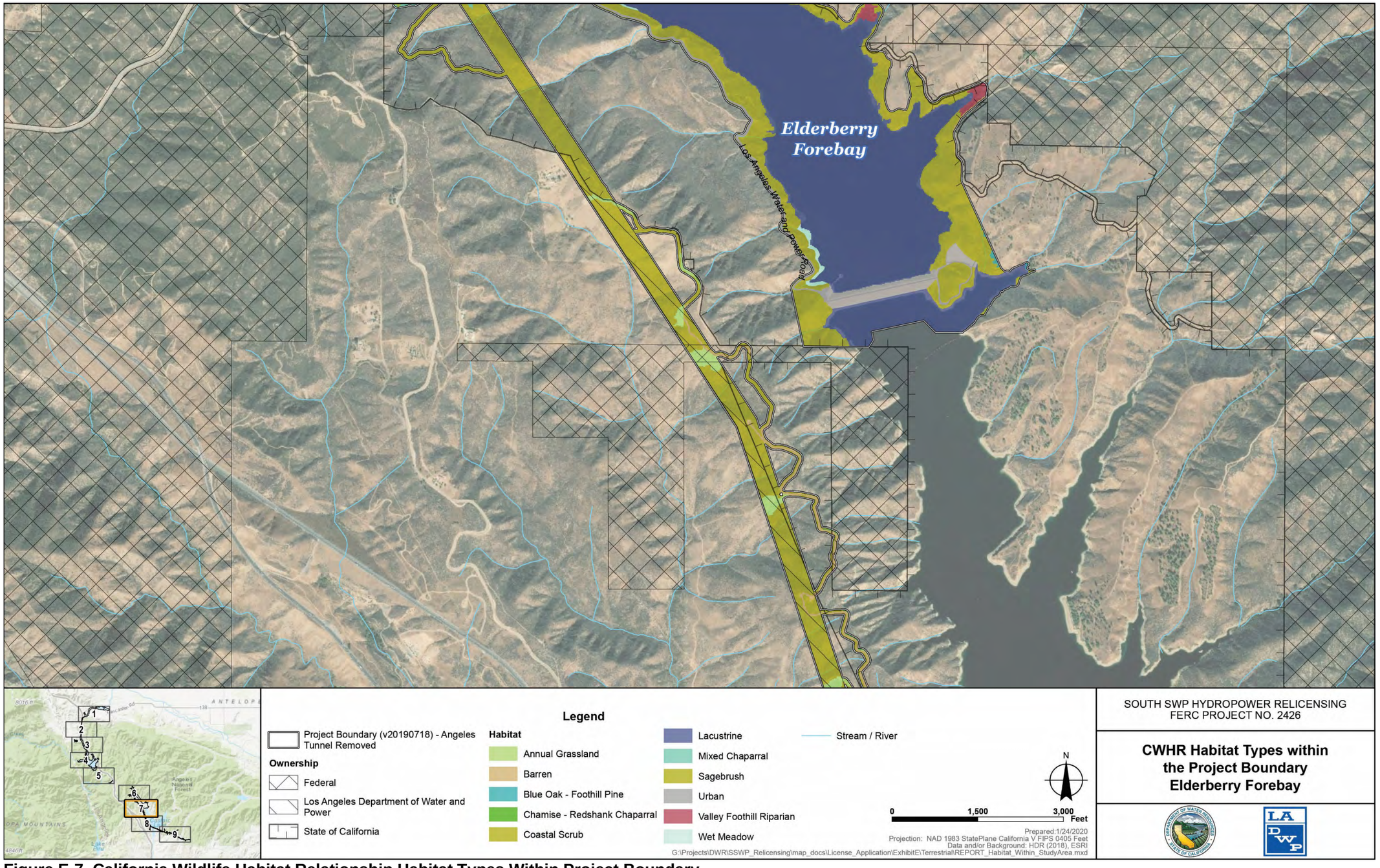

Figure E-7. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

Figure E-8. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

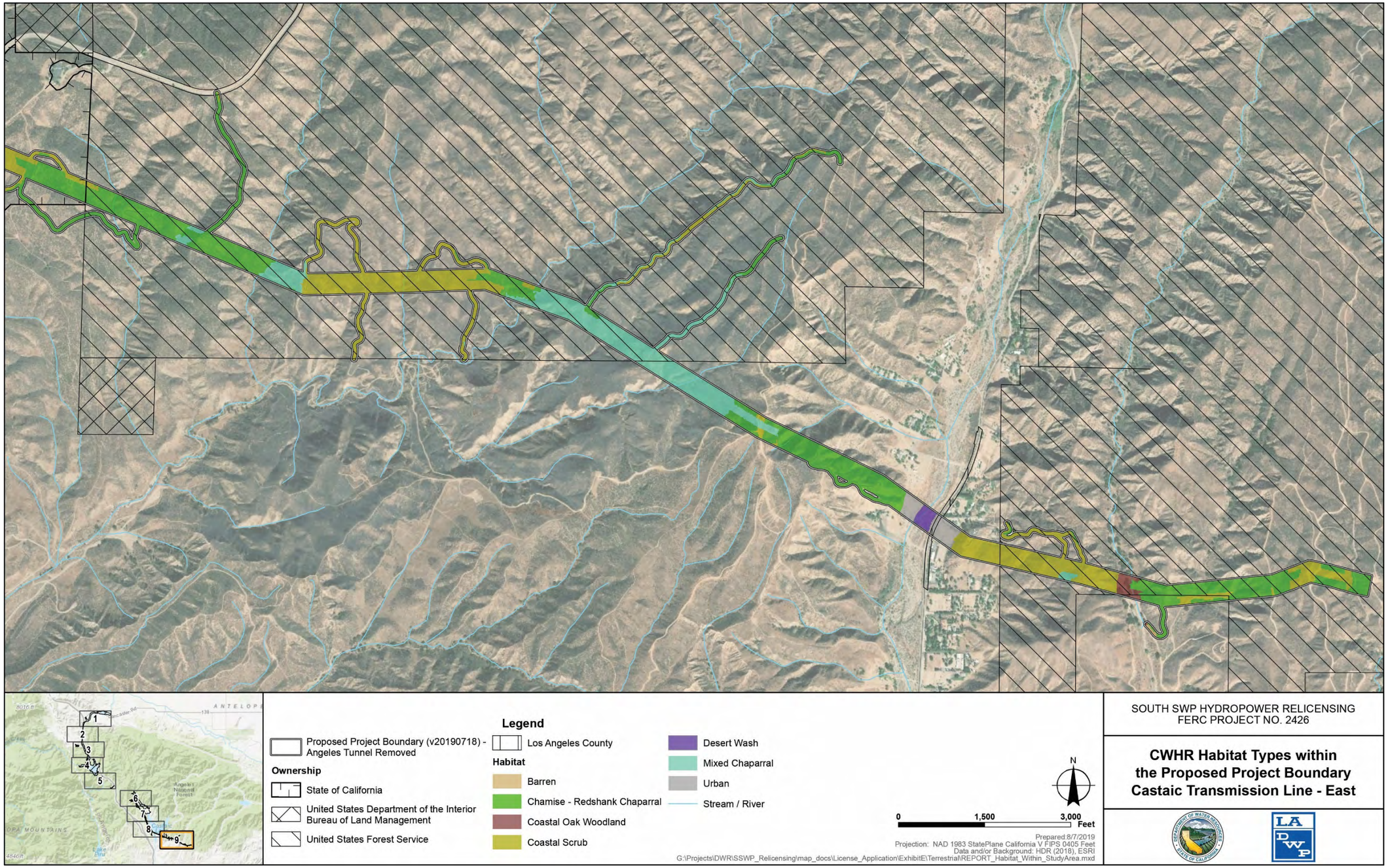

Figure E-9. California Wildlife Habitat Relationship Habitat Types Within Project Boundary

Attachment 5

Sensitive Aquatic and Terrestrial Wildlife Management Plan

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

SENSITIVE AQUATIC AND TERRESTRIAL WILDLIFE MANAGEMENT PLAN

January 2020

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

Los Angeles
DEPARTMENT OF WATER AND POWER

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TABLE OF CONTENTS

LIST OF FIGURES

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

ANF	Angeles National Forest
APLIC	Avian Power Line Interaction Committee
Application for New License	Licensees' Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, Federal Energy Regulatory Commission Project Number 2426-227
BLM	U.S. Department of the Interior, Bureau of Land Management
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
DWR	California Department of Water Resources
Emergency	Defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including California Independent System Operator and Los Angeles Department of Water and Power, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.
Equipment Exclusion Zone	Areas around perennial streams, permanent bodies of water, and intermittent streams and ponds, where mobile and heavy equipment cannot be parked, driven, or used off of a Primary Project Road. The mobile and heavy equipment may be parked, driven, or used within the right-of-way of the Primary Project Road.
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
IVMP	Integrated Vegetation Management Plan
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
LPNF	Los Padres National Forest
LWM	large woody material
MOU	Memorandum of Understanding
NFS	National Forest System

O&M	operations and maintenance
Primary Project Road	A Primary Project Road is identified in the license as a Project facility, is used almost exclusively to access the Project, is within the Project boundary, and is operated and maintained exclusively by the Licensees as a Project feature. This includes roads associated with Project recreation facilities, but does not include designated parking areas that are considered part of the facility or feature for which the parking area is provided. Primary Project Roads do not include “shared,” “joint,” or “multiple use” roads that are used and maintained by multiple parties, including the Licensees.
Project	South SWP Hydropower, Federal Energy Regulatory Commission Project Number 2426
SWP	State Water Project
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

In January 2020, the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees), pursuant to Title 18 of the Code of Federal Regulations, Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Integrated Licensing Process), filed with the Federal Energy Regulatory Commission (FERC) an Application for a New License for Major Project – Existing Dam (Application for New License) for the Licensees' South SWP Hydropower, FERC Project Number 2426 (Project).

The Licensees included this Sensitive Aquatic and Terrestrial Wildlife Management Plan (Plan) in their Application for New License. All elevation data in this exhibit are in United States (U.S.) Department of Commerce, National Oceanic and Atmospheric Administration, National Geodetic Survey Vertical Datum of 1929, unless otherwise stated.

1.1 BACKGROUND

1.1.1 Brief Description of the Project

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in Los Angeles County in southern California, on the West Branch of the SWP. The Project has a FERC-authorized installed capacity of 1,349,290 kilowatts. Project facilities range in elevation from 3,325 feet to 1,130 feet, and include the Warne Power Development and Castaic Power Development. Facilities and features of the Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant and Switchyard; (6) Primary Project Roads and Trails; (7) Quail Lake recreation facilities and (8) streamflow and reservoir staff gages. Facilities and features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities.

Facilities upstream of the Angeles Tunnel Surge Chamber are operated and managed by DWR. The remainder of the downstream facilities, including the Surge Chamber, are operated and managed by LADWP. An April 2010 amendment to the Memorandum of

Understanding (MOU) between the U.S. Department of Agriculture, Forest Service (USFS) and DWR outlines the responsibilities regarding management of recreation facilities at Pyramid Lake. In accordance with Amendment No. 2 to the MOU, effective January 1, 2011, DWR assumed responsibility from USFS for routine operations and maintenance (O&M) of recreation sites located on National Forest System (NFS) lands and management of public recreation activities at these sites and on Pyramid Lake itself.

The Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions. In essence, the Project is operated in a run-of-release mode, generating power as SWP water is provided for downstream consumptive use, with the exception that the Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users.

The Project boundary comprises 2,007.0 acres, of which 1,334.6 acres are managed by the Angeles National Forest (ANF), 665.9 acres are managed by the Los Padres National Forest (LPNF), and 6.5 acres are administered by the U.S. Department of the Interior, Bureau of Land Management (BLM). USFS administers the ANF and LPNF in conformance with the ANF and LPNF Land Management Plans (USFS 2005a, 2005b, 2005c). In addition, LADWP manages the Castaic Transmission Line right-of-way

Figure 1.1-1 shows the Project vicinity. Figure 1.1-2 shows the Project facilities, including land ownership.

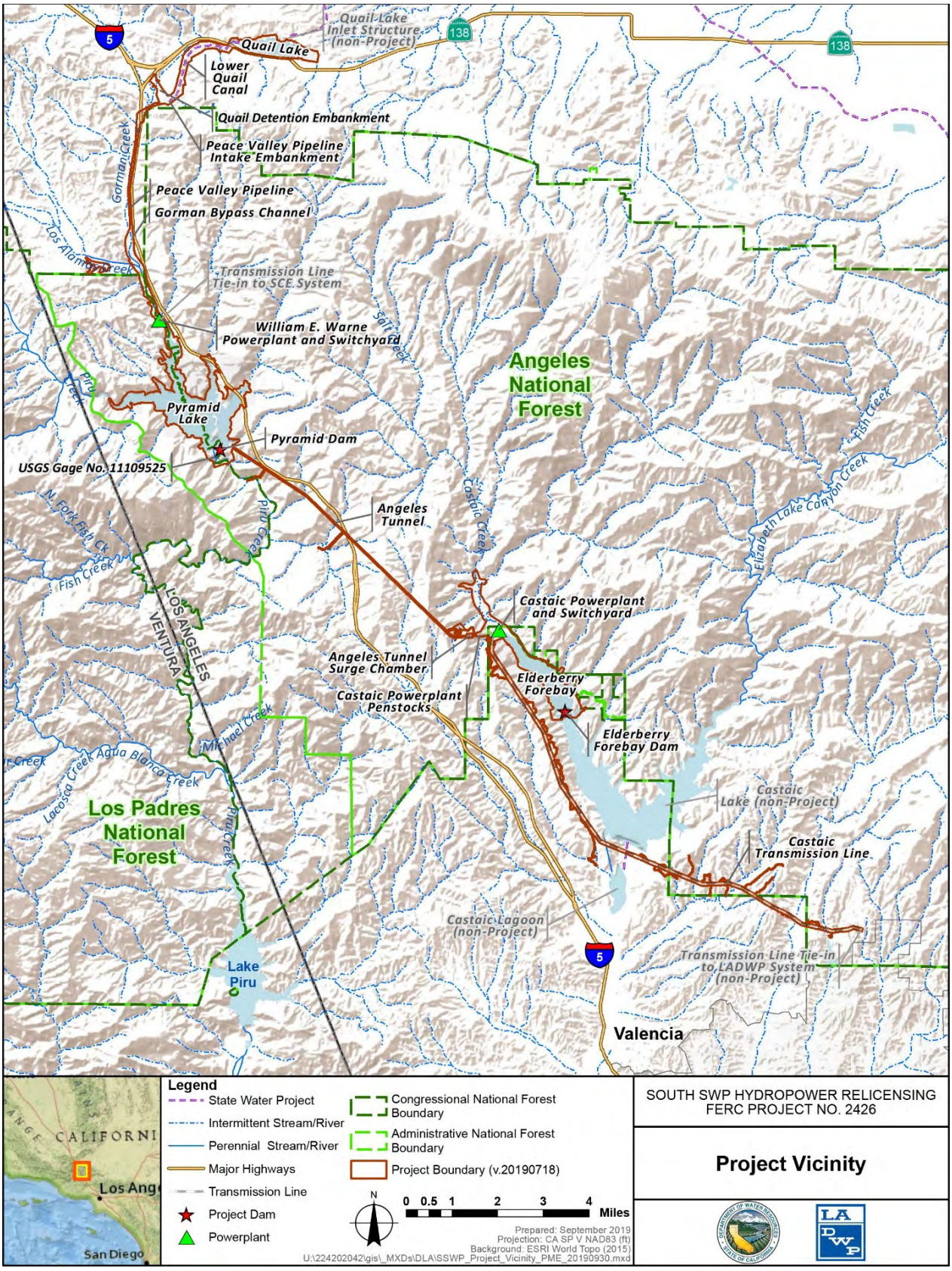

Figure 1.1-1. South SWP Hydropower Vicinity Map

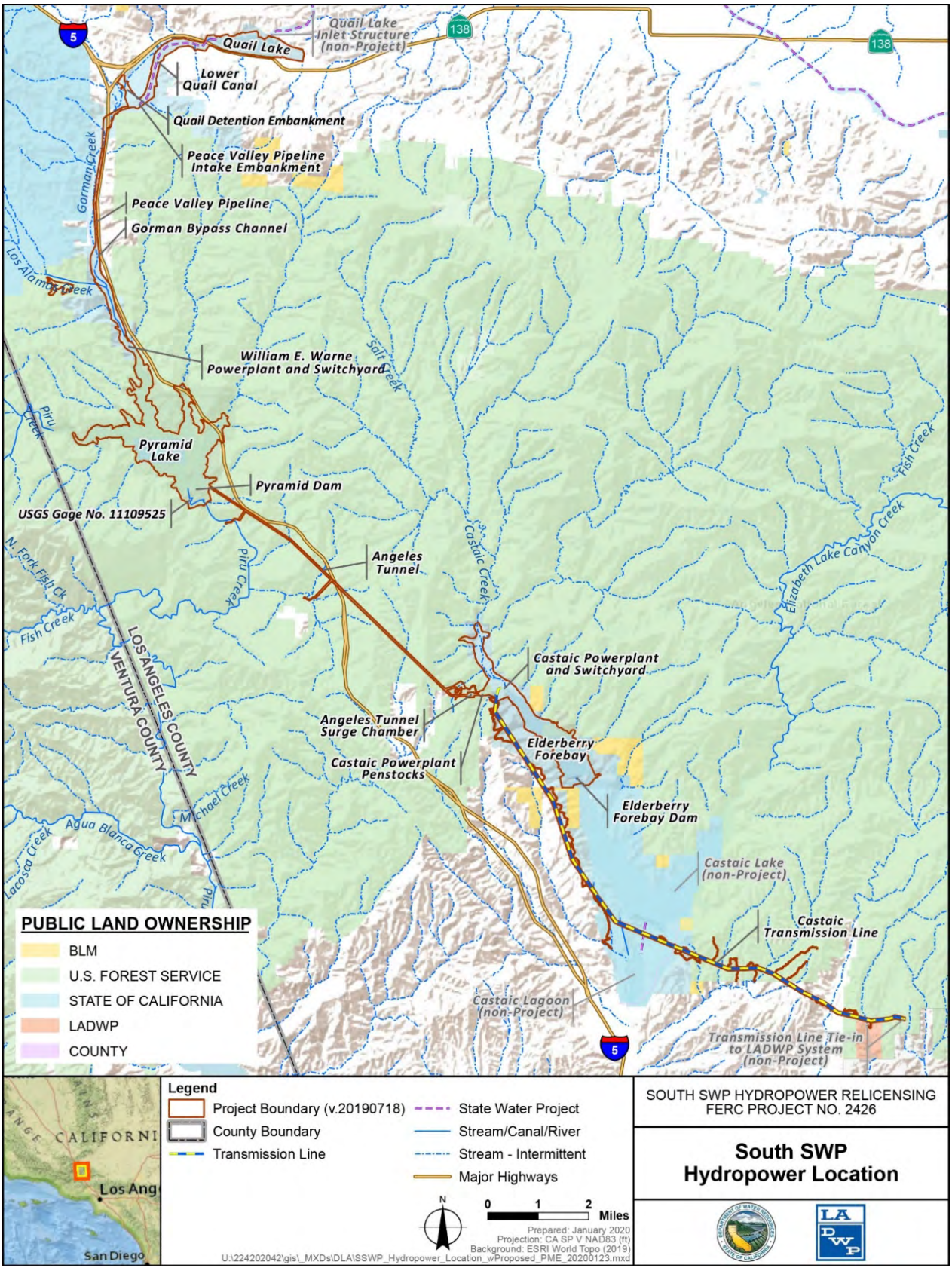

Figure 1.1-2. South SWP Hydropower Facilities and Land Ownership

1.2 PURPOSE OF THE PLAN

The purpose of this Plan is to describe measures that, when implemented, would minimize impacts from Project O&M and Project-related recreation to sensitive aquatic and terrestrial wildlife species (sensitive species) and sensitive habitats. For the purpose of this Plan, sensitive species include species listed or proposed for listing under the Endangered Species Act (ESA) or the California Endangered Special Act (CESA); listed as Fully Protected by the State; listed as Forest Service Sensitive when they occur on NFS lands; listed as Sensitive when they occur on lands administered by BLM; and/or listed as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW). Further, for the purpose of this Plan, sensitive habitats include wetlands[1], riparian areas[2], waters of the United States[3] and the State[4], littoral zones[5] and vegetation communities listed as Sensitive Natural Communities[6] by CDFW. The Licensees will coordinate the efforts required under this Plan with other Project resource efforts, including implementation of other resource management plans and measures included in the new license.

1.3 GOAL AND OBJECTIVE OF THE PLAN

The primary goal of the Plan is to describe protective measures during Project O&M and Project-related recreation that would be implemented under the new license to protect sensitive species and sensitive habitats. The objective of the Plan is to provide guidelines to meet the goal of the Plan.

[1] Wetlands are defined by federal policy as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (EPA 2018). Wetland areas include marshes, shallow swamps, lakeshores, wet meadows, and riparian areas, and often occur along or adjacent to perennial or intermittent water bodies.

[2] Riparian areas are vegetated zones that form a transition between permanently saturated areas and upland areas, and that typically exhibit vegetation and physical characteristics associated with permanent sources of surface or groundwater (USACE 1987).

[3] Waters of the United States is defined, as applicable to the Project, at the following link: https://www.epa.gov/sites/production/files/2020-01/documents/navigable_waters_protection_rule_prepbulication.pdf. (USACE and EPA 2020)

[4] State waters, as applicable to the Project, are defined as any surface water or groundwater, including saline waters, within the boundaries of the State (SWRCB 2008).

[5] Littoral areas are those with standing water of depths less than 6.6 feet. These areas typically support aquatic bed or emergent vegetation (Cowardin et al. 1979).

[6] CDFW considers natural communities, as defined by VegCAMP, Sensitive Natural Communities if they have ranks of S1 (Critically Imperiled), S2 (Imperiled) or S3 (Vulnerable) (CDFW 2020). Within the Project boundary, known Sensitive Natural Communities include Desert Riparian (51.5 acres), Joshua Tree (0.2 acres), Valley Foothill Riparian (96.3 acres), Desert Wash (2.5 acres), Fresh Emergent Wetland (55.3 acres) and Wet Meadow (20.9 acres).

1.4 CONTENTS OF THE PLAN

The Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including a brief description of the Project, and the purpose, goal, and objective of the Plan.

- Section 2.0. General Protection Measures. This section includes protection measures that cover a variety of species and locations on the Project during both routine[7] and non-routine Project O&M activities.

- Section 3.0. Consultation and Plan Revisions. This section includes a plan for consultation with USFS and other applicable resource agencies; and identifies when the Licensees will review, update, and/or revise the Plan, in consultation with USFS and other applicable resource agencies.

- Section 4.0. References Cited. This section includes the resource documents cited in this Plan.

[7] Routine Project O&M activities include, but are not limited to, those described in Exhibit B of the Licensees' Application for New License.

2.0 GENERAL PROTECTION MEASURES

Sensitive species within the Project boundary will be protected through a series of general protective measures. These measures will include protections to sensitive habitats, specific time restrictions on certain types of activities, and the implementation of buffers around known sensitive resources, as described below.

2.1 MEASURES TO PROTECT SENSITIVE HABITATS

The Licensees will implement the measures described below to protect riparian areas, wetlands, and littoral zones during Project O&M activities:

- Establish, excluding Primary Project Roads, a mobile and heavy equipment exclusion zone[8] within 100 feet of perennial streams or permanent bodies of water, and 50 feet of intermittent streams and ponds, unless otherwise coordinated with USFS on NFS lands or BLM on BLM-administered lands. Mobile and heavy equipment may be parked, driven, or used within the right-of-way of the Primary Project Road.

- In a riparian zone (except for the 100-foot buffer around reservoirs) outside of recreation facilities, leave large woody material (LWM) on site unless the LWM creates a safety risk or USFS on NFS lands or BLM on BLM-administered lands determines the LWM poses an unacceptable fire risk.

- To the extent feasible and except as otherwise needed for safety purposes, at dams and along Primary Project Roads, minimize native vegetation removal in wetland, riparian, or littoral zones.

- Minimize Project activities in Sensitive Natural Communities to the extent possible, and discuss any non-routine Project O&M planned inside a Sensitive Natural Community with CDFW and the applicable land management agency during the Agency Consultation Meeting described in Section 3.1 to identify Best Management Practices.

- To the extent possible, avoid disturbing habitat for the San Emigdio blue butterfly (*Plebulina emigdionis*), specifically the four-winged saltbrush (*Atriplex canescens*) where present.

2.2 MEASURES TO PROTECT SENSITIVE SPECIES AND NESTING BIRDS

The Licensees will implement the measures described below to protect sensitive species and nesting birds while conducting Project O&M activities. In the case of an emergency, Project activities will be exempt from the measures. For the purpose of this

[8] Mobile and heavy equipment exclusion zone is defined as areas around perennial streams, permanent bodies of water, and intermittent streams and ponds, where mobile or heavy equipment cannot be parked, driven, or used off of a Primary Project Road.

Plan, an emergency is defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including the California Independent System Operator and LADWP, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents. In case of an emergency, the Licensees will notify the U.S. Department of the Interior, Fish and Wildlife Service (USFWS) and CDFW as well as USFS if the emergency occurs on NFS lands and BLM if the emergency occurs on BLM-administered lands within 48 hours of commencement of Project activities that are undertaken based on an emergency and that require suspension of the protection measures described below.

- **Non-Routine Project Activities**. For non-routine Project activities, the Licensees will conduct pre-construction surveys for sensitive habitat (including four-winged saltbrush) and sensitive species in and within a reasonable buffer of the proposed work area. Any sensitive habitat will be flagged for avoidance, and appropriate buffers will be set up around occurrences of nests, burrows, and other sensitive resources. Sensitive species will be allowed to move from the area of their own volition prior to work beginning. If any ESA-listed or CESA-listed species are located during pre-construction surveys, the Licensees will consult with the USFWS or CDFW, as appropriate, prior to starting work. If potential bat roosting habitat could be impacted, the procedures for removing hazard trees described in the Licensees' Integrated Vegetation Management Plan (IVMP) will be followed. If impacts to sensitive species or their habitats cannot be avoided, the Licensees will consult with the agency with jurisdiction and acquire any necessary permits or approvals prior to removing the hazard tree.

- **Breeding/Nesting Birds.** To protect native breeding birds, the Licensees will generally avoid areas of breeding/nesting, and plan vegetation removal and other Project activities that could impact nesting birds outside of the general avian breeding season of February 1 through August 31. If Project activities cannot be avoided during this time period (i.e. limited operating period), the Licensees will conduct a focused survey for active nests within the area proposed for work, plus a reasonable buffer around the area, prior to the commencement of Project activities. If no nests are located within the buffer, work may proceed as planned. When regulatory permits are required, a no-disturbance buffer will be applied according to the permits. When no permits are required, appropriate buffers will be applied based on the bird species, applicable listing status, location of the activity to the nest, and professional judgment.

  If Project O&M staff incidentally observe signs of disturbance or distress to nesting birds in response to conducting routine Project O&M activities, staff will immediately cease the activities, as long as it is safe to do so, that are causing

the disturbance/distress and will notify the Licensees' authorized representative or designee. An experienced biologist will monitor the area where the disturbed/ distressed bird(s) were observed to determine if there is a nest in the area. If the bird species is a protected species under the ESA, the biologist must meet the prerequisites of a qualified biologist consistent with permit requirements.

If a previously undetected active nest is detected, the Licensees will establish a no-disturbance buffer around the nest, and work may continue. If nesting birds within an established buffer exhibit signs of stress during continued work activities, the buffer will be expanded by half its existing width for the duration of Project activities. If nesting birds continue to show signs of stress and disturbance, the activities will be delayed in the area until the nestlings have fledged or the nest is no longer active as determined by the experienced or qualified biologist.

Refer to the Licensees' Final Application for New License, Exhibit E, Section 5.3 (Fish and Aquatic Resources), Section 5.4 (Terrestrial Resources), and Section 5.4.3 (Federal ESA, Listed and Canidate Species) for the results of the Licensees' relicensing studies relative to sensitive species and sensitive habitats.

- **Sensitive Amphibians and Reptiles.** To protect California red-legged frogs (*Rana draytonii*), arroyo toad (*Anaxyrus californicus*), foothill yellow-legged frog (*Rana boylii*), Western spadefoot (*Spea hammondii*), two-striped gartersnake (*Thamnophis hammondii*), South Coast gartersnake (i.e., occurrences of California red-sided gartersnake [*Thamnophis sirtalis infernalis*] from coastal Ventura County to San Diego County), Southern Western (or western) pond turtle (*Actinemys* [=*Emys*] *pallida* [or *marmorata pallida*]), yellow-blotched salamander (*Ensatina eschscholtzii croceater*), Northern California legless lizard (*Anniella pulchra*), Southern California legless lizard (*Anniella stebbinsi)*, California glossy snake (*Arizona elegans occidentalis*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), San Bernardino ring-necked snake (*Diadophis punctatus mode*stus), California mountain kingsnake (*Lampropeltis zonata parvirubra*), coastal rosy boa (*Lichanura orcutti*), coast horned lizard (*Phrynosoma blainvillii*), and coast patch-nosed snake (*Salvadora hexalepis virgultea*), when the Licensees need to conduct vegetation management activities near known breeding sites or apply pesticides near a known location of sensitive amphibians and reptiles, the Licensees will coordinate with USFS on NFS lands and BLM on BLM-administered lands as well as CDFW and USFWS, as appropriate. Any pesticide use that is deemed by the Licensees as necessary on NFS lands will be designed to avoid adverse effects to individuals and their habitats.

- **Avian Collision with Project Transmission Line.** The Castaic Transmission Line will be made compliant with Avian Power Line Interaction Committee (APLIC) guidelines as transmission line poles are replaced or repaired (APLIC 2020). New and repaired poles will be designed to meet the most updated APLIC guidelines at the time of their repair or replacement. Any known bird strikes on

the Castaic Transmission Line will be reported as part of the annual meeting, as described in Section 3.1. Information to be collected by the Licensees on bird strikes include: (1) location of strike; (2) species of bird; and (3) time and date. If an ESA- or CESA-listed species is found to have struck a Project transmission line, USFWS or CDFW, as appropriate, will be notified within 24 hours of discovering the bird. If there are multiple bird electrocutions at any specific part of the transmission line, the Licensees will coordinate with CDFW and/or USFWS, as applicable, on the possible placement of bird protective structures on the lines and/or poles.

- **Hazard Tree Removal**. Within the Project boundary, the Licensees will adhere to the applicable procedures described in the Licensees' IVMP for removing hazard trees for the protection of sensitive species and sensitive habitats.

- **Elderberry Forebay**. For the protection of ESA- and CESA-listed species at Elderberry Forebay, pre-construction surveys will be conducted in the footprint and within a reasonable buffer of proposed Project O&M activities (e.g., dredging, dam repair, pesticide application, and vegetation management) that could impact ESA- or CESA-listed species or their habitats. If ESA- or CESA-listed species are located that are not covered by the Licensees' existing permits and/or Biological Opinions and/or Assessments, the Licensees will consult with USFWS or CDFW, as applicable, prior to beginning the work. If ESA- or CESA-listed species are covered by existing regulatory approvals, the provisions of the approvals will be followed. If no ESA- or CESA-listed species are located, work may continue as planned.

- **Distressed Sensitive Species**. The Licensees' Project O&M staff will report any instances of injured, notably diseased, or deceased sensitive species observed within the Project boundary to the Licensees' authorized representative or designee, who will report the information to the appropriate jurisdictional agencies.

2.3 PESTICIDE USE RESTRICTIONS

Pesticides are defined as any chemical used to treat unwanted vegetation, algae, and aquatic weed species. For the protection of sensitive species and sensitive habitat, the Licensees will adhere to the pesticide use procedures described in the IVMP and will adhere to the terms and conditions of their existing State Water Resources Control Board-issued National Pollutant Discharge Elimination System permits and the associated Aquatic Pesticide Application Plans.

3.0 CONSULTATION AND PLAN REVISIONS

3.1 AGENCY CONSULTATION MEETING

Beginning the first full calendar year of the new license and annually thereafter, the Licensees will hold a meeting with USFS and other applicable resource agencies to discuss sensitive species and sensitive habitats. As part of the meeting, the Licensees will share information regarding locations of new sensitive species occurrences, if any; management activities undertaken by the Licensees in the past calendar year to protect sensitive species and sensitive habitats; limited operating periods and buffers; and any emergency work undertaken by the Licensees in the prior calendar year that may have affected sensitive species and sensitive habitats. This meeting may be combined with the annual meeting between the Licensees and the USFS.

3.2 PLAN REVISIONS

The Licensees will evaluate the requirements of this Plan during the life of the new license and may modify those requirements in consultation with USFS, BLM, and other applicable resource agencies, as necessary. The Licensees will provide these agencies 60 calendar days to provide written comments and recommendations before the Licensees file the updated Plan with FERC for approval. The updated Plan will include documentation of all relevant coordination and consultation. If the Licensees do not adopt a particular recommendation by the above agencies, the filing will include the Licensees' reasons for not doing so. The Licensees will implement the Plan as approved by FERC. The Plan will not be considered revised until FERC issues its approval.

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4.0 REFERENCES CITED

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Attachment 6

Recreation Management Plan

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

RECREATION MANAGEMENT PLAN

January 2020

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

Los Angeles
DEPARTMENT OF WATER AND POWER

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

§	Section
ABA	Architectural Barriers Act of 1968
ABAAS	Architectural Barriers Act Accessibility Standards
Accessible	A facility or amenity that has features compatible with the Americans with Disabilities Act of 1990, and for National Forest System lands, features compatible with Architectural Barriers Act Accessibility Standards and the Forest Service Outdoor Recreation Accessibility Guidelines
ADA	Americans with Disabilities Act of 1990
ANF	Angeles National Forest
Application for New License	Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426
BMP	Best Management Practice
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
Emergency	Defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including California Independent System Operator and Los Angeles Department of Water and Power, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.
FERC	Federal Energy Regulatory Commission
FSORAG	Forest Service Outdoor Recreation Accessibility Guidelines
Image Guide	Built Environment Image Guide, a U.S. Department of Agriculture, Forest Service document that guides how the elements of the built environment (e.g., administrative and recreation buildings, landscape structures, site furnishings,

	signs, etc.) will be incorporated into the natural and cultural landscape
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
LPNF	Los Padres National Forest
MOU	Memorandum of Understanding
NFS	National Forest System
O&M	operation and maintenance
Plan	Recreation Management Plan
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance
Project	South SWP Hydropower, FERC Project Number 2426
Project boundary	The area to which the Licensees require access for normal Project operations and maintenance
ROS	recreation opportunity spectrum
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
Warne Powerplant	William E. Warne Powerplant

1.0 INTRODUCTION

In January 2020, the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees), pursuant to Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam [18 CFR § B(4)(f)]) (Integrated Licensing Process), filed with the Federal Energy Regulatory Commission (FERC) an Application for a New License for Major Project – Existing Dam (Application for New License) for the Licensees' South SWP Hydropower, FERC Project Number 2426 (Project).

The Licensees included this Recreation Management Plan (Plan) in their Application for New License. This Plan addresses recreation facilities and recreation management within the Project boundary.

1.1 BACKGROUND

1.1.1 Project Description

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States (U.S.). The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in Los Angeles County in southern California, on the West Branch of the SWP. The Project has a FERC-authorized installed capacity of 1,349,290 kilowatts. Project facilities range in elevation from 3,325 feet to 1,130 feet, and include the Warne Power Development and Castaic Power Development. Facilities and features of the Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Primary Project Roads and Trails; (7) Quail Lake recreation facilities; and (8) streamflow and reservoir stage gages. Facilities and features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities.

Facilities upstream of the Angeles Tunnel Surge Chamber are operated and managed by DWR. The remainder of the downstream facilities, including the Surge Chamber, are operated and managed by LADWP.

The Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions. In

essence, the Project is operated in a run-of-river mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users.

The Project boundary comprises 2,007.0 acres, of which 1,334.6 acres are managed by the Angeles National Forest (ANF), 665.9 acres are managed by the Los Padres National Forest (LPNF), and 6.5 acres are managed by the U.S. Department of the Interior, Bureau of Land Management. The U.S. Department of Agriculture, Forest Service (USFS) administers the ANF and LPNF in conformance with the ANF and LPNF Land Management Plans (USFS 2005a, 2005b, 2005c, 2005d).

Figure 1.1-1 shows the Project vicinity. Figure 1.1-2 shows the Project facilities, including land ownership.

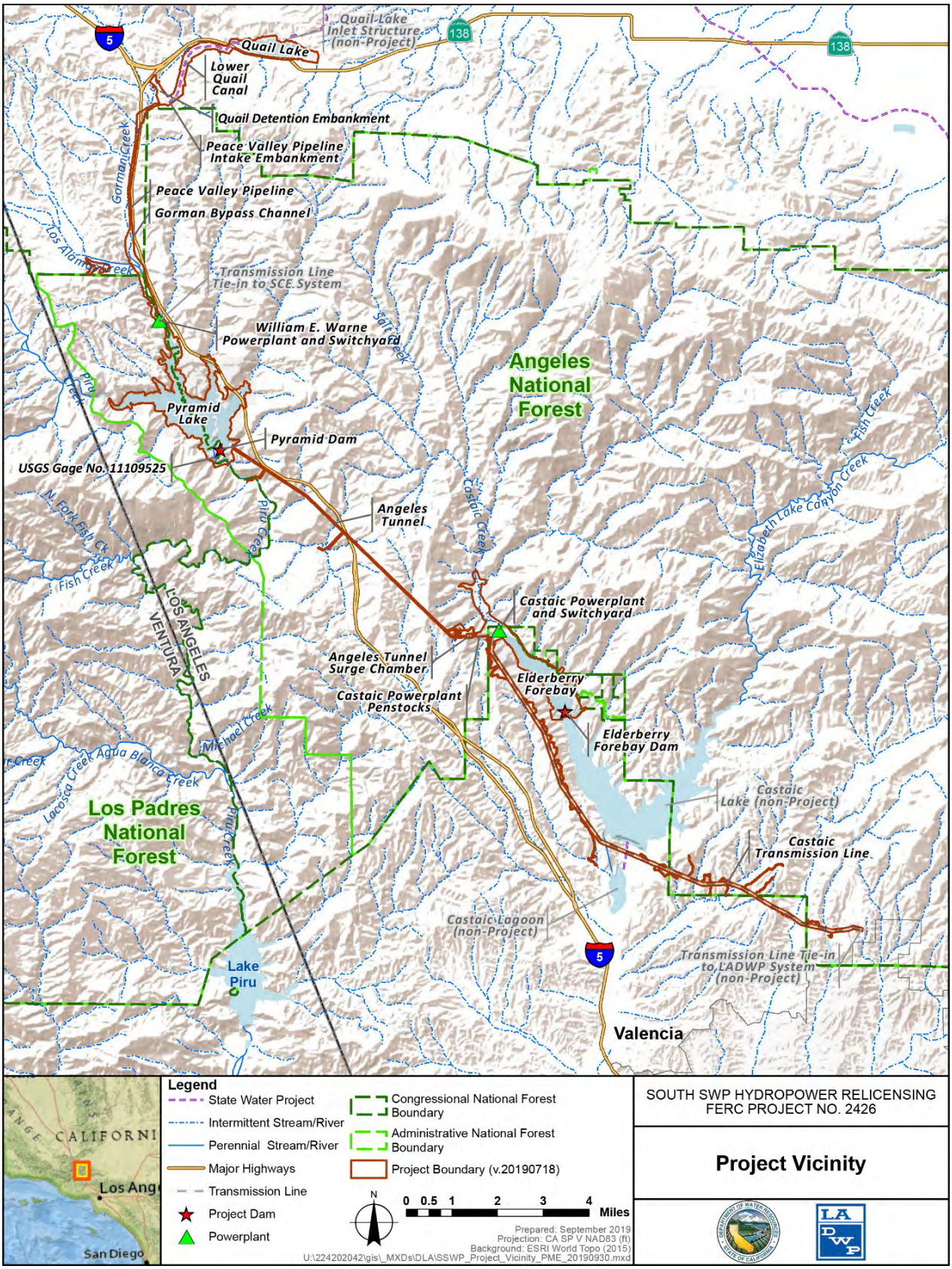

Figure 1.1-1. South SWP Hydropower Vicinity Map

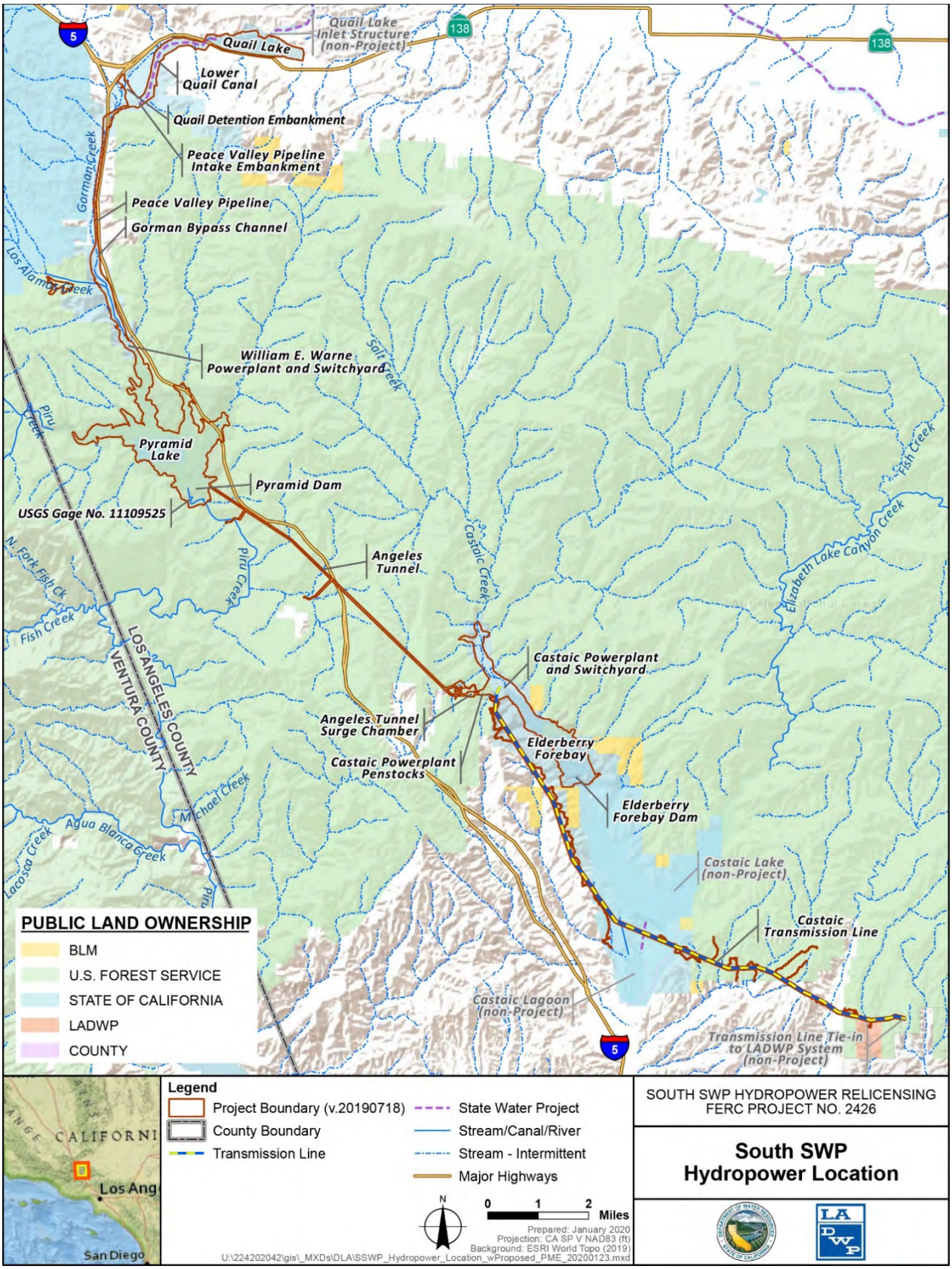

Figure 1.1-2. South SWP Hydropower Facilities and Land Ownership

1.2 PURPOSE OF THE RECREATION MANAGEMENT PLAN

This Plan is intended to provide guidance for rehabilitation of Project-related recreation facilities at Pyramid and Quail Lakes, and management measures to help improve recreation opportunities and needs. To the extent appropriate, the Licensees will coordinate the efforts required under this Plan with other Project resource efforts, including implementation of other resource management plans and measures included in the license. These include the Project Erosion and Sediment Control Plan and Integrated Vegetation Management Plan.

1.3 GOALS AND OBJECTIVES OF THE RECREATION MANAGEMENT PLAN

The primary goals of this Plan are to: (1) list recreation facilities, associated access, parking, and developed amenities at each site, associated with the Project; and (2) describe the scope of improvements, recreation management program measures, and general recreation area maintenance commitments for the term of the new license. The objectives of the Plan are to provide descriptions of the Project recreation facilities and uses, and to establish the proposed management improvement measures within the Project boundary to meet the Plan's purpose and goals.

1.4 RECREATION MANAGEMENT PLANNING AND COORDINATION RESPONSIBILITIES

Project recreational facilities at Pyramid Lake are on National Forest System (NFS) lands and are owned by the U.S. Government, with the exception of the following improvements on NPS lands: boat docks, floating restroom facilities, other safety buoy facilities, and the Vista Del Lago Visitor Center, which are all owned by the Licensees. All Pyramid Lake recreation facilities are managed by the Licensees. The responsibilities of the United States Department of Agriculture, Forest Service (USFS) and the Licensees are detailed in agreements between the agencies. Under the terms of the Memorandum of Understanding (MOU) between USFS and DWR, USFS is to manage USFS lands in the vicinity of the recreation sites and reservoir so as not to impair fulfillment of DWR's obligations in maintaining and operating the recreation facilities at Pyramid Lake. Under FERC regulations, the Licensees are responsible for provision of approved public access, recreation opportunities, and associated development within the Project boundary.

Ongoing Licensees' management duties for Project recreation areas include:

- Recreation facilities maintenance
- Support systems maintenance
- Provisions for safety on both land and water
- Interpretive activities
- Project and resource management

- Concession management
- Monitoring and strategic planning

Since 1982, DWR, through a contract with the California Department of Fish and Wildlife (CDFW), has stocked rainbow trout (*Oncorhynchus mykiss*) in Pyramid Lake at a variety of levels under several management plans included in the original license. DWR proposes that, over the term of the new license, the Licensees will continue the annual stocking of 20,000 pounds of catchable rainbow trout at Pyramid Lake (DWR 2014). Since 2000, stocking status and annual creel survey data have been reported to FERC on a biennial schedule.

The Licensees' contract with a concessionaire to provide services that support recreation at Pyramid Lake recreation areas. The Licensees' current concessionaire is Rocky Mountain Recreation. Rocky Mountain Recreation currently operates the Pyramid Lake recreation facilities including the Project's two campgrounds, day use areas at Emigrant Landing and Vaquero, four boat-in day use areas, and the floating restrooms on Pyramid Lake. Rocky Mountain Recreation also maintains and manages a boat rental fleet of up to 25 gasoline/electric-powered and 25 human-powered watercraft, boat storage for up to 50 boats, and a general convenience store open year-round.

The Licensees' concessionaire also makes use of the federal Recreation.gov campground reservation system. Overnight camping reservations using this system can be made up to six months in advance.

The Los Angeles County Sheriff's Department provides oversight for boating safety and law enforcement on Pyramid Lake and its recreation areas. The Sheriff's Department maintains offices staffed daily at Pyramid Lake. USFS also supports the Sheriff's Department when needed in response to oversight of lands, facilities, and roads, or in response to emergencies.

Project recreational facilities at Quail Lake are on state lands and are managed by the Licensees. The Licensees perform maintenance and rehabilitation activities to maintain access, safety measures, and recreation area functions. An emergency is defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, balancing authorities including the California Independent System Operator and LADWP, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.

1.5 CONTENTS OF THE PLAN

This Plan includes the following:

- Section 1.0. Introduction. This section provides introductory information, including a brief description of the Project, and the purpose, goals, and objectives of the Plan.

- Section 2.0. Project Recreation Facilities. This section lists and describes Project recreation facilities, including developed trails and dispersed use areas.

- Section 3.0. Recreation Management Plan Measures. This section describes recreation management considerations and proposed PM&E measures for Project facilities where feasible measures are identified.

- Section 4.0. Recreation Management Plan Implementation Schedule. This section includes the schedule for implementing proposed PM&E measures.

- Section 5.0. Notification, Reporting, and Plan Revisions. This section includes a plan for consultation and reporting with the Angeles National Forest (ANF) and Los Padres National Forest (LPNF); and identifies when the Licensees will review, update, and/or revise the Plan, in consultation with the ANF and LPNF, as it pertains to recreation resources on NFS lands.

- Section 6.0. References. This section references the documents cited in this Plan.

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2.0 PROJECT RECREATION FACILITIES

Project recreation resources are found on Quail Lake and Pyramid Lake (Figure 2.0.1). Quail Lake is popular with anglers. Recreational facilities surrounding Quail Lake are on State lands, and are owned, operated, and managed by the Licensees. Impounded by Pyramid Dam, Pyramid Lake is popular with boaters and anglers. In addition, the lake, its surrounding shoreline, and adjacent areas are popular with swimmers, hikers, and picnickers, particularly during the summer months.

Rocky Mountain Recreation operates the recreation area on a daily basis and does minor repairs. Large repair and maintenance projects are conducted by the Licensees. An April 2010 amendment to the MOU between USFS and DWR outlines USFS' and DWR's responsibilities regarding management of recreation facilities at Pyramid Lake.

Appendix A provides detailed maps of the 9 developed Project recreation facilities, which include:

- Quail Lake Day Use Area
- Los Alamos Campground
- Vista Del Lago Visitor Center
- Emigrant Landing Day Use Area
    - Emigrant Landing Entrance Area
    - Emigrant Landing Boat Launch
    - Emigrant Landing Picnic and Fishing Area One
    - Emigrant Landing Picnic and Fishing Area Two
    - Emigrant Landing Swim and Picnic Area
- Vaquero Day Use Area
- Spanish Point Boat-in Picnic Area
- Serrano Boat-in Picnic Area
- Bear Trap Boat-in Picnic Area
- Yellow Bar Boat-in Picnic Area

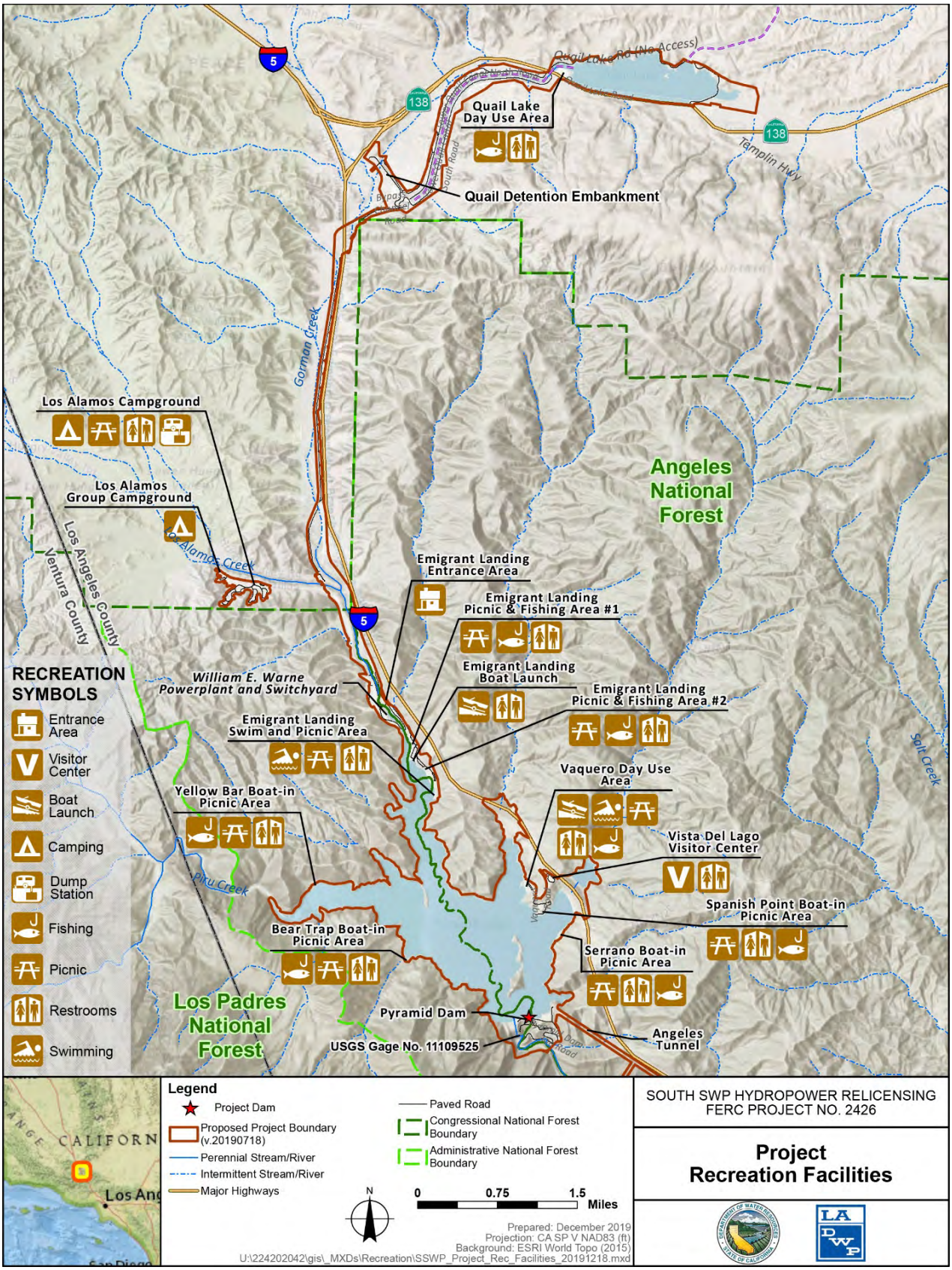

Figure 2.0-1. South SWP Hydropower Recreation Facilities

2.1 DAY USE FACILITES

Project day use areas surround both Pyramid and Quail Lakes. There are 10 day use sites surrounding the shorelines of Pyramid Lake, and Quail Lake contains one day use site that includes a social trail following its shoreline (Table 2.1-1).

Recreational facilities at Quail Lake are located at the west end of the lake and adjacent to State Highway 138. These facilities include a large, graveled parking area with portable restrooms, signage, and trash receptacles. Project lands surrounding Quail Lake are fenced and recreational access to the lake is walk-in only. Social trails lead to the lake from the parking area. A graveled service road surrounds the lake. The road is closed to public vehicles, but open to hikers and anglers. Quail Lake recreation includes shoreline fishing, bird watching, and hiking. However, no water contact uses, such as boating or swimming, are allowed.

The Emigrant Landing Day Use Area is located at the north end of Pyramid Lake, just south (downstream) of the Warne Powerplant. This area includes an entry station, four parking areas, an accessible fishing platform, shade ramadas, restrooms, a boat launch, one administrative and two public boat docks, a general store, a swim beach, and picnic tables/grills. Recreation facility fee collection at this location, daily operations, operation of the general store, and routine maintenance activities are carried out by a concessionaire under contract with the Licensees.

The 18,500-square-foot Vista Del Lago Visitor Center is located on the east side of Pyramid Lake, immediately adjacent to and easily accessible from Interstate 5. The Vista Del Lago Visitor Center overlooks Pyramid Lake and has a surrounding outdoor balcony. Educational exhibits about California's water, the SWP, ancient civilizations, natural habitats in the area, and water treatment operations are presented inside the visitor center. A large theater, reception desk, offices, restrooms, and parking for cars and buses are also included. The Vista Del Lago Visitor Center offers free admission and is open daily from 9 a.m. to 5 p.m., except Thanksgiving, Christmas, and New Year's Day.

The Vaquero Day Use Area is located just southwest of the Vista Del Lago Visitor Center. This area, which is easily accessible from Interstate 5, includes a parking area, picnic tables and grills, shade ramadas, comfort stations, a non-motorized boat launch and courtesy dock, and a swim beach.

The Spanish Point Boat-in Picnic Area is located just south of the Vista Del Lago Visitor Center, and is accessible to the general public only by boat. This picnic area includes tables, grills, shade ramadas, a beach, and a restroom. The Licensees operate and maintain three other similar boat-in day use sites on Pyramid Lake, including Serrano Boat-in Picnic Area, Bear Trap Boat-in Picnic Area, and Yellow Bar Boat-in Picnic Area. These three boat-in sites also have courtesy docks.

Table 2.1-1. Project Day Use Facilities

Recreation Area		Developed Facilities
Quail Lake Day Use Area		Day use area with angler access paths on both sides of lake; gravel parking area; and 3 portable restrooms
Vista Del Lago Visitor Center		18,500-square-foot visitor building with interpretive exhibits, auditorium, potable water, and restrooms; parking for approximately 159 vehicles (6 signed accessible parking spaces, 2 designated for vans), 1 FERC informational sign, 2 other informational signs, approximately 11 trash receptacles, 2 telescopes, 1 overview lookout structure (1 bench, 1 information sign), and multiple standard parking lot lights
Emigrant Landing Day Use Area	Emigrant Landing Entrance Area	2 entrance station kiosks; boat inspection station; and approximately 24 parking spaces
	Emigrant Landing Boat Launch	8-lane boat launch ramp; 2 boat docks; 1 accessible unisex restroom with flush toilets; 2 floating restrooms that are deployed on the lake as needed; and parking for approximately 73 vehicles with boat trailers, with 3 other standard parking spaces and 5 additional signed accessible parking spaces (2 signed, van accessible)
	Emigrant Landing Picnic and Fishing Area One	About 22 picnic sites, with 22 grills, 21 shade ramadas, and approximately 34 standard tables; shoreline fishing platform/walkways; 2 unisex restrooms with flush toilets; 1 drinking fountain; parking for approximately 90 vehicles (5 signed accessible parking spaces); 1 fish cleaning station
	Emigrant Landing Swim and Picnic Area	Swim beach with lifeguard tower; about 31 picnic sites with approximately 52 standard tables, 34 grills, 31 shade ramadas, 5 water spigots, and 2 drinking fountains; 2 unisex restrooms with flush toilets; parking for approximately 135 vehicles (2 signed accessible parking spaces)
	Emigrant Landing Picnic and Fishing Area Two	5 picnic sites with tables, 5 shade ramadas (1 has 3 combined shade ramadas counted as 1), approximately 14 standard tables, 7 grills; pedestrian overlook structure connected to walkway; 1 unisex restroom with flush toilets; water spigots and 3 drinking fountains; parking for approximately 80 vehicles (2 signed accessible parking spaces)
Vaquero Day Use Area		Swim beach with lifeguard tower; 2-lane non-motorized watercraft launch ramp with courtesy dock; about 14 picnic sites with approximately 13 standard tables, 14 grills, and shade ramadas; 2 unisex restrooms with flush toilets; 5 water spigots and 1 drinking fountain; parking for approximately 146 vehicles (8 signed accessible parking spaces, with 3 designated for vans); 2 restroom buildings (unisex),
Spanish Point Boat-in Picnic Area		Boat-in area with 12 picnic sites, each with shade ramada; 9 grills and 1 group barbeque site with 3 grills; 1 restroom with vault toilet; portable restrooms with portable sinks provided seasonally as needed
Serrano Boat-in Picnic Area		6 picnic sites, 8 standard tables, 6 grills, and shade ramadas; 1 unisex restroom with vault toilets; boat dock

Table 2.1-1. Project Day Use Facilities (continued)

Recreation Area	Developed Facilities
Bear Trap Boat-in Picnic Area	2 picnic sites with 3 tables, 2 grills, and 3 shade ramadas; 2 unisex restrooms with vault toilets; boat dock
Yellow Bar Boat-in Picnic Area	10 picnic sites with 17 standard tables and 10 shade ramadas; 2 restrooms with vault toilets; boat dock and paths with shoreline fishing

Source: DWR 2019

2.2 CAMPGROUND FACILITIES

The Licensees operate and maintain one campground facility, the Los Alamos Campground, which contains both standard and group campsites (Table 2.2-1).

Table 2.2-1. Project Overnight Recreation Facilities

Recreation Area		Developed Facilities
Los Alamos Campground	Los Alamos Family Campground	93 campsites with typically 1 or 2 picnic tables each, parking spur, and 1 fire ring per site (3 sites are accessible); 4 restrooms with flush toilets; potable water spigots, 4 of which have sinks; 5 shade ramadas; 2 lane recreational vehicle/trailer dump stations
	Los Alamos Group Campground	3 group camping sites with maximum occupancy of 40 people and parking for typically 8 to 10 vehicles per site; each site includes a large shade ramada containing barbeque grills, fire pits, 5 picnic tables, and water spigot; 1 unisex restroom with flush toilets, water spigot, and outdoor sink

Source: DWR 2019

2.2.1 Los Alamos Campground

The Los Alamos Campground is located approximately 2 miles northwest of the Warne Powerplant and is accessible via Hardluck Road. The Los Alamos Family Campground offers 93 family campsites, restrooms, potable water, a trailer dump station, and campground hosts and facilities. Fee collection, daily operations, and routine maintenance activities are carried out by a recreation concessionaire under contract with Licensees.

The Los Alamos Group Campground is adjacent to the main Los Alamos Campground. The group campground offers three group camping sites with maximum occupancy of 40 people and parking for typically 8 to 10 vehicles per site. Each site includes a large shade ramada containing barbeque grills; fire pits; 5 picnic tables, a water spigot; and 1 unisex restroom with flush toilets, water spigot, and outdoor sink.

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3.0 RECREATION MANAGEMENT PLAN MEASURES

3.1 RECREATION FACILITY OPERATION, MAINTENANCE, AND MONITORING PROGRAM

3.1.1 Recreation Facility Operation and Maintenance

The Licensees will continue O&M and repair of recreation facilities at a level that provides for public recreation to occur in a safe and enjoyable manner. O&M activities to support recreation development and use will include, but are not limited to, maintaining parking areas, lawns, restrooms, lights, water, power, sewer, shelters, and picnic/campground equipment. Table 3.1-1 provides a general description of the type of O&M activities anticipated to occur at each of the recreation facilities. The Licensees utilize a concessionaire to provide personnel, equipment, and/or materials to help achieve most of these O&M standards.

Table 3.1-1. General Maintenance Activities at Project Recreation Facilities Managed by Licensees

Resource	Maintenance Activity
Water supply	Maintain and repair, as needed, all facilities and equipment associated with potable and non-potable (irrigation) water systems.
Wastewater services	Maintain and repair, as needed, all facilities and equipment associated with wastewater collection and treatment in compliance with applicable requirements.
Recreation facilities electrical system	Maintain and repair, as needed, all equipment associated with recreation sites' electrical distribution systems.
Recreation facilities road and parking areas	Maintain and repair, as needed, all Project recreation roadways, bridges, parking lots, and drainage systems, including channels, swales, inlets and culverts. Maintain accessibility features where applicable. Conduct asphalt repairs/overlay to roadways and parking areas as needed. Maintain vegetation around road musters and parking areas to preserve visibility. Clean culverts and the beginning and end of each recreation season, and following large storm events.
Buildings and grounds	Maintain and repair, as needed, all Project recreation-related buildings and structures to allow public recreation to occur in a safe, accessible and enjoyable manner. Regularly inspect and clean picnic tables, camp sites, fire rings, grills, and barbeque stands. When it is necessary to replace them, all features and amenities will be replaced with a uniform and consistent style and character corresponding to applicable USFS standards and guidelines. Provide trash receptacles and waste disposal services as needed.
Boat launching and mooring facilities	Maintain and repair, as necessary, boat launching and mooring facilities, docks, and floating restrooms (including pumping vaults when 75 percent capacity is reached).

Table 3.1-1. General Maintenance Activities at Project Recreation Facilities Managed by Licensees (continued)

Resource	Maintenance Activity
Swimming beaches	Maintain visitor swimming-wading beaches at Vaquero and Emigrant Landing areas. Keep swim beaches free of weeds above water's edge. Where possible and practical, provide imported weed-free sand near the shoreline for use during the peak visitor season (Memorial Day through Labor Day).
Navigation and safety buoys	Maintain and repair, as necessary, navigational and safety buoys and anchors on the lake, including those near the dam and intake structures, and water treatment plant.
Landscaping	Maintain and provide routine maintenance such as pruning, mowing, removal of hazardous trees, and planting of replacement trees. At time of replacement, only native plants endemic to the site area will be used. Maintain and repair irrigation systems as necessary.

3.1.1.1 Accessibility Improvement Program

In accordance with the Architectural Barriers Act (ABA) of 1968, all recreation buildings on NFS lands as well as corresponding recreation sites that are designed, constructed, altered, purchased, rented or leased by, for, or on behalf of a federal agency, such as some of the recreation facilities at Pyramid Lake, should comply with the applicable ABA Accessibility Standards (ABAAS) (United States Access Board, undated). ABAAS provides Accessibility standards for recreation buildings, including adjacent facilities and parking lots. Current recreation standards for outdoor recreation sites on NFS lands are contained in the Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG). All new, altered, reconstructed, or purchased recreation sites, buildings, and constructed features are required to comply with the applicable provisions of the FSORAG and ABAAS (USFS 2017, 2015).

For the purposes of this Plan, an "Accessible" facility or amenity has features compatible with the Americans with Disabilities Act (ADA) of 1990, and for National Forest System lands, features compatible with ABAAS and the FSORAG.

As part of the relicensing recreation inventory, the Licensees found that several recreation sites and buildings require upgrades to be considered Accessible. As outlined below, measures will be taken to improve those facilities and bring them into compliance with applicable Accessibility standards for NFS lands.

Because Quail Lake facilities are on State lands, the ADA standards apply. The ADA standards can be found in 36 CFR § 1191, "Americans With Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Recreation Facilities" (Architectural and Transportation Barriers Compliance Board 2002). These provisions provide guidance related to boating facilities, fishing piers and platforms, signs, parking, accessible routes, and other outdoor recreation facilities that are not designed,

constructed, altered, purchased, rented or leased by, for, or on behalf of a federal agency, such as USFS.

Improvements for Accessibility are a central theme of this Plan. Day-use areas considered high-use will receive first priority for improvement. See Section 3.2 for the planned program details.

3.1.1.2 Facility Design Improvement Framework

Current guidelines for new or rehabilitated USFS structures at the Pyramid Lake recreation areas can be found in the USFS' Built Environment Image Guide (Image Guide), Forest Service Handbook 2309.13, and the ANF's and LPNF's Land Management Plans (USFS 2001, 2005b, 2005c). The guidelines provide region-specific design guidelines for administrative and recreation facility development on NFS lands.

The Project is located within the Southwest Province (as defined in the Image Guide). The Image Guide provides specific design guidelines for this province, including province-specific landscape; ecological and cultural context; siting criteria; appropriate structure types, styles, and materials; color/aesthetic recommendations; and sustainability principles, among others. The intent of the guidebook is "to improve the image, aesthetics, sustainability, and overall quality of Forest Service facilities consistent with the agency's role as leaders in land stewardship." Facility improvements on State lands are currently guided by the DWR State Water Project Architectural Motif standards. These include future developments at Quail Lake, and docks and floating restrooms at Pyramid Lake.

3.1.1.3 Erosion Control for Recreation Use Areas

As outlined in the Project Erosion and Sediment Control Plan proposed by the Licensees for inclusion in the new license, erosion treatment projects are either planned in advance or arise as, or are initially implemented as, preventative or emergency actions. Erosion control projects may require consultation with appropriate agencies.

Generally, planned erosion control activities that disturb a land area greater than 1 acre may be subject to a Statewide General Permit for Stormwater Discharge associated with construction activity. As outlined in the Project Erosion and Sediment Control Plan, other jurisdictions may also need to be consulted, including the U.S. Army Corps of Engineers, if the erosion treatment project falls within designated waters of the United States or under California Fish and Game Code Section 1602. The best management practices (BMP) outlined in Table 2.2-1 of the Project Erosion and Sediment Control Plan would apply equally to the priority actions considered in development of site-specific erosion control planning.

Preventative erosion control measures may be undertaken when severe erosion or natural resource damage is possible along cut hillslopes in or near recreation and shoreline areas, along roads, in parking areas, in heavy use areas, and in dispersed use areas with user-made or "social trails." Where significant erosion control methods are necessary, recreation sites may need to be relocated or erosion preventative

measures installed to enhance the site and keep visitors safe. Fence barriers made of natural materials should be used where recreation exclusion areas are established for the promotion of natural regeneration of vegetation.

The erosion control measures that may be used in closing dispersed use trails and other heavy use areas that show erosion problems involve development of site-specific BMPs that could include:

- Close/block trail access
- Erosion prevention
- Surface stabilization
- Runoff and sediment control
- Trail drainage
- Restoration and rehabilitation

Designated trails that may remain would be configured to help prevent concentration of stormwater runoff and resulting erosion. Water should drain evenly under sheet flow conditions, or be channeled into drainage culverts, ditches, or energy dissipation structures designed to handle the anticipated flow.

Areas of rehabilitation and repair (revegetation) will be closed to vehicular traffic and follow the Project's Integrated Vegetation Management Plan. Closed areas will be signed so users know to stay on established trails, and not create new trails through vegetation.

3.1.2 Litter Control Program

The relicensing recreation study identified that littering and litter accumulation and dispersion are problems in some developed sites, and along some shorelines of Pyramid and Quail Lakes. Current litter control involves daily patrols and cleanup of the grounds of all facilities in order to keep all developed sites free of litter and domestic animal waste. Graffiti, if found, is removed or painted over. To better control potential litter problems, the Licensees will undertake the following efforts:

- Continue program to replace trash receptacles with a consistent and standard color using USFS' Built Environment Image Guide and recreation opportunity spectrum (ROS) guidelines
- Trash receptacles will be bear-proof cans that are accessible, and additional containers will be added in higher use areas as needed

- Empty trash containers at least once a week during off season periods and up to three times a day at developed sites accessible by vehicles during periods of high use

- Maintain patrols for lands in and adjoining the Project boundary to help reduce trash, sanitation problems, and actions that may degrade natural resources and the potential for wildland fires

- Provide better signage and information to visitors about low-impact day use methods (e.g. Leave No Trace, or similar.)

- Implement additional litter control program measures, such as providing "pack it in, pack it out" litter bags, and disseminate litter control information at visitor contact centers, such as the Emigrant Landing Entrance Station and Vaquero Day Use entrance kiosk

- Outreach to local volunteer organizations to help with litter clean-up. Explore doing this in conjunction with efforts at the Hungry Valley State Vehicular Recreation Area.

3.1.3 Visitor Services and Signage Program

The Licensees propose to implement a visitor services program to help recreationists make better decisions on use periods and potential closures. The program will include useful information on fire safety and prevention as well as recreation use safety. The information program will be launched by direct contact and social media as well as webpage postings. The program will include dissemination of Pyramid Lake recreation areas use information that can be used by the public for trip planning purposes. The program will develop new marketing materials that will include information on capacity controls, typical and expected closure periods, and closure procedures that can be understood and used by recreationists for trip planning purposes. Information will include locations of alternative recreation areas and typical user patterns with regard to use levels at Project recreation facility parking and site facilities. The intent of this program is to help recreationists know about periods of closure or water use restrictions in advance, and hopefully prevent them from becoming displaced, turned away, or having to wait on Pyramid Lake Road for long periods of time. Real time noticing of Emigrant Landing and Los Alamos Campgrounds closures and noticing of park capacity levels (remaining vehicle or boat capacity) could include live-feed web cameras during peak use seasons, electronic signage, or updates on social media websites.

As part of the visitor services program, informational and directional signage at Project recreation areas will be reviewed and updated based upon a staged signage replacement and installation program following the requirements of Forest Service policy regarding signs and posters in Forest Service Manual 7100, Chapter 7160–Signs and Posters (USFS 2013). Signage improvements will be phased in as applicable with each plan improvement component. At developed recreation sites, signs and posters should adhere to USFS standards and guidelines and should be consistent with USFS

sign planning efforts. The signs and posters should utilize pictures, interpretation and educational language, as well as maps that support effective management of developed recreation sites, including campgrounds and picnic sites/day use sites.

3.1.4 Recreation Resources Monitoring and Evaluation Program

The Licensees will collect visitor registration and user fee data in a standardized fashion as needed to evaluate use and demand. This data will be used to help determine the need for improvements or expansion of facilities and offerings. Currently, for the fee areas, data is collected daily regarding number of visitors, number of visitor nights (camping), number of vehicles, and number of boating vessels. Maintaining consistent recreation data collection will help to identify trends, manage use, and plan for future improvements. Any proposed changes to the Plan will be coordinated between the Licensees and USFS, and would be based on documented changes in use patterns evidenced by verified monitoring information and future visitor needs analyses. FERC must approve any amendments to the Plan.

3.2 RECREATION FACILITY IMPROVEMENT PROGRAM

Based on the Licensees' relicensing recreation study, consultation, and analysis, the following facility improvements will be implemented by the Licensees. In general, it has been expressed by USFS that it is also desirable to develop consistent standardized recreation amenities, including developed outdoor recreation site features, shapes, colors, and appearances to obtain better uniformity of the facility provisions and offerings across all Pyramid Lake recreation facilities to help comply with USFS' Built Environment Image Guide and ROS guidelines. Additionally, as part of the Accessibility upgrades that will be undertaken, based on results of the relicensing visitor surveys, where possible the Licensees will provide additional shade structures or trees at each of the recreation facilities. All of these factors will be considered by the Licensees and USFS as they develop the detailed implementation plans for each recreation area.

The specific improvement programs outlined below will involve partnering with USFS for all improvements on NFS lands, beginning with the assessment of practical improvements to the facilities using the FSORAG guidelines and assisting USFS in developing its conformance analysis and site-specific exception basis under the FSORAG guidelines and applicable Forest Plan standards. Licensees will work with USFS to develop a detailed schedule, cost, and plan for implementing the improvements as outlined in the Plan. The planned improvements comprise the program that USFS and the Licensees can use to demonstrate what is being done to comply with Accessibility requirements. Plans and specifications would then be finalized, and relevant approvals and permits would be obtained, if needed, after which contractors and suppliers can be sourced and implementation would commence.

3.2.1 Emigrant Landing Recreation Areas Accessibility Improvements

Based on the Licensees' relicensing recreation study and consultation with USFS, the Licensees have identified Accessibility improvements that will be helpful to bring the

existing Emigrant Landing day use facilities further into conformance with the Forest Plan standards and ABA. The improvements identified for the Emigrant Landing Day Use Area are:

- Upgrades to the parking areas, including appropriate provision of designated and properly aligned spaces using ABAAS sections 208 and 502 guidance
- Provision of Accessible picnic site tables, and smoothing of picnic area ground surfaces at all sites that do not qualify for FSORAG exceptions
- Provision of Accessible barbeque grills and spacings at picnic sites that do not qualify for FSORAG exceptions
- Upgrades to water spigots and trash receptacles to provide adequate dimensions and spacing around facilities
- In some areas, determine the feasibility of providing improved, hardened, smooth surfaces (to reduce tread obstacle sizes) with lower gradient running and cross slopes, and add resting intervals along access paths leading to shorelines including the swim beach

3.2.2 Vista Del Lago and Vaquero/Spanish Point Accessibility Improvements

Based on Licensees' relicensing recreation study and consultation with USFS, the Licensees have identified Accessibility improvements that will be helpful to bring the Vista Del Lago Visitor Center, Vaquero Day Use Area, and Spanish Point Boat-in Picnic Area further into conformance with the Forest Plan standards and ABA. The improvements for these areas include the following:

- At Vista Del Lago Visitor Center and Vaquero Day Use Areas, upgrade the parking areas, including appropriate provision of designated and properly aligned spaces using ABAAS sections 208 and 502 guidance
- At Vaquero Day Use Area, upgrade trash receptacles and water spigots to meet Accessibility standards using applicable FSORAG guidelines
- At Vaquero Day Use Area, evaluate shoreline beach access paths for Accessibility improvements
- At Vaquero Day Use Area, evaluate and improve the current, partially Accessible site to meet FSORAG guidance, and provide information on location of Accessible facilities on websites, in brochures, on signage, and at the entry kiosks, but not at sites themselves
- At Spanish Point Boat-in Picnic Area, add gap in paved-access route speed bump to provide barrier-free access route, evaluate spacings of barbeque facilities and paths to picnic units, and provide improvements as necessary to

help bring facilities further into conformance with the applicable FSORAG Accessibility Guidelines

3.2.3 Los Alamos Campground Accessibility Improvements

Based on the Licensees' relicensing recreation study and consultation with USFS, the Licensees have identified Accessibility improvements that will be helpful to bring the Los Alamos Family Campground and Los Alamos Group Campground facilities further into conformance with the Forest Plan standards and ABA. To the extent-possible, improvements should also follow the USFS' Built Environment Image Guidelines or subsequent guides for facility design in order to provide for consistency in design of recreation facilities. The improvements identified for the Los Alamos Campground are:

- At Los Alamos Campground, evaluate and improve the three partially Accessible sites to meet FSORAG guidance and provide information on location of Accessible units on websites, in brochures, and at the entry kiosks and on information signs, but not at sites themselves

- At Los Alamos Campground, where practical, replace concrete curbs with natural barriers such as rocks or boulders

- At Los Alamos Family Campground and Group Campground, upgrade campground site tables and firepit barbeque grills to meet the applicable FSORAG standards

- At Los Alamos Family Campground and Group Campground, upgrade water spigots, outdoor sinks, and trash receptacles to provide adequate dimensions and spacing around facilities to meet the applicable FSORAG standards

- At Los Alamos Family Campground and Group Campground, improve access surfaces where possible, provide multiple openings, and harden or smooth surfaces (to reduce tread obstacle sizes) with lower gradient running and cross slopes

3.2.4 Serrano, Bear Trap, and Yellow Bar Boat-in Picnic Areas Accessibility Improvements

Based on the Licensees' relicensing recreation study and consultation with USFS, the Licensees identified Accessibility improvements that will be helpful to bring these existing boat-in picnic facilities further into conformance with the Forest Plan standards and ABA. The improvements for the boat-in areas include the following:

- Provision of Accessible picnic site tables, and smoothing of picnic area ground surfaces

- Provision of Accessible barbeque grills and spacings, if the day-use area has grills (Yellow Bar does not have grills due to the fire hazard)

- Upgrades to trash receptacles to provide adequate dimensions and spacing around facilities

- In some areas providing improved, hardened, smooth surfaces (to reduce tread obstacle sizes) with lower gradient running and cross slopes, and adding resting intervals along access paths leading to dock and shoreline areas

3.2.5 Quail Lake Day Use Area Improvements

Based on the Licensees' relicensing recreation studies, some improvements can be made to the Quail Lake Day Use area to help improve the facility and its attractiveness for recreation users. The improvements include the following:

- Replace interior barbed-wire fencing at parking areas with wood or metal fencing that has smoother surfaces and that blends into the landscape

- Provide ADA-compliant restroom facilities. Evaluate and upgrade parking surfaces to reduce tread obstacles and create surfaces that are as barrier-free as practicable

- Improve signage to include more information on user safety, fire prevention, litter control, and other interpretive information regarding Quail Lake

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4.0 RECREATION MANAGEMENT PLAN IMPLEMENTATION SCHEDULE

The Plan will become effective following FERC issuance of a new license. A summary of the specific implementation measures and proposed schedule are provided in Table 4.0-1.

Table 4.0-1. Recreation Management Plan Measures Implementation Schedule

Action	Timeline
Recreation Facilities Operation and Maintenance (Section 3.1.1) Ensure O&M standards are met at all Project recreation facilities.	Continuous
Litter Control Program (Section 3.1.2) Maintain patrols and reduce and minimize litter to help reduce trash and sanitation problems and actions that may degrade natural resources and the potential for wildland fires. Provide better signage and information to visitors about low-impact day use and implement other litter control program measures, such as providing litter bags, organizing volunteer community-based clean-up events, and disseminating litter control information at visitor entrance centers and Vista Del Lago Visitor Center.	By year 2 of the new license, then continuous
Visitor Services and Signage Program (Section 3.1.3) Implement visitor services program involving dissemination of real-time park use information, as practical, that can be used for trip planning purposes that is not currently available. Develop new marketing materials to include information on protection of the environment, capacity controls, typical closure periods and procedures, boating use and controls, and other information to enhance existing recreation opportunities associated with Pyramid Lake.	By year 3 of the new license then continuous
Emigrant Landing Day Use Area Accessibility Improvements (Section 3.2.1) Prepare site-specific plans, consult with USFS, develop specifications and bid documents, obtain approvals, undertake improvements, and begin to evaluate effectiveness.	By year 7 of the new license
Vista Del Lago and Vaquero/Spanish Point Accessibility Improvements (Section 3.2.2) Prepare site-specific plans, consult with USFS, develop specifications and bid documents, obtain approvals, undertake improvements, and begin to evaluate effectiveness.	By year 10 of the new license
Los Alamos Campground Accessibility Improvements (Section 3.2.3) Prepare site-specific plans, consult with USFS, develop specifications and bid documents, obtain approvals, undertake improvements, and begin to evaluate effectiveness.	By year 15 of new license
Serrano, Bear Trap, and Yellow Bar Boat-in Day Use Areas Accessibility Improvements (Section 3.2.4) Prepare site-specific plans, consult with USFS, develop specifications and bid documents, obtain approvals, undertake improvements, and begin to evaluate effectiveness.	By year 20 of the new license
Quail Lake Day Use Area Improvements (Section 3.2.5) Prepare site-specific plans, develop specifications and bid documents, undertake improvements, and begin to evaluate effectiveness.	By year 4 of new license

Key:
O&M = operation and maintenance
USFS = U.S. Department of Agriculture, Forest Service

5.0 NOTIFICATION, REPORTING, AND PLAN REVISIONS

5.1 CONSULTATION

The Licensees prepared this Plan in consultation with USFS and CDFW. Additional input was obtained from meetings held with Relicensing Participants in 2019. Consultation with USFS and the Licensees on the development of the Plan took place in a series of meetings and reviews in 2019. Over the new license term, any revisions to the Plan will be submitted to interested parties for review and input.

Flexibility in the Plan is important to address unanticipated changes in conditions over time. The Licensees will consult with the USFS on any schedule changes of specific actions during annual meetings that are expected to continue over the term of the new license. The annual review process may result in the adjustment of some specific actions or schedules as needed. Proposed amendments to the plan will be submitted to FERC for approval.

5.2 PLAN REVISIONS

Every 20 years during the term of the new license, the Licensees will conduct a comprehensive recreation study to assess recreation use and needs related to the Project. The Licensees will consult with interested parties in developing the final study plans, will convene a series of meetings with USFS and other interested parties to evaluate the results, and will update the Plan based on infrastructure, safety, and other visitor needs.

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6.0 REFERENCES

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Appendix A

Project Recreation Facilities

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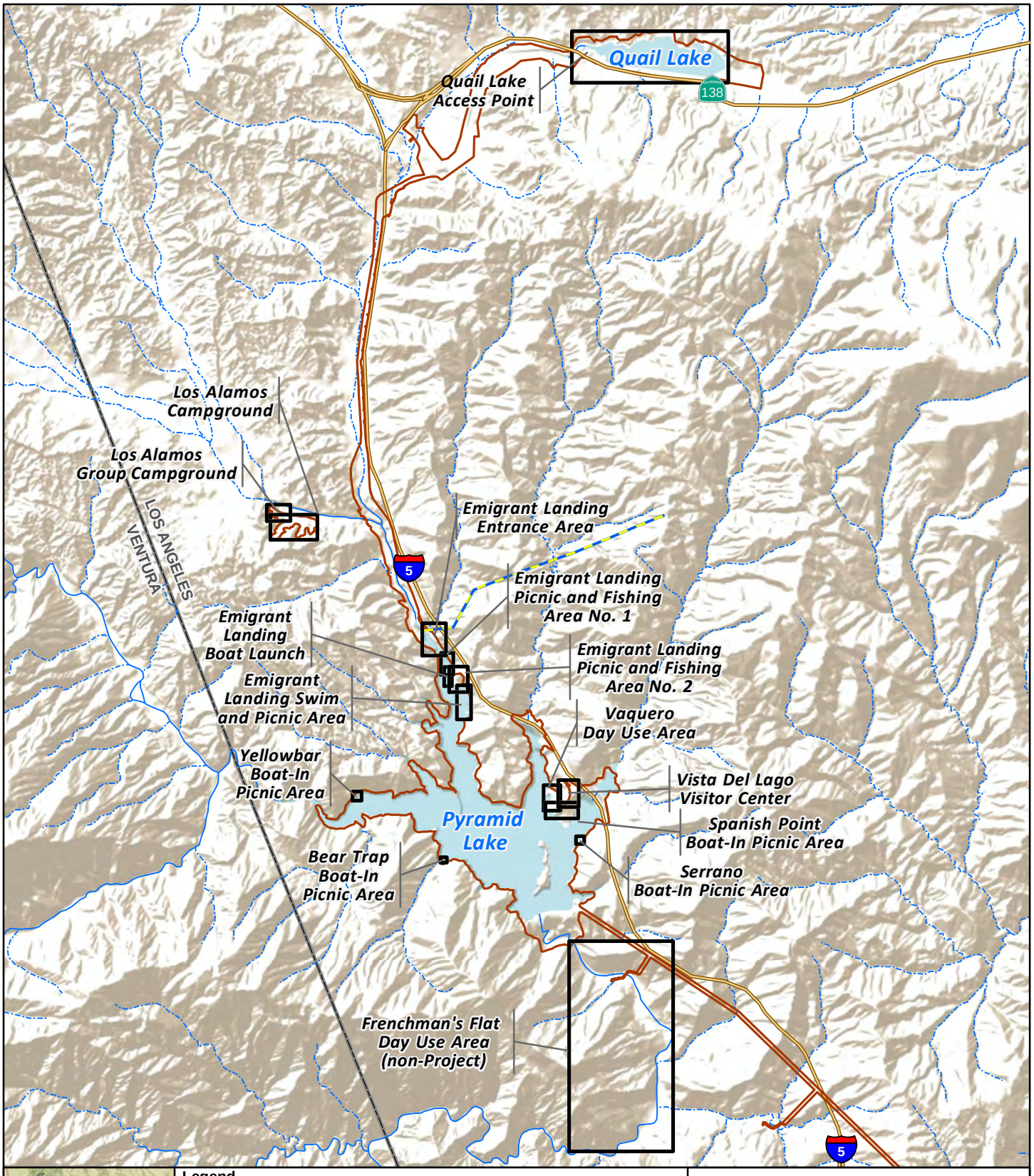

Legend

- Transmission Line
- Intermittent Stream/River
- Perennial Stream/River
- Major Highways
- Proposed Project Boundary (v.20190718)
- Individual Recreation Map Book Page Extent
- County Boundary

N

0 0.7 1.4 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: ESRI World Topo (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

Recreation Map Book Page Index

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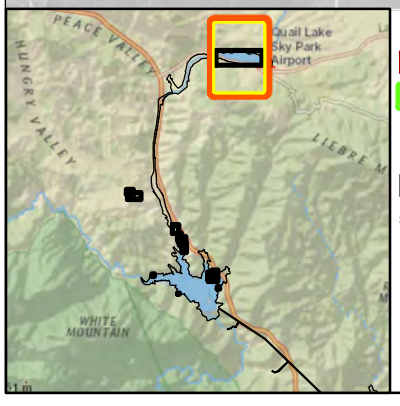
Gravel Road

Gravel Parking

Portable Restroom

Shoreline Access Trail

Gravel Road



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Portable Restroom
- Gravel Parking
- Gravel Access Road/Trail

N

0 385 770 1,540 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

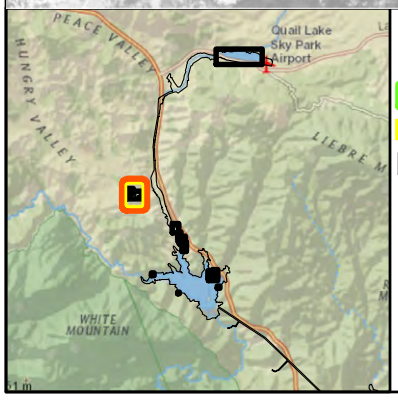
South State Water Project Recreation Facilities

Quail Lake Day Use Area
Figure 1 of 14

Hard Luck Road

Accessible Campsite

Accessible Campsite



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Campsite (Accessible)
- Gate
- Spigot
- Restroom
- Trash
- Shade Ramada
- Gravel Access Road/Trail

N

0 115 230 460 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
\\Us0349-ppfss01\shared_projects\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

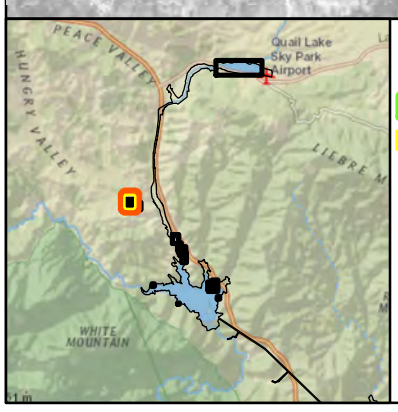
Los Alamos Campground
Figure 2 of 14

Hard Luck Road

Los Alamos Campground Loop 4

Los Alamos Campground Loop 4

Los Alamos Campground Loop 4



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Group Campsite
- Gate
- Spigot
- Restroom
- Trash
- Shade Ramada
- Gravel Access Road/Trail

N

0 62.5 125 250 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Los Alamos Group Campground

Figure 3 of 14

Boat Inspection Station

Emigrant Landing Entrance Station (Closed)

Warne Powerplant Access

German Creek E Road

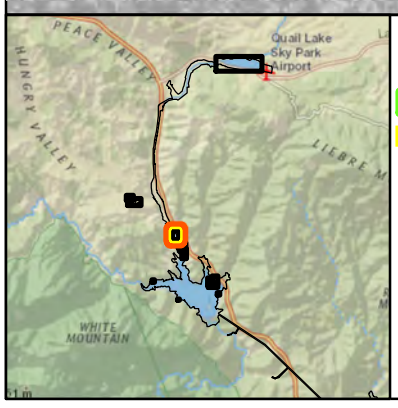
Warne Powerplant Access

Emigrant Landing Access

Boat Inspection Station

Emigrant Landing Kiosk

Parking Loop



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Building
- Entrance Building
- Kiosk
- Gate

N

0 62.5 125 250 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Emigrant Landing Entrance Station
Figure 4 of 14

Accessible Fishing Platform

Accessible Walkway

Parking Lot A

Parking Lot A

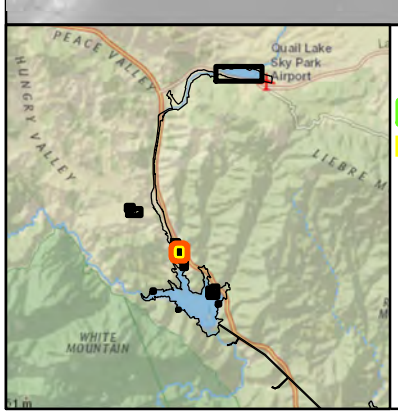
German Creek E. Road

Emigrant Landing Parking Loop

Emigrant Landing Access

Emigrant Landing Parking Loop

Pyramid Lake Road (Emigrant Landing Access)



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Fish Cleaning Station
- Spigot
- Restroom
- Trash
- Shade Ramada
- Paved Access Road

N

0 40 80 160 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Emigrant Landing Picnic and Fishing Area No. 1

Figure 5 of 14

Parking Lot B

Parking Lot B

Storage Yard

Heli Pad

Administration Building and Sheriff's Office

Boat Ramps

Sheriff's Dock

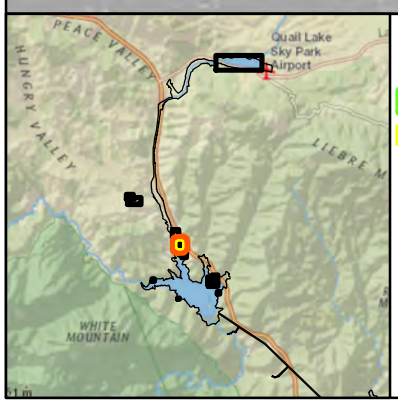
Accessible Walkway

Emigrant Landing Parking Loop

Emigrant Landing Access

Pyramid Lake Road (Emigrant Landing Access)

Emigrant Landing Parking Loop



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Spigot
- Restroom
- Boat Dock
- Paved Access Road

N

0 30 60 120 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Emigrant Landing Boat Launch
Figure 6 of 14

Emigrant Landing Parking Loop

Emigrant Landing Parking Access

Emigrant Landing Access

Stairs

Emigrant Landing Parking Loop

Pyramid Lake Road (Emigrant Landing Access)

Parking Lot C

Emigrant Landing Parking Loop

Parking Lot C

Stairs

Pedestrian Overlook

Accessible Walkway

Storage Yard

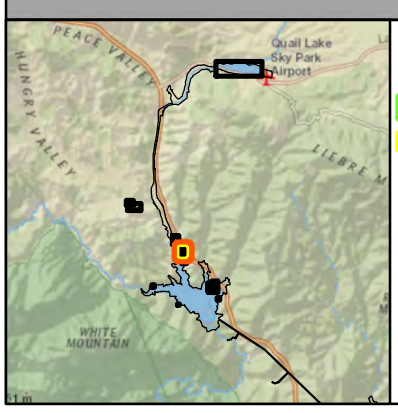
Stairs

Stairs

Concessionaire Store

Emigrant Landing Parking Loop

Emigrant Landing Parking Loop



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Concessionaire
- Spigot
- Restroom
- Trash
- Boat Dock
- Shade Ramada
- Paved Access Road

N

0 50 100 200 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Emigrant Landing Picnic and Fishing Area No. 2

Figure 7 of 14

Emigrant Landing Parking Loop

Pyramid Lake Road (Emigrant Landing Access)

Accessible Paths

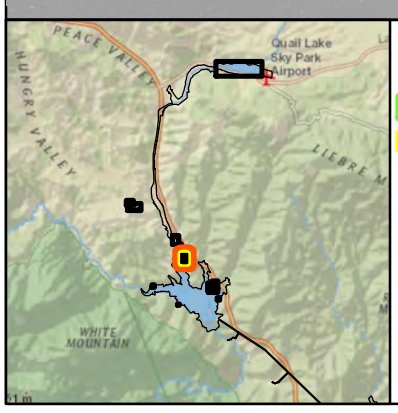
Parking Lot D

Emigrant Landing Parking Loop

Accessible Paths

Lifeguard Tower

Swim Beach



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Spigot
- Lifeguard Tower
- Restroom
- Trash
- Shade Ramada

N

0 62.5 125 250 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Emigrant Landing Swim and Picnic Area

Figure 8 of 14

Vista del Lago Parking Loop

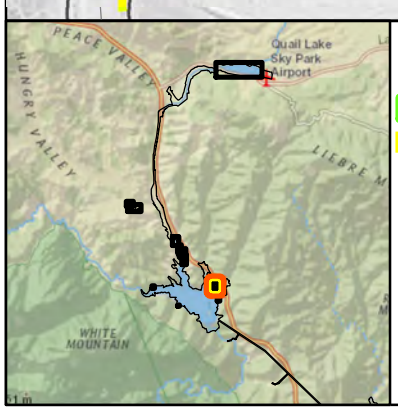
Visitor Center

Vaquero Road

Vista del Lago Road

Vaquero Entrance Station

Point Road



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Building
- Entrance Building
- Gate
- Trash

N

0 50 100 200 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Vista Del Lago Visitor Center
Figure 9 of 14

DWR Storage Area

Boat Launch

Swim Beach

Lifeguard Tower

Stairs

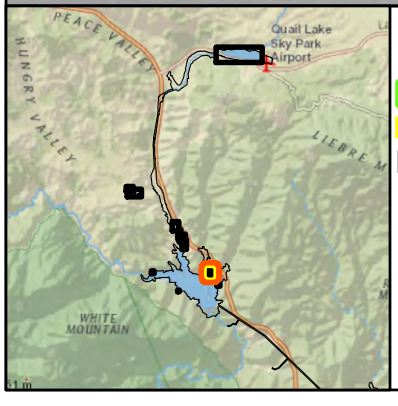
Stairs

Vaquero Parking Loop

Vaquero Road

Vista del Lago Road

Spanish Point Road



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Spigot
- Lifeguard Tower
- Restroom
- Trash
- Boat Dock
- Shade Ramada

N

0 50 100 200 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Vaquero Day Use Area
Figure 10 of 14

Vaqueros Road

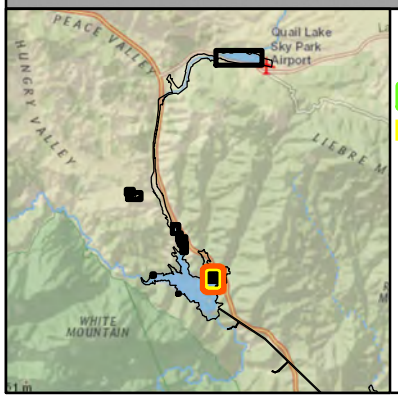
Vaqueros Parking Loop

Vista del Lago Road

Vista del Lago Parking Loop

Spanish Point Road

Heli Pad



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Adjacent Recreation Site
- Existing Recreation Plan Common Features
- Gate
- Restroom
- Trash
- Shade Ramada

N

0 85 170 340 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Spanish Point Boat-In Picnic Area
Figure 11 of 14

Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Restroom
- Trash
- Boat Dock
- Shade Ramada

N

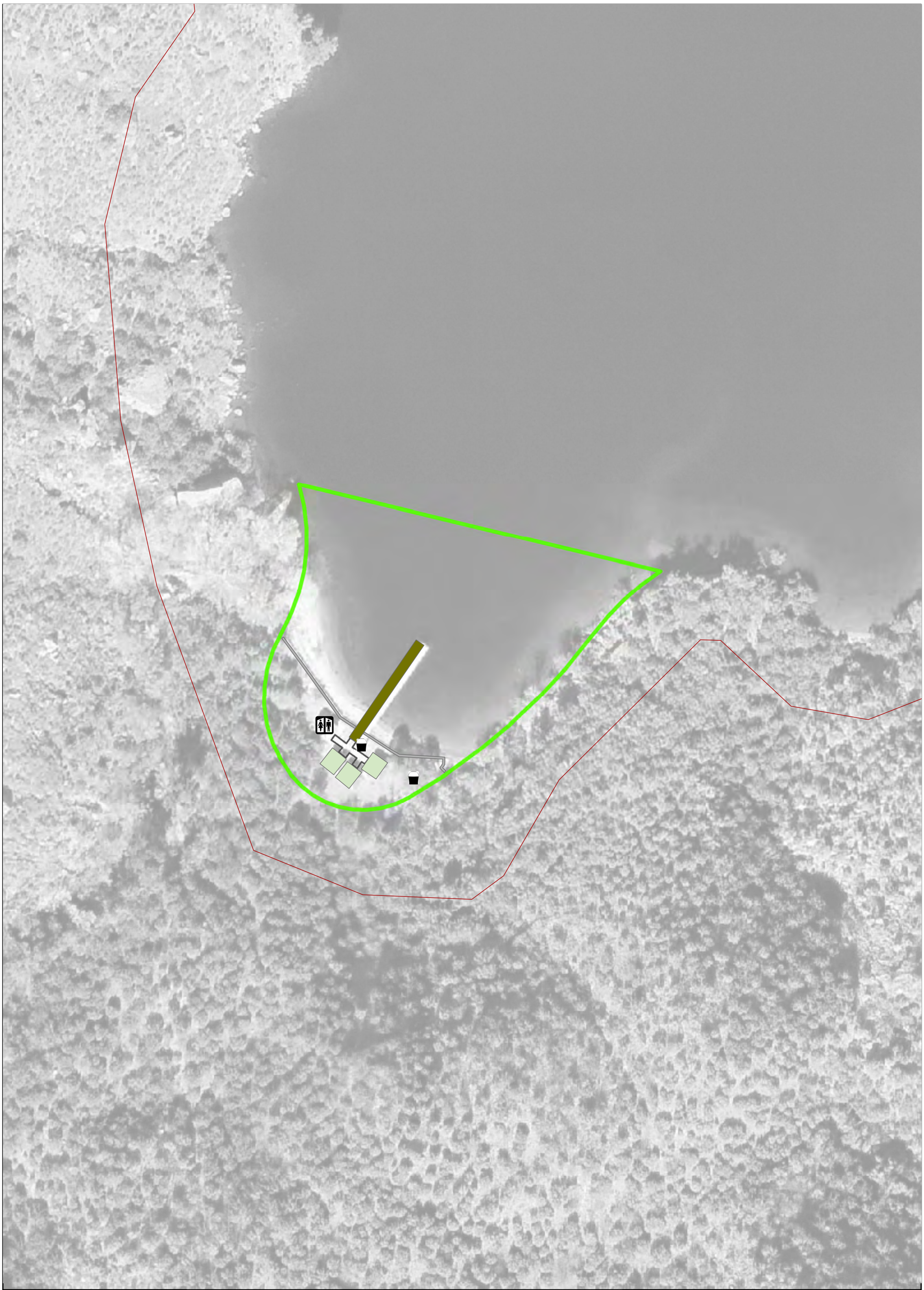
0 30 60 120 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Serrano Boat-In Picnic Area
Figure 12 of 14



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Existing Recreation Plan Common Features
- Restroom
- Trash
- Boat Dock
- Retaining Wall
- Shade Ramada

N

0 30 60 120 Feet

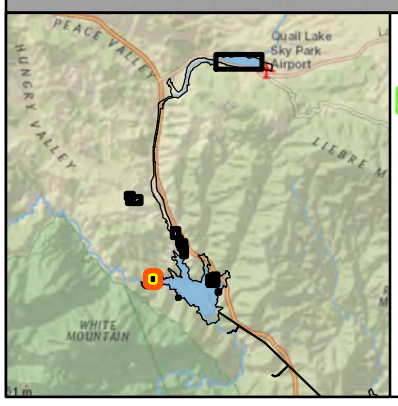
Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Bear Trap Boat-In Picnic Area
Figure 13 of 14

Accessib e
Wa kway



Legend

- Proposed Project Boundary (v.20190718)
- Recreation Site
- Existing Recreation Plan Common Features
- Restroom
- Trash
- Boat Dock
- Retaining Wall
- Shade Ramada

N

0 30 60 120 Feet

Prepared: August 2019
Projection: NAD 1983 2011 StatePlane California V FIPS 0405 Ft US
Background: USGS (2013)
U:\224202042\gis_MXDs\Recreation\SSWP_Recreation_Mapbook_20190819.mxd

SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

South State Water Project Recreation Facilities

Yellowbar Boat-In Picnic Area

Figure 14 of 14

Attachment 7

Fire Prevention and Response Plan

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

FIRE PREVENTION AND RESPONSE PLAN

January 2020

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

Los Angeles
DEPARTMENT OF WATER AND POWER

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TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

ACC	Area Control Center
ANF	Angeles National Forest
Application for New License	Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426
BLM	U.S. Department of the Interior, Bureau of Land Management
CAL FIRE	California Natural Resources Agency, Department of Forestry and Fire Protection
CPRC	California Public Resource Code
DWR	California Department of Water Resources
Emergency	Defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including California Independent System Operator and Los Angeles Department of Water and Power, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.
FERC	Federal Energy Regulatory Commission
fire prevention and protection	Activities directed at reducing the number of person-caused fires, including public education, law enforcement, dissemination of information, and the reduction of hazards
LACFD	Los Angeles County Fire Department
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
LPNF	Los Padres National Forest
NFS	National Forest System
O&M	operation and maintenance
PAL	Project Activity Level

Plan	Fire Prevention and Response Plan
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance
Project	South SWP Hydropower, FERC Project Number 2426
Project area	The area within the Project boundary and the area immediately surrounding the Project boundary
Project boundary	The area to which the Licensees require access for normal Project operations and maintenance
Project vicinity	The area within the Project boundary and the area surrounding the Project on the order of a USGS 1:24,000 quadrangle
SCE	Southern California Edison
State	State of California
suppression	All the work of extinguishing or containing a fire, beginning with its discovery
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
Warne Powerplant	William E. Warne Powerplant
wildfire	An unplanned and unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out

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1.0 INTRODUCTION

In January 2020, the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees), pursuant to Title 18 of the Code of Federal Regulations, Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Integrated Licensing Process), filed with the Federal Energy Regulatory Commission (FERC) an Application for a New License for Major Project – Existing Dam (Application for New License) for Licensees' South SWP Hydropower, FERC Project Number 2426 (Project).

The Licensees included this Fire Prevention and Response Plan (Plan) in their Application for New License. This Plan addresses fire prevention procedures, reporting, and safe fire practices for the Licensees' personnel and contractors responsible for operating and maintaining the Project.

All elevation data in this exhibit are in United States (U.S.) Department of Commerce, National Oceanic and Atmospheric Association, National Geodetic Survey Vertical Datum of 1929, unless otherwise stated.

1.1 BACKGROUND

1.1.1 Brief Description of the Project

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in Los Angeles County in southern California, on the West Branch of the SWP. The Project has a FERC-authorized installed capacity of 1,349,290 kilowatts. Project facilities range in elevation from 3,325 feet to 1,130 feet, and include the Warne Power Development and Castaic Power Development. Facilities and features of the Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Primary Project Roads and Trails; (7) Quail Lake recreation facilities and (8) streamflow and reservoir staff gages. Facilities and features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities.

Facilities upstream of the Angeles Tunnel Surge Chamber are operated and managed by DWR. The remainder of the downstream facilities, including the Surge Chamber, are operated and managed by LADWP.

The Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions. In essence, the Project is operated in a run-of-river mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users.

The Project boundary comprises 2,007.0 acres, of which 1,334.6 acres are managed by the Angeles National Forest (ANF), 665.9 acres are managed by the Los Padres National Forest (LPNF), and 6.5 acres are managed by the U.S. Department of the Interior, Bureau of Land Management. The U.S. Department of Agriculture, Forest Service (USFS) administers the ANF and LPNF in conformance with the ANF and LPNF Land Management Plans (USFS 2005a, 2005b, 2005c, 2005d).

Figure 1.1-1 shows the Project vicinity. Figure 1.1-2 shows the Project facilities, including land ownership.

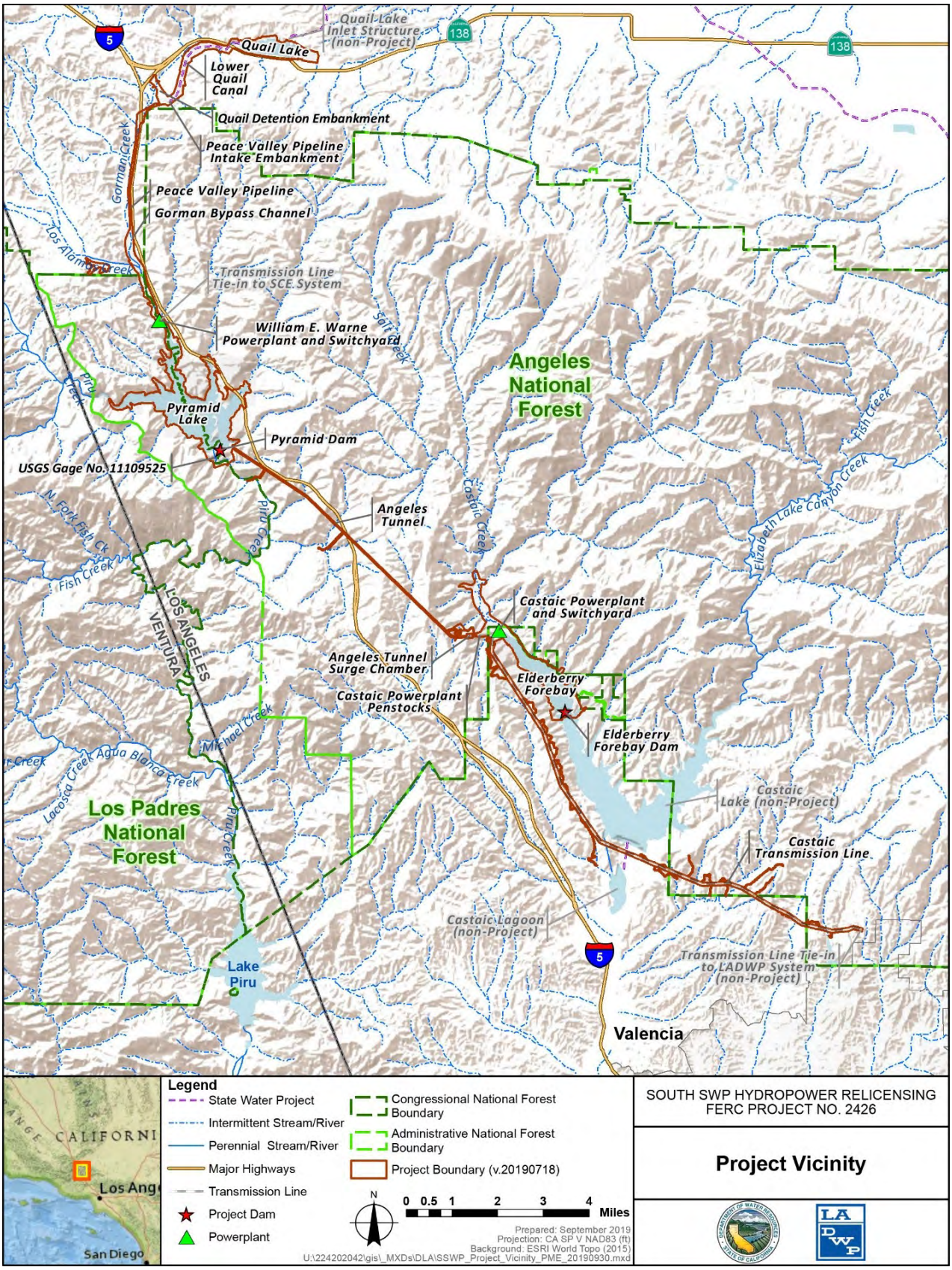

Figure 1.1-1. South SWP Hydropower Vicinity Map

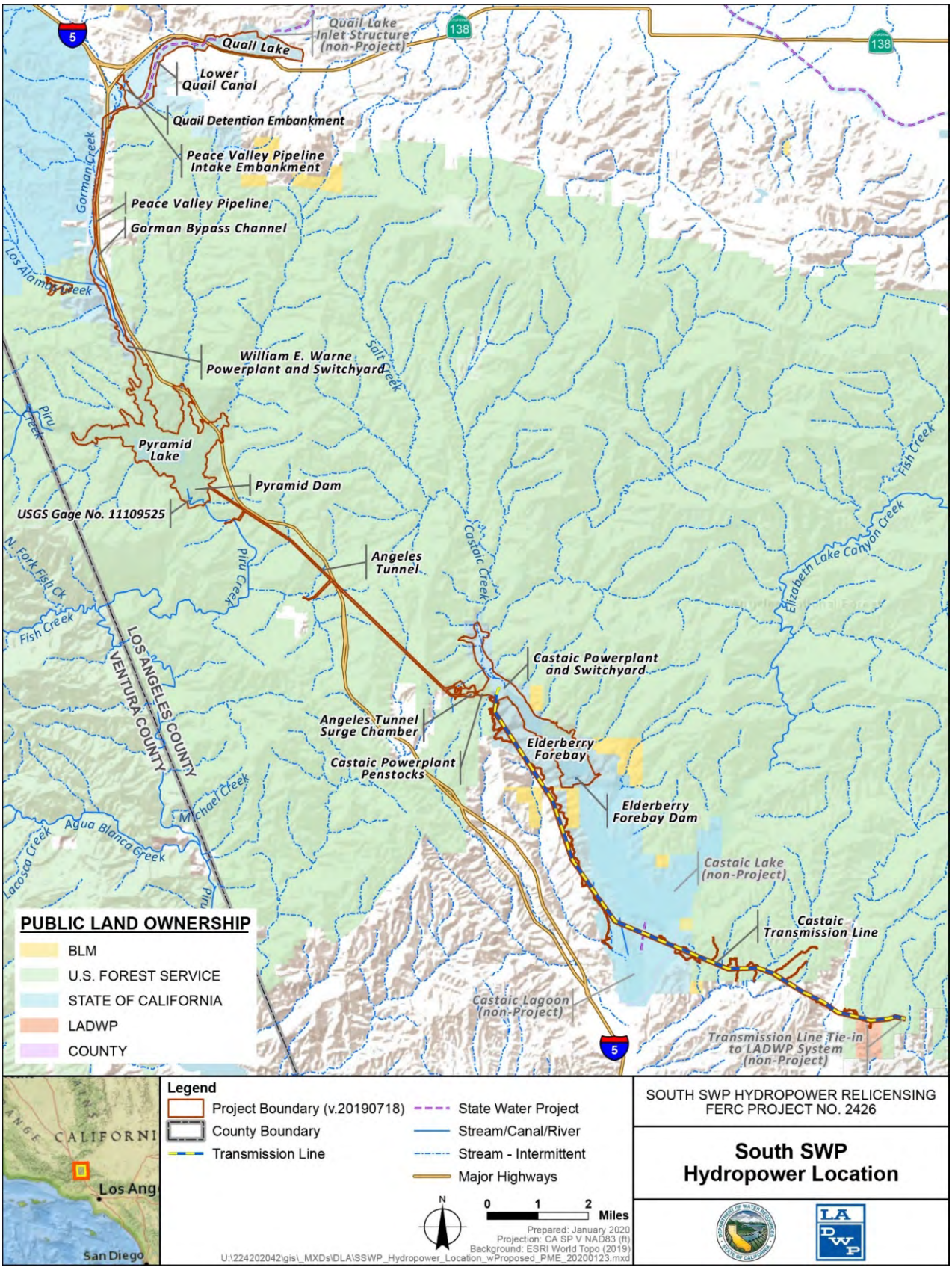

Figure 1.1-2. South SWP Hydropower Facilities and Land Ownership

1.2 PURPOSE OF THE PLAN

The purpose of this Plan is to provide guidance for fire prevention, response, and investigation, including prevention, emergency response preparedness, reporting, and fire control/extinguishing, during operation and maintenance (O&M) of the Project. An emergency is defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, balancing authorities including the California Independent System Operator and LADWP, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents. To the extent appropriate, the Licensees will coordinate the efforts of this Plan with other Project resource efforts, including implementation of other resource management plans and measures included in the new license.

1.3 GOALS AND OBJECTIVE OF THE PLAN

The goals of the Plan are to guide O&M in a manner intended to help prevent the ignition and spread of wildfires, and to guide response should fires occur. The objective of the Plan is to describe the fire prevention, protection, and response actions to meet the Plan's goals.

1.4 CONTENTS OF THE FIRE PREVENTION AND RESPONSE PLAN

This Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including the purpose, goals, and objective of the Plan.
- Section 2.0. Guiding Information Framework. This section describes the research conducted and relevant documents consulted for the development of the Plan.
- Section 3.0. Fire Prevention and Protection Actions. This section describes fire prevention and protection measures for the Project.
- Section 4.0. Fire Response Actions. This section describes fire response measures for the Project.
- Section 5.0. Plan Review, Consultation, and Revisions. This section describes Plan review and consultation between the Licensees and the ANF and LPNF, and Plan revisions.
- Section 6.0. References Cited. This section provides a list of the references cited in this Plan.

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2.0 GUIDING INFORMATION FRAMEWORK

A variety of agency plans, agreements, standards, and codes were identified and used to develop this Plan, all of which are summarized in the sub-sections that follow.

2.1 INFORMATION/DATA COLLECTION AND RESEARCH

The information sources and data listed below relating to fire prevention, suppression, and fuel management on lands within the Project boundary were reviewed to provide appropriate background and technical reference for the development of this Plan. Not all of the information sources listed below may be applicable to the Project and Licensees, but were reviewed during the preparation of this Plan.

2.1.1 Federal Agency Land Use and Resource Management Plans

The following federal land use and resource management plans were reviewed for development of this Plan:

- Land Management Plan Part 1, Southern California National Forests Vision (USFS 2005a)
- Land Management Plan Part 2, ANF Strategy (USFS 2005b)
- Land Management Plan Part 2, LPNF Strategy (USFS 2005c)
- Land Management Plan Part 3, Design Criteria for the Southern California National Forests Vision (USFS 2005d)

2.1.2 Fire Management, Fire Prevention, Fire Response, and Fuel Management Plans

The following federal, State, local, and interagency fire prevention, management, and response plans were reviewed for development of this Plan:

- Los Angeles County, Los Angeles County Fire Department – 2018 Strategic Fire Plan (Los Angeles County 2018)
- Forest Service Manual 5100 – Forest Service Policies for Wildland Fire Management – Wildfire Prevention (USFS 2010)
- Forest Service Handbook 5109.18 – Forest Service Wildfire Prevention Handbook (USFS 2019a)
- Angeles National Forest Emergency Communications Center Operating Guide (USFS 2019b)
- California Natural Resources Agency, Department of Forestry and Fire Protection (CAL FIRE), Strategic Plan – January 2019 (CAL FIRE 2019a)

- National Interagency Mobilization Guide, 2019 (National Interagency Fire Center 2019a)

- Interagency Standards for Fire and Fire Aviation Operations, 2019 (National Interagency Fire Center 2019b)

- The National Strategy, The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy, 2014 (Wildland Fire Leadership Council 2014)

- Angeles National Forest, Land Management Plan – Part 2 Angeles National Forest Strategy, 2005 (USFS 2005b)

- Los Padres National Forest, Land Management Plan – Part 2 Los Padres National Forest Strategy, 2005 (USFS 2005c)

2.1.3 Agency Management Goals for Implementation of Fire Prevention and Response Actions

The Interagency Standards for Fire and Fire Aviation Operations (National Interagency Fire Center 2019b) contain fire and fire aviation program management direction for federal land managers on federal lands at the following federal agencies: USFS; U.S. Department of the Interior, Fish and Wildlife Service; National Park Service; and Bureau of Indian Affairs. The Interagency Standards work concurrently with the guiding principles of two other main federal policies for management of wildland fires on federal lands: the 1995 Federal Wildland Fire Management Policy and the Guidance for Implementation of Federal Wildland Fire Management Policy. The 1995 Federal Wildland Fire Management Policy has 17 elements that are detailed in the Interagency Standards document. The Guidance for Implementation of Federal Wildland Fire Management Policy details guidelines for implementing policy consistent with federal wildland fire policy. Also, each of the five federal agencies has its own fire management and fire aviation goals that are also outlined in the Interagency Standards.

2.1.4 Cooperative Agreements, Regulations, and Codes

Federal, State, and local agencies' cooperative agreements, regulations, and codes related to fire protection, prevention, and suppression activities within or near the Project boundary were reviewed. These references included: California Public Resources Code (CPRC) Sections 4291-4293, 4421-4423, 4425, 4427-4428, 4430-4431, 4433, 4442, 4442.5, 4443, and 4446; California Health and Safety Code Sections 12101, 13000, 13001, and 13005; the Forest Service Manual 5100; CAL FIRE Power Line Fire Prevention Field Guide (CAL FIRE 2008); the California Master Cooperative Wildland Fire Management and Stafford Act Response Agreement (2013-2018); and the current Los Angeles County Fire Code.

2.1.5 Emergency Communication Plans

Federal, State, and local fire agency emergency management, fire dispatch, and mobilization plans and documents were reviewed. These included:

- Project-related fire prevention and safety plans
- Angeles National Forest Emergency Communication Center Operating Guide, 2019

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3.0 FIRE PREVENTION AND PROTECTION ACTIONS

Fire prevention and protection are activities directed at reducing the number of person-caused fires, including public education, law enforcement, dissemination of information, and the reduction of hazards. The following discusses fire prevention and projection actions, applicable codes and compliance activities, and requirements for the Project area.

3.1 GENERAL FIRE PREVENTION AND PROTECTION ACTION SUMMARY

The Licensees' Project operators and contractors will adhere to the following codes, regulations, requirements, measures, and activities on National Forest System (NFS) lands:

- The fire prevention practices consistent with industry standards applicable to Project-related O&M, equipment, tool use, and fire use activities
- ANF's and LPNF's Project Activity Level (PAL) fire restrictions

3.2 SPECIFIC FIRE PREVENTION AND PROTECTION REQUIREMENTS APPLICABLE TO PROJECT-RELATED OPERATIONS AND MAINTENANCE

The Licensees will, for the purposes of this Plan, follow the specific fire prevention and protection measures listed below that are applicable to O&M of the Project.

- The Licensees will secure special written permission from the applicable ANF or LPNF District Ranger or District Fire Management Officer for work on NFS lands, CAL FIRE battalion chief for work on private lands, or any of their officially designated representatives, before engaging in any of the activities listed below, except in the case of an emergency as noted below:
    - Blasting, and storing explosives and detonators (explosives permit required by California Health and Safety Code, Section 12101)
    - Controlled burning
    - Welding, cutting, and grinding
- Whenever work crews are participating in activities outside the normal O&M activities that may potentially require fire suppression equipment above and beyond hand-held fire extinguishers that are normally in each O&M vehicle (e.g. welding, facilities and equipment repair in heavily vegetated areas, and use of heavy equipment), the Licensees will have the following equipment on-hand whenever working on NFS lands.
    - A round point shovel with an overall length of not less than 46 inches for clearing away flammable materials; a rake may be used, but it may not be a substitute for the shovel on the vehicle

  - One ABC fire extinguisher
  - An axe and saw
  - Radio for coordination with the Licensees' Area Control Centers (ACC) in the event of a fire on NFS lands

- National Fire Protection Association placards will be posted at locations with hazardous materials to alert emergency responders.
- If USFS provides appropriate signage regarding USFS orders that limit fire building in campgrounds, along with guidance on the time periods to post, the Licensees will post the signs at Project campgrounds to inform campers of seasonal fire restrictions.

Licensees will contact the USFS or access relevant information to determine the PAL. For PAL requirements, see Appendix A – Fire Plan for Construction and Service Contracts, and Appendix B – Agency Checklist and Instructions for Determining Project Activity Level Variances. If emergency repairs (i.e., those repairs necessary for public safety or to prevent damage to facilities) on NFS lands require welding, grinding, or cutting, and Licensees do not have a permit, Licensees will strive to follow the "Very High" fire rating restrictions, have appropriate fire safety equipment available on-site, and notify the Duty Officer at the ANF and/or LPNF by phone as soon as reasonably possible after responding to the emergency. In the event of an emergency, Licensees' staff on-site will contact the Licensees' ACC, and the ACC will then contact the responsible fire agency while staff on-site proceed with emergency repairs.

3.3 PROJECT OPERATIONS REQUIRING THE USE OF FIRE/BURNING

Licensees will obtain permission from ANF and/or LPNF prior to burning on NFS lands.

3.4 PROTECTION, APPLICABLE CODES, AND CODE COMPLIANCE ACTIONS

The Licensees are responsible for complying with all applicable USFS codes for work on NFS lands. The Licensees practice ongoing fire protection measures to comply with applicable codes and safeguard Project assets. For example, the Licensees create a defensible space around all Project structures, including the powerplants and recreation facilities, by routinely clearing vegetation in the immediate vicinity. This includes periodic inspections to determine the need for vegetation removal, hazard tree trimming/removal, and compliance with CPRC clearance requirements. These efforts are expected to provide an effective level of fire protection and prevention within the Project boundary.

3.4.1 Applicable Codes

The Licensees manage the Project in compliance with applicable codes and orders, unless otherwise exempt.

Licensees are responsible for complying with all USFS rules that are applicable to the Licensees' operations of the Project. Any fire code or operating violation will be corrected by the Licensees to the satisfaction of the appropriate USFS representative if it occurs on NFS lands or by a CAL FIRE representative if on non-NFS lands.

3.4.2 Project Area Code Compliance and Inspections

Inspections of equipment used for maintenance of the Project facilities and surrounding vegetation are the responsibility of the Licensees. Project compliance inspections will be completed at periodic intervals. The purpose of the inspections is to look for missing or damaged equipment that may be an ignition source and identify vegetation that poses a potential wildland fire risk.

3.5 FIRE PREVENTION REQUIREMENTS FOR PROJECT AREA TOOL AND EQUIPMENT USE

Licensees' operations staff involved with any type of equipment/tool use within the Project boundary will take specific fire prevention actions and measures. Tools and equipment may be inspected by CAL FIRE or USFS, if the work is on NFS lands, to ensure compliance with fire safety rules. The Licensees will follow the applicable equipment use-specific restrictions detailed by PAL ratings, as identified in Appendix A.

3.6 FIRE HAZARD ZONE LEVELS

CAL FIRE use the Fire Hazard Zone model to evaluate fire hazard severity zones within the local responsibility areas (CAL FIRE 2018). In turn, the results of the zone model are used as a tool to create local ordinances for planning purposes. The majority of the area within the Project boundary lies within the Very High fire hazard level zone, and the remaining areas lie within the High or Extreme fire hazard level zones. Figure 3.6-1 shows land ownership in the Project vicinity, and Figure 3.6-2 shows fire hazard levels in the Project vicinity, as designated by the ANF, LPNF, and CAL FIRE.

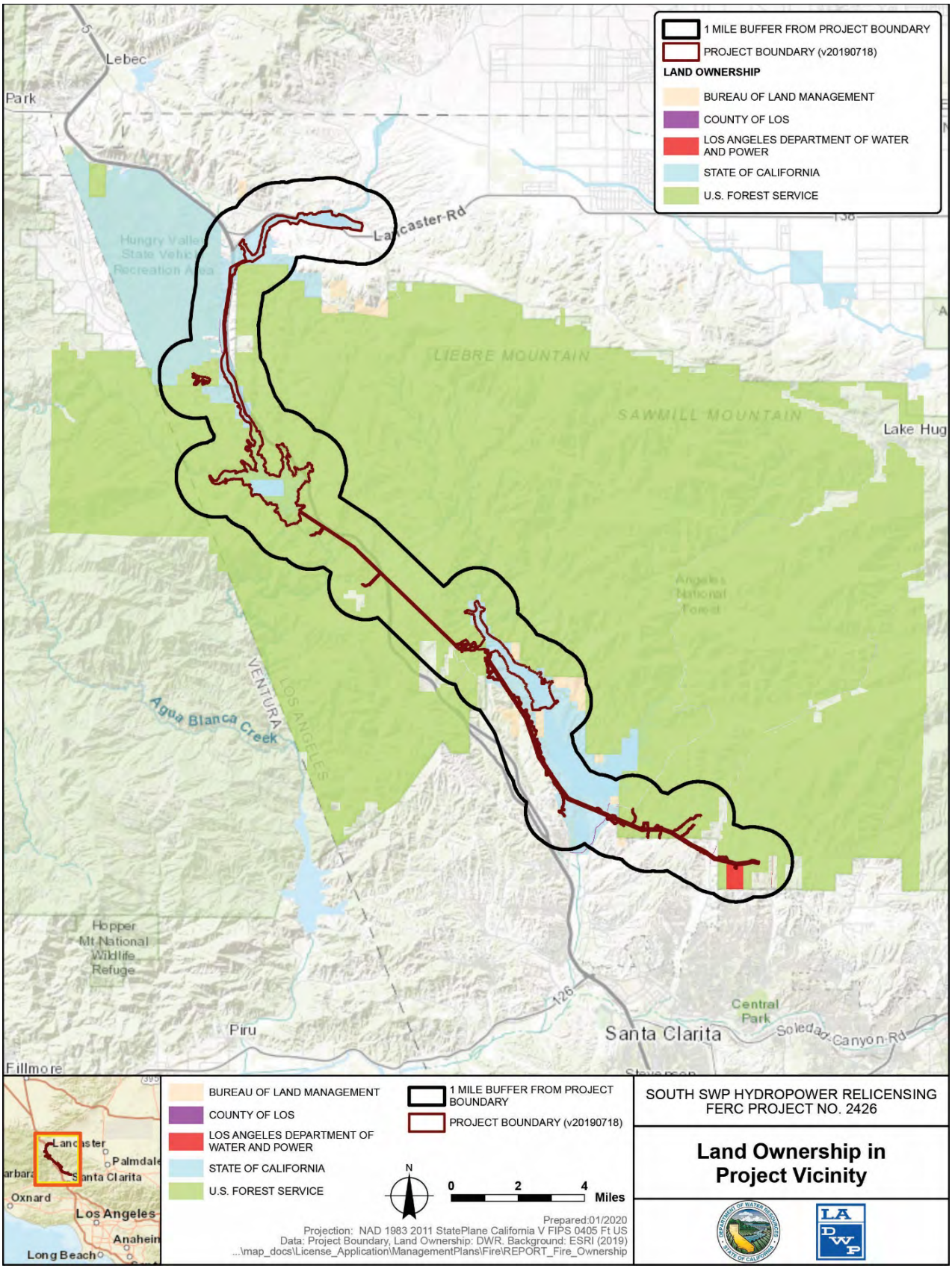

Figure 3.6-1. Land Ownership in the Project Vicinity

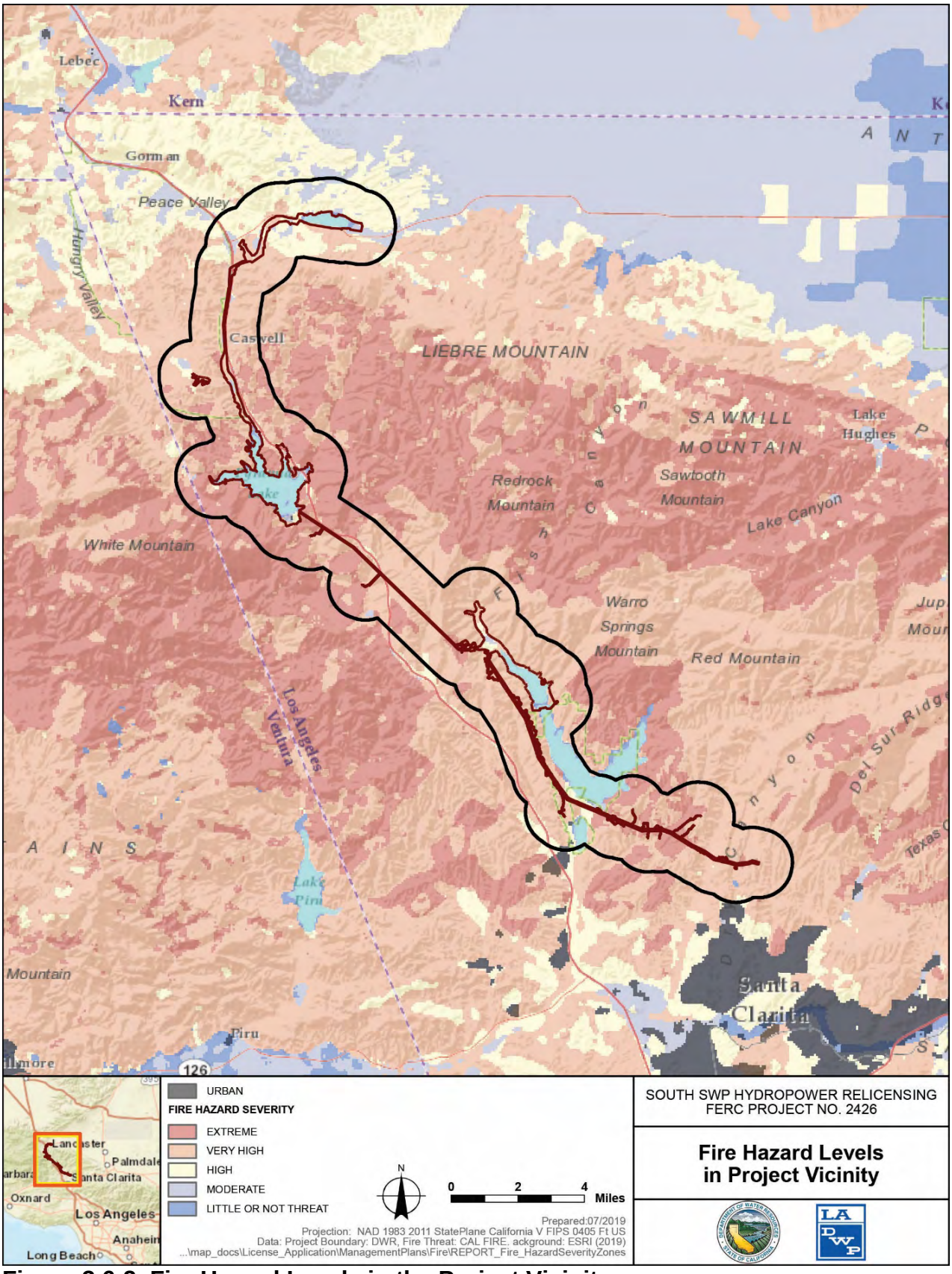

Figure 3.6-2. Fire Hazard Levels in the Project Vicinity

3.7 PROJECT ACTIVITY LEVEL PLANNING REQUIREMENTS FOR THE PROJECT AREA

USFS has a fire prevention process that determines fire danger each day on NFS lands as displayed by PAL. The PAL is implemented and administered to regulate activities of private companies performing work on NFS lands. For Licensees' Project O&M that involves equipment/tool use within the Project boundary, Licensees will monitor fire danger conditions and comply with the appropriate PAL fire prevention requirements. Project vicinity lands reside within ANF PAL jurisdictions.

The ANF may, in most cases, determine the following day's activity level on NFS lands by 4:00 p.m. each afternoon. The Licensees can obtain Project area PAL fire and activity restrictions on NFS lands for the following day by calling 661-723-2752 or visiting the appropriate PAL website: https://www.fs.usda.gov/detail/angeles/home/?cid=FSBDEV3_027721. The Licensees will then comply with the prescribed requirements and restrictions for that day.

4.0 FIRE RESPONSE ACTIONS

4.1 REPORTING FIRES

The Licensees will report Project-related fires and any fire detected within the Project boundary by calling 9-1-1. When reporting a wildland fire, Licensees' personnel will provide incident information, which may include the following:

- Reporting party's name
- Radio number; office or cell phone call back number
- Approximate location of the fire:
    - Legal or global positioning system location description (township, range, section, or latitude and longitude), if available at the time
    - Descriptive location (road or geographic reference point)
- Best access routes, in Licensees' staff opinion
- Incident size estimate (in acres)
- Incident status
- Estimated rate of fire growth or spread
- Weather conditions
- Radio frequencies
- Special hazards and concerns, if Licensees' operations staff are aware of any
- Additional resource needs, if Licensees' operations staff are aware of any

4.2 FIRE CONTROL/EXTINGUISHING FIRES

Fire suppression responsibility within the Project boundary is the responsibility of three agencies. Fire suppression on NFS lands is the responsibility of USFS; for suppression on non-NFS lands, the initial response is the responsibility of the Los Angeles County Fire Department (LACFD). If the fire escapes the initial attempt at containment, CAL FIRE responds with firefighting resources to assist the county (CAL FIRE 2019b). Firefighting resources in the Project vicinity are shown in Figure 4.2-1.

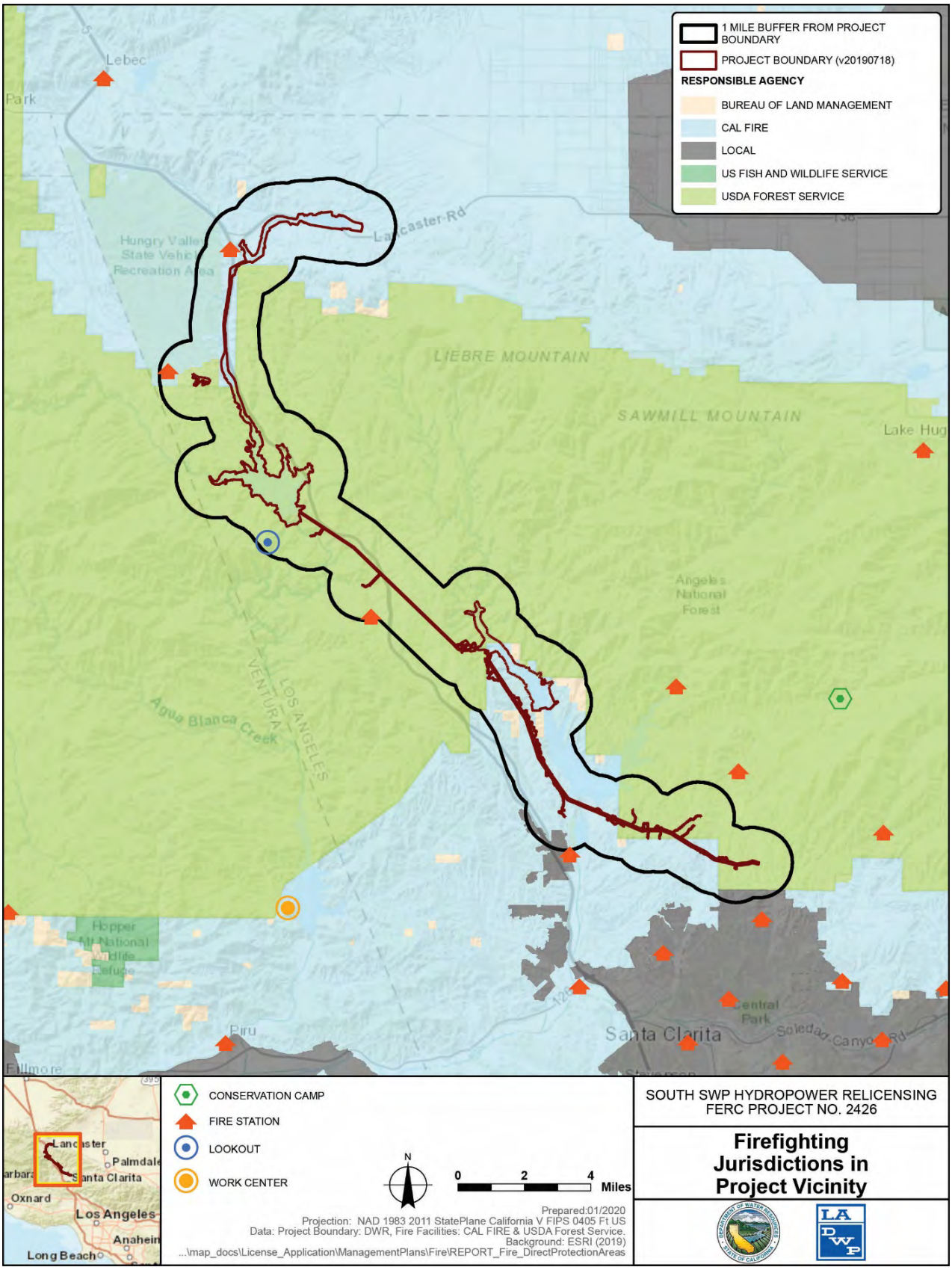

Figure 4.2-1. Firefighting Jurisdictions in the Project Vicinity

Each public agency with fire suppression responsibility within the Project boundary has its own communication center for coordinating the mobilization of resources for wildland fire and other incidents. Should a wildfire occur within the Project boundary, the Licensees will call 9-1-1, which will contact the appropriate jurisdictional agency. On NFS lands, the ANF and LPNF Communication Centers are the central locations for coordinating USFS resources. On non-NFS lands, the LACFD, under contract to CAL FIRE (CAL FIRE 2019b), is the central location for coordinating resources.

4.3 ROAD ACCESS

Portions of the Project boundary are normally accessible by fire suppression crews through federal, State, and NFS roads, and via the Licensees' Project access roads; though Licensees cannot ensure access by fire suppression crews to these areas under all conditions. The Project is located adjacent to Interstate 5, as shown in Figure 1.1-1. A description of potential access routes from Interstate 5 to Project facilities are provided in Section 4.4.1, and a description of potential routes from Project facilities to Interstate 5 are described in Section 4.4.2.

4.3.1 Directions to Project Facilities

4.3.1.1 Quail Lake

From Interstate 5, take the off-ramp for State Highway 138 (eastbound towards Lancaster, Palmdale). Continue on State Highway 138 for 2.3 miles to a gated driveway for Quail Lake Road on the left (north) side of State Highway 138. Turn left and proceed through gate; Quail Lake is along the right side of the road.

4.3.1.2 Lower Quail Canal

From Interstate 5, take the off-ramp for State Highway 138 (eastbound towards Lancaster, Palmdale). Continue on State Highway 138 for 2.3 miles to a gated driveway on the right side of State Highway 138. Turn right, proceed through the gate and use either Lower Quail Canal North Road or Lower Quail Canal South Road to access the canal.

4.3.1.3 Peace Valley Pipeline Intake Embankment

From northbound Interstate 5, take Exit 198B, the Quail Lake Road off-ramp, then turn right onto Quail Lake Road. Proceed approximately 0.3 miles to Quail Detention Embankment Road, a gated road on the left side of Quail Lake Road. Turn left onto Quail Detention Embankment Road and drive about 0.7 miles to a tee intersection with Quail Dam Road. Turn left at the tee intersection and follow Quail Dam Road approximately 0.1 miles up onto the Peace Valley Pipeline Intake Embankment.

4.3.1.4 Peace Valley Pipeline

The Peace Valley Pipeline can be accessed at several locations along the alignment of the pipeline. This description provides directions to the uphill and downhill ends of the pipeline.

The upper end of Peace Valley Pipeline is accessed at the Peace Valley Pipeline Intake Embankment, as follows: from northbound Interstate 5, take Exit 198B, the Quail Lake Road off-ramp, then turn right onto Quail Lake Road. Proceed approximately 0.3 miles to Quail Detention Embankment Road, a gated road on the left side of Quail Lake Road. Turn left onto Quail Detention Embankment Road and drive about 0.7 miles to a tee intersection with Quail Dam Road. Turn left at the tee intersection and follow Quail Dam Road approximately 0.1 miles up onto the Peace Valley Pipeline Intake Embankment.

The lower end of Peace Valley Pipeline is located at the Warne Powerplant and Switchyard. To get there, take Exit 195, Smokey Bear Road, and turn southwest onto Smokey Bear Road. Drive approximately 0.1 miles to a tee intersection with Pyramid Lake Road and turn south (left). Drive south on Pyramid Lake Road about 1.5 miles to Hard Luck Road and turn right. Proceed 0.1 miles across the overpass to a gated driveway on the left side. Proceed through the gate and into the Warne Powerplant and Switchyard, where the southern end of the Peace Valley Pipeline is located.

4.3.1.5 Gorman Bypass Channel

Gorman Bypass Channel is located generally adjacent to Interstate 5. To access the upper end of the channel, from Interstate 5, take Exit 198B, the Quail Lake Road off-ramp, then turn right onto Quail Lake Road. Proceed approximately 0.3 miles to Quail Detention Embankment Road, a gated road on the left side of Quail Lake Road. Turn left onto Quail Detention Embankment Road and drive about 0.7 miles to a tee intersection with Quail Dam Road. Turn left at the tee intersection and follow Quail Dam Road approximately 0.1 miles up onto the Peace Valley Pipeline Intake Embankment. Proceed across the embankment and turn left onto Lower Quail Canal South Road. Continue about 0.8 miles along the canal on Lower Quail Canal South Road to the upper end of the Gorman Bypass Channel.

The lower end of the Gorman Bypass Channel is located adjacent to the Warne Powerplant, where it enters Pyramid Lake. From Interstate 5, take Exit 195, Smokey Bear Road, and turn southwest onto Smokey Bear Road. Drive 0.1 miles to a tee intersection with Pyramid Lake Road and turn south (left). Drive south on Pyramid Lake Road about 1.5 miles to Hard Luck Road and turn right. Proceed 0.1 miles across the overpass to a gated driveway on left side. Proceed through the gate and into the Warne Powerplant and Switchyard to access the lower end of the Gorman Bypass Channel.

4.3.1.6 Warne Powerplant and Switchyard

From Interstate 5, take Exit 195, Smokey Bear Road, and turn southwest onto Smokey Bear Road. Drive 0.1 miles to a tee intersection with Pyramid Lake Road and turn south (left). Drive south on Pyramid Lake Road about 1.5 miles to Hard Luck Road and turn

right. Proceed 0.1 miles across the overpass to a gated driveway on the left side. Proceed through the gate and into the Warne Powerplant and Switchyard.

4.3.1.7 Pyramid Lake

Interstate 5 crosses Pyramid Lake at multiple locations along the east shore of the lake. To access the lake, take Interstate 5 to Exit 183, Templin Highway. Turn southwest onto Templin Highway and proceed 0.1 miles to the tee intersection with Golden State Highway. Turn right onto Golden State Highway and proceed about 5 miles to the gate. Proceed through gate and continue on Golden State Highway for an additional 2 miles, then turn right onto Pyramid Dam Crest Road. Follow Pyramid Dam Crest Road, past two branching intersections (bearing right at each), approximately 0.6 miles to reach the intersection with the Angeles Tunnel Intake Gate Road and Pyramid Lake.

4.3.1.8 Pyramid Dam

To access Pyramid Dam, take Interstate 5 to Exit 183, Templin Highway. Turn southwest onto Templin Highway and proceed approximately 0.1 miles to the tee intersection with Golden State Highway. Turn right onto Golden State Highway and proceed about 5 miles to the gate. Proceed through the gate and continue on Golden State Highway for 2 additional miles, then turn right onto Pyramid Dam Crest Road. Follow Pyramid Dam Crest Road, past two branching intersections (bearing right at each), approximately 0.6 miles to reach the intersection with the Angeles Tunnel Intake Gate Road. Bear left, staying on Pyramid Dam Crest Road to the gate at edge of the dam crest.

4.3.1.9 Angeles Tunnel

To access the upper end of the Angeles Tunnel, take Interstate 5 to Exit 183, Templin Highway. Turn southwest onto Templin Highway and proceed approximately 0.1 miles to the tee intersection with Golden State Highway. Turn right onto Golden State Highway and proceed about 5 miles to the gate. Proceed through the gate and continue on Golden State Highway for 2 additional miles, then turn right onto Pyramid Dam Crest Road. Follow Pyramid Dam Crest Road, past two branching intersections (bearing right at each), approximately 0.6 miles to reach the intersection with the Angeles Tunnel Intake Gate Road. Bear right and follow Angeles Tunnel Intake Gate Road about 0.15 miles to the intake gate and the upper end of the Angeles Tunnel.

To access the lower end of the Angeles Tunnel, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed about 2.2 miles to Castaic Penstock Road on the right side of Templin Highway. Proceed along Castaic Penstock Road approximately 0.1 miles to the gate. Continue through the gate for about 0.8 miles to the end of the Angeles Tunnel at the top of the Castaic Powerplant Penstock.

4.3.1.10 Angeles Tunnel Surge Chamber

To access the Angeles Tunnel Surge Chamber, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 1.9 miles to an unnamed

gated driveway on the right side of Templin Highway. Proceed through the gate for 200 feet to the Angeles Tunnel Surge Chamber.

4.3.1.11 Castaic Powerplant Penstock

To access the Castaic Powerplant Penstock take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 2.2 miles to Castaic Penstock Road on the right side of Templin Highway. Proceed along Castaic Penstock Road approximately 0.1 miles to the gate. Continue through the gate for 0.8 miles to the top of the Castaic Powerplant Penstock.

4.3.1.12 Castaic Powerplant and Switchyard

To access the Castaic Powerplant and Switchyard, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 4.2 miles to the roadblock and the driveway onto Los Angeles Water and Power Road (right turn). Proceed along Los Angeles Water and Power Road approximately 1.1 miles to the gate at the Castaic Powerplant and Switchyard. Proceed through the gate into the facility.

4.3.1.13 Elderberry Forebay

To access Elderberry Forebay, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 4.2 miles to the roadblock and the driveway onto Los Angeles Water and Power Road (right turn). Proceed along Los Angeles Water and Power Road approximately 1.1 miles to the gate at the Castaic Powerplant and Switchyard. Proceed through the gate into the facility. Elderberry Forebay is located adjacent to the powerplant.

4.3.1.14 Elderberry Forebay Dam

To access Elderberry Forebay Dam, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 4.2 miles to the roadblock and the driveway onto Los Angeles Water and Power Road (right turn). Proceed south along Los Angeles Water and Power Road approximately 1.1 miles to the gate at the Castaic Powerplant and Switchyard. Proceed through the gate southeast, across the Castaic Powerplant and Switchyard site, and continue for 2.9 miles along Los Angeles Water and Power Road to the crest of the Elderberry Forebay Dam.

4.3.1.15 Castaic Transmission Line

The Castaic Transmission Line originates at the Castaic Powerplant and Switchyard at its western terminus. To access the western terminus of the transmission line, take Interstate 5 to Exit 183, Templin Highway. Turn northeast onto Templin Highway and proceed 4.2 miles to the roadblock and the driveway onto Los Angeles Water and Power Road (right turn). Proceed along Los Angeles Water and Power Road approximately 1.1 miles to the gate at the Castaic Powerplant and Switchyard. Proceed through the gate to the origin (western terminus) of the Castaic Transmission Line; the

transmission line extends southeasterly for approximately 11.5 miles to its eastern terminus.

To access the eastern terminus of the transmission line, take Interstate 5 to Exit 160, Newhall Ranch Road. Turn northeast onto Newhall Ranch Road and continue approximately 1.8 miles to the intersection with Copper Hill Road. Turn left onto Copper Hill Road and continue for 4.8 miles to the second driveway on the north side of Copper Hill Road, past the Haskell Canyon Wash (between two parallel transmission lines). Continue north alongside Haskell Canyon Wash on the unnamed road about 1.5 miles to the intersection with City Highline Motorway Fire Road (at the Veluzat Movie Ranch entrance). Turn left onto City Highline Motorway Fire Road and proceed north approximately 1.4 miles to the Castaic Transmission Line.

4.3.2 Directions from the Project Facilities

4.3.2.1 Quail Lake

From Quail Lake, take State Highway 138 for 2.3 miles east to Interstate 5.

4.3.2.2 Lower Quail Canal

From the north end of the canal (accessed using either Lower Quail Canal North Road or Lower Quail Canal South Road), proceed through the gate and turn left onto State Highway 138. Continue on State Highway 138 for 2.3 miles to Interstate 5.

4.3.2.3 Peace Valley Pipeline Intake Embankment

From the Peace Valley Pipeline Intake Embankment, depart toward the north from the embankment and drive 0.1 miles on Quail Dam Road to the intersection with Quail Detention Embankment Road. Turn right onto Quail Detention Embankment Road and drive 0.7 miles to the gate and the intersection with Quail Lake Road. Turn right onto Quail Lake Road and proceed approximately 0.3 miles to Interstate 5.

4.3.2.4 Peace Valley Pipeline

From the upper end of Peace Valley Pipeline, depart toward the north from the embankment and drive 0.1 miles on Quail Dam Road to the intersection with Quail Detention Embankment Road. Turn right onto Quail Detention Embankment Road and drive 0.7 miles to the gate and the intersection with Quail Lake Road. Turn right onto Quail Lake Road and proceed 0.3 miles to Interstate 5.

From the lower end of the Peace Valley Pipeline at the Warne Powerplant and Switchyard, exit through the north side gated entrance. Immediately turn right onto Hard Luck Road and drive 0.1 miles across overpass to the intersection with Pyramid Lake Road. Turn left onto Pyramid Lake Road and continue 1.5 miles to Smokey Bear Road. Turn right and continue for 0.1 miles to Interstate 5.

4.3.2.5 Gorman Bypass Channel

From the upper end of the channel, drive south 0.8 miles along the canal on Lower Quail Canal South Road to the Peace Valley Pipeline Intake Embankment. Turn right onto the embankment and proceed across the embankment about 0.1 miles on Quail Dam Road to the intersection with Quail Detention Embankment Road. Turn right onto Quail Detention Embankment Road and drive 0.7 miles to the gate near the intersection with Quail Lake Road. Turn right onto Quail Lake Road and proceed 0.3 miles to Interstate 5.

From the southern end of the Gorman Bypass Channel, proceed to the north gated entrance of the Warne Powerplant and Switchyard. Immediately turn right onto Hard Luck Road and drive 0.1 miles across the overpass to the intersection with Pyramid Lake Road. Turn left onto Pyramid Lake Road and continue about 1.5 miles to Smokey Bear Road. Turn right and continue for 0.1 miles to Interstate 5.

4.3.2.6 Warne Powerplant and Switchyard

Exit the Warne Powerplant and Switchyard at the north side gated entrance. Immediately turn right onto Hard Luck Road and drive 0.1 miles across the overpass to the intersection with Pyramid Lake Road. Turn left onto Pyramid Lake Road and continue 1.5 miles to Smokey Bear Road. Turn right and continue for 0.1 miles to Interstate 5.

4.3.2.7 Pyramid Lake

From Pyramid Dam, take Pyramid Dam Crest Road and continue 0.6 miles to the intersection with Golden State Highway. Turn left onto Golden State Highway and continue 2 miles to the gate. Proceed through the gate and continue 5 miles on Golden State Highway to Templin Highway. Turn left onto Templin Highway and proceed approximately 100 feet to Interstate 5.

4.3.2.8 Pyramid Dam

From the eastern end of the dam crest, take Pyramid Dam Crest Road and continue 0.6 miles to the intersection with Golden State Highway. Turn left onto Golden State Highway and continue 2 miles to the gate. Proceed through the gate and continue 5 miles on Golden State Highway to Templin Highway. Turn left onto Templin Highway and proceed about 100 feet to Interstate 5.

4.3.2.9 Angeles Tunnel

From the upper end of the Angeles Tunnel, follow the Angeles Tunnel Intake Gate Road 0.15 miles to the intersection with Pyramid Dam Crest Road. Turn left onto Pyramid Dam Crest Road and continue 0.6 mile to the intersection with Golden State Highway. Turn left onto Golden State Highway and continue 2 miles to the gate. Proceed through the gate and continue 5 miles on Golden State Highway to Templin Highway. Turn left onto Templin Highway and proceed about 100 feet to Interstate 5.

From the lower end of the Angeles Tunnel, proceed west along Castaic Penstock Road approximately 0.8 miles to the gate. Continue through the gate for 0.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 2.2 miles to Interstate 5.

4.3.2.10 Angeles Tunnel Surge Chamber

From the Angeles Tunnel Surge Chamber, drive 200 feet to the gate at Templin Highway. Proceed through the gate and turn left onto Templin Highway; proceed 1.9 miles on Templin Highway to Interstate 5.

4.3.2.11 Castaic Powerplant Penstock

From the Castaic Powerplant Penstock, proceed west along Castaic Penstock Road for 0.8 miles to the gate. Continue through the gate for 0.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 2.2 miles to Interstate 5.

4.3.2.12 Castaic Powerplant and Switchyard

From the Castaic Powerplant and Switchyard, exit the gated facility at the north side gate and continue on Los Angeles Water and Power Road north for 1.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 4.2 miles to Interstate 5.

4.3.2.13 Elderberry Forebay

Elderberry Forebay is located adjacent to the Castaic Powerplant and Switchyard. Exit the gated facility at the north side gate and continue on Los Angeles Water and Power Road north for 1.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 4.2 miles to Interstate 5.

4.3.2.14 Elderberry Forebay Dam

From the western side of Elderberry Forebay Dam, proceed north along Los Angeles Water and Power Road for 2.9 miles to and through the Castaic Powerplant and Switchyard. Exit the gated facility and continue on Los Angeles Water and Power Road north for 1.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 4.2 miles to Interstate 5.

4.3.2.15 Castaic Transmission Line

The Castaic Transmission Line originates at the Castaic Powerplant and Switchyard and extends southeasterly for 11.5 miles. From the western terminus of the transmission line at the Castaic Powerplant and Switchyard, take Los Angeles Water and Power Road north for 1.1 miles to Templin Highway. Turn left onto Templin Highway and proceed 4.2 miles to Interstate 5.

From the eastern terminus of the transmission line, take City Highline Motorway Fire Road and proceed south for 1.4 miles to the unnamed road intersection (at the Veluzat Movie Ranch entrance). Turn right and continue south 1.5 miles alongside Haskell

Canyon Wash to Copper Hill Road. Turn right onto Copper Hill Road and continue for 4.8 miles to Newhall Ranch Road. Turn right onto Newhall Ranch Road and continue for 1.8 miles to Interstate 5.

4.4 HELICOPTER LANDING ZONES WITHIN THE PROJECT BOUNDARY

While all Project facilities normally may be accessed by road, fire suppression activities may require the use of helicopters. There are two dedicated helicopter landing zones within the Project boundary: Emigrant Landing, adjacent to the Los Angeles County Sheriff's office, and south of the Castaic Powerplant. Additionally, three helibases are located within 30 miles of the Project: (1) Los Angeles County Sheriff's Wayside Heliport, located approximately 8 miles south of Castaic Lake; (2) LACFD's Camp 14 Heliport, located approximately 20 miles east of Castaic Lake; and (3) SCE's Pardee Substation Helistop, located roughly 10 miles south of Castaic Lake.

4.5 FIRE SUPPRESSION EQUIPMENT AND PERSONNEL

The Licensees do not own fire suppression equipment suitable for combating wildland fires (e.g., fire trucks and helicopters). Fire suppression equipment owned by the Licensees within the Project boundary primarily consists of fire extinguishers located at Project buildings and in employee vehicles. Other fire suppression equipment owned by the Licensees is located at various Project facilities and consists of permanently installed carbon dioxide systems within the powerplants and, as mentioned in Appendix A, shovels, picks and axes. This portable equipment is deployed along with Licensees' work crews who are participating in activities that may potentially require fire suppression equipment above and beyond hand-held extinguishers (e.g., welding, facilities and equipment repair in heavily-vegetated areas, and use of heavy equipment). While equipment for suppression is limited, water from all Project reservoirs is available to agencies responding to wildland fires.

The Licensees have personnel available to provide technical information and support for USFS, LACFD, and CAL FIRE operations in and adjacent to the Project. The Licensees' employees and contractors will normally attempt to respond to fires that are a result of their activities, if the circumstances permit the safe containment and extinguishment of the fire. However, Licensees' operations staff and contractors are not trained or required to fight fires.

As of 2018, LACFD's firefighting resources located within a radius of approximately 50 miles of the Project include the following: 9 operating divisions, 22 battalions, 174 fire stations, and 10 fire suppression camps, along with 4,670 personal on staff, 174 fire stations, 210 fire engines (including 500 series), 4 light forces, 25 quints, 109 paramedic squads, 10 wildland fire suppression camps, 10 bulldozers, 8 helicopters, and 13 Forestry units (Los Angeles County 2018). The LACFD Fire Stations located closest to Pyramid Lake and Castaic Lake are Stations 76, 77, 108, 143, 149, and 156; emergency contact information for these six LACFD stations is provided below in Section 4.7.1.2.

ANF Emergency Communications Center currently provides 24-hour dispatching, 365 days a year. Wildland fires and reports of smoke within ANF Direct Protection Area will receive a first alarm brush assignment. The composition of the first alarm brush currently includes: 5 type 3 engines, 2 type 1 crews, 2 water tenders, 2 dozers, 2 patrol/prevention units, 2 chief officers, 1 air attack, 1 lead plane, 2 air tankers, 1 type 1 helicopter and 1 type 2 helicopter (USFS 2019b, Angeles National Forest Emergency Communications Center Operating Guide, Appendix A). A second alarm response will be sent out upon request of the Incident Commander (IC) or a Chief Officer.

4.6 KEY PERSONNEL CONTACT DIRECTORY

4.6.1 Emergency Contacts

4.6.1.1 USFS Emergency Contacts – Angeles National Forest

ANF contacts for emergency fire-related issues:

To report a fire: Angeles National Forest Emergency Command Center: (661) 723-3620

4.6.1.2 USFS Emergency Contacts – Los Padres National Forest

LPNF contacts for emergency fire-related issues:

To report a fire: 9-1-1

Federal Interagency Communication Center: (909) 383-5652

LPNF Emergency Operations Unit: (805) 961-5727, day or night

LPNF Fire Stations located closest to the Project:

Los Alamos Fire Station, Engine 74
Hardluck Road
Lebec, CA
(661) 248.6307

4.6.1.3 Los Angeles County Fire Department Emergency Contacts

Los Angeles County Fire Department contacts for emergency fire-related issues:

Los Angeles County Fire Department: 9-1-1

Arson Hotline: (800) 472-7766 (47 ARSON) Ext 1

Los Angeles County Fire Stations located closest to the Project:

Los Angeles County Fire Department -Station 77
46833 Ralphs Ranch Road
Gorman, CA 93243
(661) 248-5284

Los Angeles County Fire Department - Station 149
31770 Ridge Route Road
Castaic, CA 91384
(661) 259-2111

Los Angeles County Fire Department - Station 143
28580 Hasley Canyon Road
Castaic, CA 91384
(661) 257-5009

Los Angeles County Fire Department - Station 108
28799 Rock Canyon Drive
Santa Clarita, CA 91390
(661) 297-8653

Los Angeles County Fire Department - Station 156
24505 Copper Hill Drive
Santa Clarita, CA 91354
(661) 257-6734

Los Angeles County Fire Department - Station 76
27223 Henry Mayo Drive
Valencia, CA 91355
(661) 257-4144

4.6.2 Non-Emergency Contacts

4.6.2.1 USFS Non-Emergency Contacts – Angeles National Forest

ANF fire management contacts for non-emergency Project vegetation or fire-related issues:

ANF Supervisor's Office
701 N Santa Anita Avenue
Arcadia, CA 91006
(626) 574-1613

4.6.2.2 USFS Non-Emergency Contacts – Los Padres National Forest

LPNF fire management contacts for non-emergency Project vegetation or fire-related issues:

LPNF Supervisor's Office
6750 Navigator Drive #150
Goleta, CA 93117
(805) 968-6640

4.6.2.3 Los Angeles County Fire Department Non-Emergency Contacts

Los Angeles County Fire Department contact for non-emergency Project vegetation or fire-related issues:

Los Angeles County Fire Department: (818) 890-5719

4.6.2.4 Licensees' Non-Emergency Contacts – South SWP Hydropower

DWR contacts for non-emergency fire-related issues:

Main Telephone: (661) 944-8600 – DWR Dispatch

Alternative: (661) 944–8720 Warne Powerplant Facility

LADWP contacts for non-emergency fire-related issues:

Main Telephone: (800) 342--5397 – LADWP non-emergency

Alternative: (213) 367-.4211 – LADWP Operator

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5.0 PLAN REVIEW, CONSULTATION, AND REVISIONS

5.1 PLAN REVIEW AND CONSULTATION

The Licensees will annually review with the ANF and LPNF fire prevention and response activities associated with this Plan on NFS lands during the previous calendar year, as well as any activities related to this Plan on NFS lands planned for the current calendar year. In addition, the Licensees will consult with the ANF and/or LPNF, as needed, regarding fire prevention and response on NFS lands.

5.2 PLAN REVISIONS

The Licensees, in consultation with the ANF and LPNF, will review, update and/or revise this Plan as it pertains to NFS lands. Any updates to the Plan will be prepared in coordination and consultation with the ANF and LPNF. The ANF and LPNF will have 60 days after receipt of the updated Plan from the Licensees to provide written comment and recommendations before Licensees file the updated Plan with FERC for its approval. Licensees will include documentation of all relevant coordination and consultation with the updated Plan filed with FERC. If the Licensees do not adopt a particular recommendation by the ANF and/or LPNF, the filing will include the Licensees' reasons for not doing so. The Licensees will implement the Plan as approved by FERC. The Plan will not be considered revised until FERC issues its approval.

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Appendix A

Fire Plan for Construction and Service Contracts

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FIRE PLAN FOR CONSTRUCTION AND SERVICE CONTRACTS
08/02/2012

1. SCOPE:

The provisions set forth below outline the responsibility for fire prevention and suppression activities and establish a suppression plan for fires within the contract area. The contract area is delineated by map in the contract. The provisions set forth below also specify conditions under which contract activities will be curtailed or shut down.

2. RESPONSIBILITIES:

A. CONTRACTOR

(1) Shall abide by the requirements of this Fire Plan.

(2) Shall take all steps necessary to prevent his/her employees, subcontractors and their employees from setting fires not required in completion of the contract, shall be responsible for preventing the escape of fires set directly or indirectly as a result of contract operations, and shall extinguish all such fires which may escape.

(3) Shall permit and assist in periodic testing and inspection of required fire equipment. Contractor shall certify compliance with specific fire precautionary measures in the fire plan, before beginning operations during Fire Precautionary Period and shall update such certification when operations change.

(4) Shall designate in the Fire Plan and furnish on Contract Area, during operating hours, a qualified fire supervisor authorized to act on behalf of Contractor in fire prevention and suppression matters.

B. Forest Service

The Forest Service may conduct one or more inspections for compliance with the Fire Plan. The number, timing, and scope of such inspections will be at the discretion of agency employees responsible for contract administration. Such inspections do not relieve the Contractor of responsibility for correcting violations of the fire plan or for fire safety in general, as outlined in paragraph 2.A above.

3. DEFINITIONS:

The following definitions shall apply:

Active Landing: A location the contractor may be skidding logs into, or performing other operations such as delimbing, log manufacturing, and chipping logs. Except for EV and E days, loading logs or stockpiling chips only, on a cleared landing, does not constitute an Active Landing.

Hot Saw: A harvesting system that employs a high-speed (>1100 rpm) rotating felling head, i.e., full rotation lateral tilt head.

Mechanical Operations: The process of felling, skidding, chipping, shredding, masticating, piling, log processing and/or yarding which requires the use of motorized power which includes, chainsaws, chippers, motorized carriages, masticators, stroke delimbers, skidders , dozers etc.

4. TOOLS AND EQUIPMENT:

The Contractor shall comply with the following requirements during the fire precautionary period, as defined by unit administering contracts:

The Fire Precautionary Period is set by the State of California which is April 1 through December 1 of any year.

- **This contract ☐ requires, ☐ does not require, a Fire Box and associated Fire Tools according to CPRC Section 4428.**

A. **Fire Tools and Equipment**: Contractor shall meet minimum requirements of Section 4428 of the California Public Resources Code (C.P.R.C.). Fire tools kept at each operating landing shall be sufficient to equip all employees in the felling, yarding, loading, chipping, and material processing operations associated with each landing. Fire equipment shall include two tractor headlights for each tractor dozer used in Contractor's Operations. Tractor headlights shall be attachable to each tractor and served by an adequate power source. All required fire tools shall be maintained in suitable and serviceable condition for fire fighting purposes.

Trucks, tractors, skidders, pickups and other similar mobile equipment shall be equipped with and carry at all times a size 0 or larger shovel with an overall length of not less than 46 inches and a 2-1/2 pound axe or larger with an overall length of not less than 28 inches.

Where cable yarding is used, Contractor shall provide a size 0 or larger shovel with an overall length of not less than 46 inches and a filled backpack can (4 or 5 gallon) with hand pump within 25 feet of each tail and corner block.

B. **Fire Extinguishers**: Contractor shall equip each internal combustion yarder, fuel truck, and loader with a fire extinguisher for oil and grease fires (4-A:60-B:C).

Skidders and tractors shall be equipped with a minimum 5-BC fire extinguisher.

All Fire Extinguishers shall be mounted, readily accessible, properly maintained and fully charged.

Contractor shall equip each mechanized harvesting machine with hydraulic systems, powered by an internal combustion engine (chipper, feller/buncher, harvester, forwarder, hot saws, stroke delimber, etc), except tractors and skidders, with at least two 4-A:60-B:C fire extinguishers or equivalent.

C. **Spark Arresters and Mufflers:** Contractor shall equip each operating tractor and any other internal combustion engine with a spark arrester, except for motor vehicles equipped with a maintained muffler as defined in C.P.R.C. Section 4442 or tractors with exhaust-operated turbochargers. Spark Arresters shall be a model tested and approved under Forest Service Standard 5100-1a as shown in the. National Wildlife Coordinating Group Spark Arrester Guide, Volumes 1 and 2, and shall be maintained in good operating condition. Every motor vehicle subject to registration shall at all times be equipped with an adequate exhaust system meeting the requirements of the California Vehicle Code.

D. **Power Saws:** Each power saw shall be equipped with a spark arrester approved according to C.P.R.C. Section 4442 or 4443 and shall be maintained in effective working order. An Underwriters Laboratories (UL) approved fire extinguisher containing a minimum 14 ounces of fire retardant shall be kept with each operating power saw. In addition, a size 0 or larger shovel with an overall length of not less than 38 inches shall be kept with each gas can but not more than 300 feet from each power saw when used off cleared landing areas.

- **This contract ☐ requires, ☐ does not require, Section 4E of the Fire Plan.**

E. **Tank Truck or Trailer:** Contractor shall provide a **water tank truck or trailer** on or in proximity to Contract Area during Contractor's Operations hereunder during Fire Precautionary Period. When Project Activity Level B or higher is in effect, a tank truck or trailer shall be on or immediately adjacent to each active landing, unless otherwise excepted when Hot Saws or Masticators are being used. See Section 6 for specific contract requirements.

The tank shall contain at least 300 gallons of water available for fire suppression. Ample power and hitch shall be readily available for promptly and safely moving tank over roads serving Contract Area. Tank truck or trailer shall be equipped with the following:

(1) Pump, which at sea level, can deliver 23 gallons per minute at 175 pounds per square inch measured at the pump outlet. Pumps shall be tested on Contract Area using a 5/16 inch orifice in the Forester One Inch In-Line Gauge test kit. Pump shall meet or exceed the pressure value in the following table for nearest temperature and elevation:

Temp	Sea Level		1000 Feet		2000 Feet		3000 Feet		4000 Feet		5000 Feet		6000 Feet		7000 Feet		8000 Feet		9000 Feet		10000 Feet	
55	179	23	174	23	169	23	165	22	161	22	157	22	153	22	150	21	146	21	142	21	139	21
70	175	23	171	23	166	22	162	22	158	22	154	22	150	21	147	21	143	21	139	21	136	20
85	171	23	168	23	163	22	159	22	155	22	151	21	147	21	144	21	140	21	136	20	133	20
100	168	23	164	23	159	22	155	22	152	22	148	21	144	21	141	21	137	20	133	20	131	20
	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM	PSI	GPM

The pump outlet shall be equipped with 1-1/2 inch National Standard Fire Hose thread. A bypass or pressure relief valve shall be provided for other than centrifugal pumps.

(2) 300 feet of 3/4-inch inside diameter rubber-covered high-pressure hose mounted on live reel attached to pump with no segments longer than approximately 50 feet, when measured to the extreme ends of the couplings. Hose shall have reusable compression wedge type 1-inch brass or lightweight couplings (aluminum or plastic). One end of hose shall be equipped with a coupling female section and the other end with a coupling male section. The hose shall, with the nozzle closed, be capable of withstanding 200 PSI pump pressure without leaking, distortions, slipping of couplings, or other failures.

(3) A shut-off combination nozzle that meets the following minimum performance standards when measured at 100 P.S.I. at the nozzle:

	G.P.M.	Horizontal Range
Straight Stream	10	38 feet
Fog Spray	6 - 20	N/A

(4) Sufficient fuel to run the pump at least 2 hours and necessary service accessories to facilitate efficient operation of the pump.

When Contractor is using Hot Saws or Masticators, an additional 250 feet of light weight hose, approved by the Forest Service, shall be immediately available for use and be capable of connecting to the 300 feet of hose and appurturances in (2) and (3) above.

This equipment and accessories shall be deliverable to a fire in the area of operations and is subject to the requirements for each specific activity level identified in Section 6.

F. <u>Compressed Air Foam System</u>: A Compressed Air Foam System (CAFS) is a fire suppression system where compressed air is added to water and a foaming agent. By agreement, Contractor may substitute a CAFS or functional equivalent in lieu of the tank truck, trailer or fire extinguishers, provided it meets or exceeds the following specifications and requirements:

1. Variable foam expansion ratio – 10:1 to 20:1.
2. Units shall be kept fully charged with air; water and foam concentrate as recommended by the manufacturer and have the appropriate tools to service the system.
3. The unit shall contain enough energy to empty tank and clear hose prior to exhausting propellent.
4. The unit shall be capable of being completely recharged within 10 minutes.
5. When used on cable yarding landings, the unit shall be outfitted for immediate attachment to carriage and transported without damage to the unit.

Fire extinguishers required for Hot Saws, Masticators and similar equipment identified in Section 4 B. above may be substituted with a 3 gallon CAFS.

Tank truck, trailer or equivalent may be substituted with a 30 Gallon CAFS with at least 550 feet of one inch hose and an adjustable nozzle with enough water, air and foam concentrate for at least one recharge.

This equipment and accessories shall also be deliverable to a fire in the area of operations and subject to the requirements for each specific activity level identified in Section 6.

5. GENERAL

A. **State Law**: In addition to the requirements in this Fire Plan, the Contractor shall comply with all applicable laws of the State of California. In particular, see California Public Resource Codes.

B. **Permits Required**: The Contractor must secure a special written permit from the District Ranger or designated representative before burning, welding or cutting metal or starting any warming fires. If contract requires Blasting and Storing of Explosives and Detonators, an Explosives Permit may be required pursuant to the California Health and Safety Code, Section 12101.

C. **Blasting**: Contractor shall use electric caps only unless otherwise agreed in writing. When blasting is necessary in slash areas, a Fire Patrolperson equipped with a size 0 or larger shovel with an overall length of not less than 46 inches and a filled backpack can (4 or 5 gallon) with hand pump shall remain in the immediate area for an hour after blasting has been completed.

D. **Smoking**: Smoking shall not be permitted during fire season, except in a barren area or in an area cleared to mineral soil at least three feet in diameter. In areas closed to smoking, the CO may approve special areas to be used for smoking. The Contractor shall sign designated smoking areas. Contractor shall post signs regarding smoking and fire rules in conspicuous places for all employees to see. Contractor's supervisory personnel shall require compliance with these rules. Under no circumstances shall smoking be permitted during fire season while employees are operating light or heavy equipment, or walking or working in grass and woodlands.

E. **Storage and Parking Areas**. Equipment service areas, parking areas, and gas and oil storage areas shall be cleared of all flammable material for a radius of at least 10 feet unless otherwise specified by local administrative unit. Small mobile or stationary internal combustion engine sites shall be cleared of flammable material for a slope distance of at least 10 feet from such engine. The COR shall approve such sites in writing.

F. **Reporting Fires**: As soon as feasible but no later than 15 minutes after initial discovery, Contractor shall notify Forest Service of any fires on Contract Area or along roads used by Contractor. Contractor's employees shall report all fires as soon as possible to any of the following Forest Service facilities and/or personnel listed below, but not necessarily in the order shown:

	Name	Office Address	Office telephone
Dispatch Center			
Nearest FS Station			
Inspector			
COR			
District Ranger			

When reporting a fire, provide the following information:

- Your Name
- Call back telephone number
- Project Name
- Location: Legal description (Township, Range, Section); and Descriptive location (Reference point)
- Fire Information: Including Acres, Rate of Spread and Wind Conditions.

- **This contract ☐ requires, ☐ does not require, Section 5G of the Fire Plan.**

G. **Communications**: Contractor shall furnish a serviceable telephone, radio-telephone or radio system connecting each operating side with Contractor's headquarters. When such headquarters is at a location which makes communication to it clearly impractical, Forest Service may accept a reasonable alternative location. The communication system shall provide prompt and reliable communications between Contractor's headquarters (or agreed to alternative) and Forest Service via commercial or Forest Service telephone.

- **This contract ☐ requires, ☐ does not require, Section 5H of the Fire Plan.**

H. **Fire Patrolperson**: Contractor shall furnish a qualified fire patrolperson each operating day when Project Activity Level C or higher is in effect. When on duty, sole responsibility of patrolperson shall be to patrol the operation for prevention and detection of fires, take suppression action where necessary and notify the Forest Service as required. This Fire patrol is required on foot, unless otherwise agreed. By agreement, one patrolperson may provide patrol on this and adjacent projects. No patrolperson shall be required on Specified Road construction jobs except during clearing operations unless otherwise specified.

The Contractor shall, prior to commencing work, furnish the following information relating to key personnel:

Title	**Name**	**Telephone Number**
Fire Supervisor		
Fire Patrolperson		

I. Clearing of Fuels: Contractor shall clear away, and keep clear, fuels and logging debris as follows:

Welding equipment and stationary log loaders, yarders and other equipment listed in California State Law	10 feet slope radius
Tail or corner haulback blocks	All running blocks shall be located in the center of an area cleared to mineral soil at least 15 feet in diameter.
Lines near, between or above blocks	Sufficient clearing to prevent line from rubbing on snags, down logs and other dead woody material.

6. EMERGENCY PRECAUTIONS

Contractor's Operations shall conform to the limitations or requirements in the Project Activity Level (PAL) table below. Project Activity Levels applicable to this project shall be the predicted activity levels for the Fire Danger Rating Area(s), or fire weather station(s) stated in the Contract Area Map Legend on Integrated Resource Service Contracts (IRSC's), and other contracts where applicable.

Fire Danger Rating Area/Fire Weather Station for Project: _____

The Forest Service, in its sole discretion, may change the predicted activity level if the current fire suppression situation, weather and vegetation conditions warrant an adjustment. If practicable, Forest Service will determine the following day's activity level by 6:00 PM. Contractor shall obtain the predicted Project Activity Level from the appropriate Ranger District Office before starting work each day.

Phone Number or Website to obtain Predicted Activity Levels: _____

Forest Service may change the Project Activity Level Table to other values upon revision of the National Fire Danger Rating System. When Contractor is notified, the revised Project Activity Levels will supersede the levels in the Project Activity Level Table below.

PROJECT ACTIVITY LEVEL

Level	***Project Activity Minimum Requirements and Restrictions. Restrictions at each level are cumulative.***
A	Minimum requirements noted above in Sections 4 and 5.
B	1. Tank truck, trailer, or approved CAFS substitute shall be on or adjacent to the Active Landing.
C	1. When Hot Saws or Masticators are operating, a tank truck, trailer, or approved CAFS substitute shall be within ¼ mile of these operations. Effective communications shall exist between the operator and the Active Landing. 2. Immediately after Mechanical Operations cease, Fire patrol is required for two hours.
D	1. Immediately after Hot Saw or Masticator operations cease, Fire patrol is required for three hours. 2. No Dead Tree felling after 1:00 PM, except recently dead. 3 No burning, blasting, welding or cutting of metal after 1:00 PM, except by special permit.

Level	***Project Activity Minimum Requirements and Restrictions. Restrictions at each level are cumulative.***
Ev	1. The following activities may operate all day: a) Loading and hauling logs decked at approved landings. b) Loading and hauling chips stockpiled at approved landings. c) Servicing equipment at approved sites. d) Dust abatement, road maintenance (Chainsaw use prohibited)**,** culvert installation within cleared area, chip sealing, paving, earth moving or rock aggregate stock pile loading and installation (does not include pit or quarry development). e) Chainsaw and log processing operations associated with loading logs or other forest products at approved landings. 2. Hot Saws or Masticators may operate until 1:00 PM; provided that: a) A tractor or other equipment with a blade capable of constructing fireline is on or adjacent to the active landing or within ¼ mile of the operating equipment. This piece of equipment shall have effective communication with the Hot Saw or Masticator. b) Any additional restrictions specified by the Forest. 3. All other conventional Mechanical Operations are permitted until 1:00 PM. 4. Some operations may be permitted after 1:00 PM, on a case-by-case basis, under the terms of a PAL Ev Variance Agreement. Activities for which a Variance may be issued are: • Rubber Tire Skidding • Chipping on Landings • Helicopter Yarding • Fire Salvage When approved by a Line Officer, a Variance Agreement can be implemented when the criteria specified in the agreement are met and mitigation measures are in place. This approval is good for ten (10) days unless cancelled sooner or extended by the Contracting Officer for an additional ten (10) days. Variance approval can be withdrawn at the sole discretion of the Forest Service. Variance approval is contingent on the 7-day fire weather forecast, fuel conditions, site characteristics, current fire situation, state of Contractor's equipment for prevention and suppression readiness, type of operation and social and community considerations etc. (See attached Project Activity Level Variance Agreement).
E	The following activities may operate all day: 1. Loading and hauling logs decked at approved landings. 2. Loading and hauling chips stockpiled at approved landings. 3. Servicing Equipment at approved sites. 4. Dust abatement, road maintenance (chainsaw use prohibited) or loading stock piles and rock aggregate installation (does not include pit or quarry development). 5. Chainsaw operation associated with loading at approved landings. All other activities are prohibited.

This Project utilizes "The Project Activity Level" (PAL), an industrial operation's fire precaution system. The following Climatology Chart indicates the Historic Activity Levels for the Project Fire Danger Rating Area or Fire Weather Station utilized on this Project. This is only a historical average of the Activity Levels for the identified Fire Danger Rating Area or Weather Station.

Project Activity Level Climatology								
Fire Danger Rating Area/Weather Station					Years Analyzed			
	A	B	C	D	Ev	E	Days	
Month	Expected Days per Month at Each PAL Value						Analyzed	
July								
August								
September								
October								

Region 5 Project Activity Level (PAL) Ev Variance Application/Agreement

Project Name: _____
Contract Number: _____
Contractor Name: _____
Request #__, for period: _____
Units/Subdivisions Affected: _____

Location of operation:	
Slope	
Aspect	
Elevation	
Fuels on site	
Fuels in surrounding area	
7 Day PAL Outlook	
Short range predictions (Red Flags)	
Fuel Moistures	
Response time of suppression resources	
Potential for ignition	
RAWS location	
Current Fire Situation:	
Draw down information	
National Readiness Level	
Contractual considerations:	
Normal Operating Season	
Frequency of recent contract fires in area	
Type of operation	
Contractors past/current performance & equipment readiness	
Other site specific mitigation or precaution (i.e. Contractors proposals)	
Social & Community Considerations:	
Proximity of high value resources	
Sensitivity of location	

Proposed Actions:

Description of Mitigation Measures:

Remarks:

Fire Management Officer Concurrence | Date

Line Officer Approval | Date

I have considered the above request and determined the specified mitigation measures or actions must be implemented to continue operations in Project Activity Level Ev. Unless extended, the approval remains in effect for ten (10) calendar days unless cancelled sooner or extended by the Forest Service for an additional ten (10) days. At the sole discretion of the Forest Service, this variance can be modified and/or cancelled at no cost to the government.

Contracting Officer | Date

Contractor Representative | Date

Appendix B

Agency Checklist and Instructions for Determining Project Activity Level Variances

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Project Name: _____
Contract Number: _____
Purchaser/Contractor Name: _____
Request #__, for period: _____
Units/Subdivisions Affected: _____

Location of operation:	
Slope Aspect Elevation	
Fuels on site	
Fuels in surrounding area	
10 day Forecast	
Short range predictions (Red Flags)	
Fuel Moistures	
Response time of suppression resources	
Potential for ignition RAWS location	
Current Fire Situation:	
Draw down information	
National Readiness Level	
Contractual considerations:	
Operating Season	
Frequency of recent contract fires in area	
Type of operation	

Purchaser/Contractors past performance	
Other site specific mitigation or precaution (i.e. Purchaser/Contractors proposals)	
Social & Community Considerations:	
Proximity of high value resources	
Sensitivity of location	
Remarks:	

I have considered the above items and have determined the following actions must be implemented to continue operations in Project Activity Levels _____ through EV

-
-
-
-

☐ Fire Management Consulted _____
Name

☐ Line Officer Concurred_____
Name

Contracting Officer or Delegated Representative _____

Date:_____

Purchaser/Contractor Rep._____ Date_____

Instructions for Determining Variances for Continued Operations Within Specific Units and With a Specific Time Frame

1. Variances are in addition to the stated requirements for the Predicted Activity Level.

2. The Line Officer in consultation with the Forest Fire Management Officer or his/her representative will evaluate the items in the above check list as they relate to the existing and planned activities, add any mitigation measures as needed and the Line Officer will advise the Contracting Officer to execute the variance. The name of the Fire Management Representative and the Line Officer involved must be filled in but a signature is not required.

3. The delegated authority can be at the FSR/COR level since they would usually have more knowledge of the ground and access to the District Ranger.

4. The project area should be evaluated for differences in potential fire activity if a fire starts. This could necessitate the use of multiple forms. Examples of this would be units on a north slope near riparian areas vs. those on south slopes that would be dryer and expected to have more severe fire conditions or there is a significant difference from the predicted PAL and the actual conditions.

5. The Purchaser/Contractor or their representative should be consulted when determining types of variances that are being considered. They might be able to come up with other options.

6. Examples of written variances are:

    A. Local assessment determines that existing precautions are adequate
    B. Use of specialized detection equipment such as an infrared detection device for locating heat sources is required
    C. Provide additional fire suppression resources (i.e. crews, equipment etc.) to achieve shorter response time.

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Attachment 8

Visual Resources Management Plan

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

VISUAL RESOURCES MANAGEMENT PLAN

January 2020

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

Los Angeles
DEPARTMENT OF WATER AND POWER

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

ANF	Angeles National Forest
Application for New License	Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426
BEIG	Built Environment Image Guide, a U.S. Department of the Agriculture, Forest Service document that guides how the elements of the built environment (e.g., administrative and recreation buildings, landscape structures, site furnishings, signs, etc.) shall be incorporated into the natural and cultural landscape
BLM	U.S. Department of the Interior, Bureau of Land Management
DWR	California Department of Water Resources
Emergency	Defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction of law enforcement, emergency services, grid balancing authorities including California Independent System Operator and Los Angeles Department of Water and Power, or other regulatory entity, including actions to prevent the imminent loss of human life, injury to the public or the Licensees' staff, or damage to property. An emergency may include, but is not limited to: natural events such as earthquakes, landslides, storms, or wildfires; vandalism; malfunction, failure, or loss of reliability of the electric grid or Project works; or other public safety incidents.
FERC	Federal Energy Regulatory Commission
Interstate 5 Corridor	The area visible by travelers on Interstate 5 between State Highway 138 on the north and the community of Castaic on the south
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
LPNF	Los Padres National Forest
mph	miles per hour

NFS	National Forest System
O&M	operations and maintenance
Plan	Visual Resources Management Plan
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance
Project	South SWP Hydropower, FERC Project Number 2426
Project boundary	The area to which the Licensees require access for normal Project operations and maintenance
RMP	Recreation Management Plan
SIO	scenic integrity objective
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
Warne Powerplant	William E. Warne Powerplant

1.0 INTRODUCTION

In January 2020, the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees), pursuant to Title 18 of the Code of Federal Regulations, Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Integrated Licensing Process), filed with the Federal Energy Regulatory Commission (FERC) an Application for a New License for Major Project – Existing Dam (Application for New License) for the Licensees' South SWP Hydropower, FERC Project Number 2426 (Project).

The Licensees included this Visual Resources Management Plan (Plan) in their Application for New License. All elevation data in this exhibit are in United States (U.S.) Department of Commerce, National Oceanic and Atmospheric Association, National Geodetic Survey Vertical Datum of 1929, unless otherwise stated.

1.1 BACKGROUND

1.1.1 Brief Description of the Project

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in Los Angeles County in southern California, on the West Branch of the SWP. The Project has a FERC-authorized installed capacity of 1,349,290 kilowatts. Project facilities range in elevation from 3,325 feet to 1,130 feet, and include the Warne Power Development and Castaic Power Development. Facilities and features of the existing Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Primary Project Roads and Trails; (7) Quail Lake recreation facilities and (8) streamflow and reservoir stage gages. Facilities and features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities.

Facilities upstream of the Angeles Tunnel Surge Chamber are operated and managed by DWR. The remainder of the downstream facilities, including the Surge Chamber, are operated and managed by LADWP.

The Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions. In essence, the Project is operated in a run-of-river mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users.

The Project boundary comprises 2,007.0 acres, of which 1,334.6 acres are managed by the Angeles National Forest (ANF), 665.9 acres are managed by the Los Padres National Forest (LPNF), and 6.5 acres are managed by the U.S. Department of the Interior, Bureau of Land Management. The U.S. Department of Agriculture, Forest Service (USFS) administers the ANF and LPNF in conformance with the ANF and LPNF Land Management Plans (USFS 2005a, 2005b, 2005c, 2005d). The U.S. Department of Agriculture, Forest Service (USFS) administers the ANF and LPNF in conformance with the ANF and LPNF Land Management Plans (USFS 2005a, 2005b, 2005c, 2005d).

Figure 1.1-1 shows the Project vicinity. Figure 1.1-2 shows the Project facilities, including land ownership.

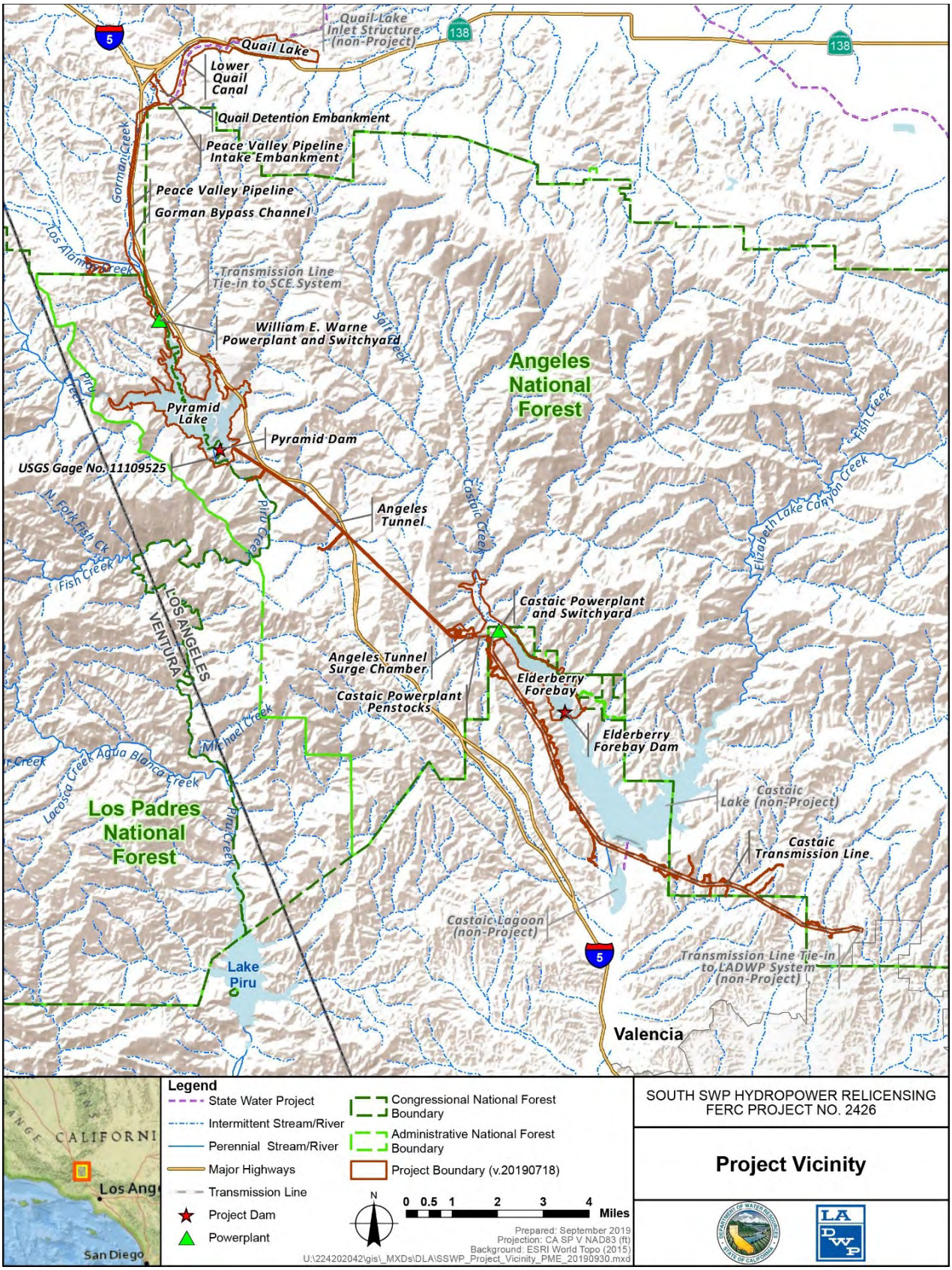

Figure 1.1-1. South SWP Hydropower Vicinity Map

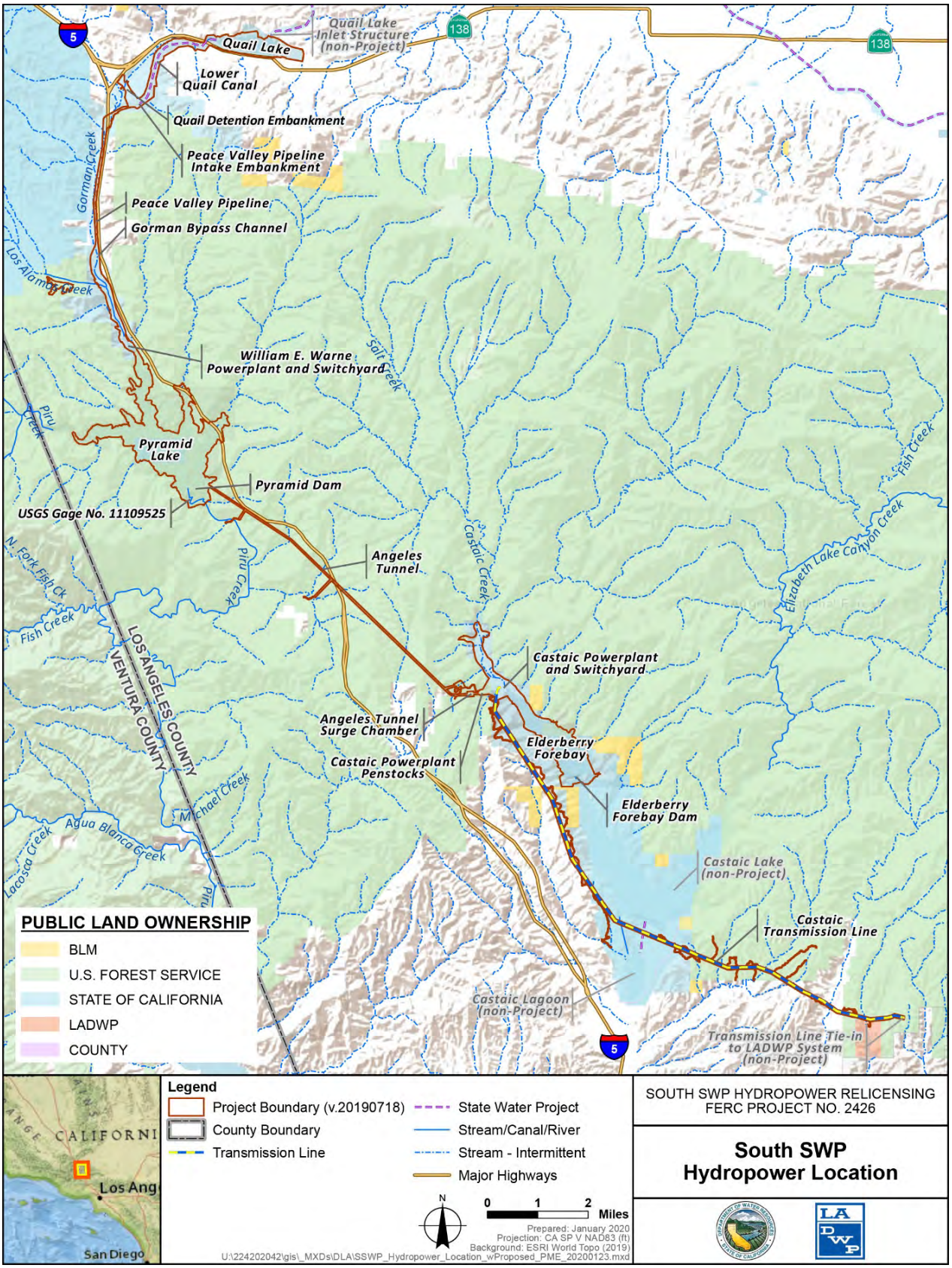

Figure 1.1-2. South SWP Hydropower Facilities and Land Ownership

1.2 PURPOSE OF THE PLAN

This Plan provides guidance for the implementation of protection, mitigation, and enhancement (PM&E) measures related to visual resources in the Project vicinity and the visual quality of Project facilities in accordance with applicable Forest policies and applicable laws and regulations. In addition, this Plan provides a framework for addressing visual quality when there are changes to the Project. To the extent appropriate, the Licensees will coordinate the efforts required under this Plan with other Project resource efforts, including implementation of other resource management plans and measures included in the new license.

1.3 GOALS AND OBJECTIVES

The primary goals of this Plan are to describe the PM&E measures for maintaining, updating and enhancing visual quality conditions affected by Project facilities and features, and to describe the consultation process and the consideration of new mitigation measures if there are changes to the Project that could affect visual quality. The objective of the Plan is to provide the guidance necessary to meet Plan goals.

1.4 CONTENTS OF THE PLAN

The Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including a brief description of the Project and the purpose, goals, and objective of the Plan.

- Section 2.0. Visual Resource Setting. This section summarizes the visual resource setting and context of the Licensees' Proposal. The summary focuses on the management framework and visual resources environmental considerations that are a backdrop for PM&E measures related to visual resources.

- Section 3.0. Proposed Protection, Mitigation, and Enhancement Measures. This section identifies visual resource management considerations, and PM&E measures for Project facilities where feasible measures are identified.

- Section 4.0. Schedule for Implementation. This section includes the schedule for implementing proposed PM&E measures.

- Section 5.0. Consultation, Reporting, and Plan Revisions. This section includes a plan for consultation and reporting with the ANF, LPNF, and BLM; and identifies when the Licensees will review, update, and/or revise the Plan, in consultation with the ANF, LPNF and BLM, as it pertains to visual resources on National Forest System (NFS) and BLM lands.

- Section 6.0. References. This section includes the resource documents cited in this Plan.

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2.0 VISUAL RESOURCE SETTING

This section summarizes the Project's visual resource setting. The summary includes a description of the overall aesthetic character of the Project vicinity, as well as the management framework and visual resources environmental considerations that are a backdrop for PM&E measures related to visual resources.

2.1 AESTHETIC CHARACTER OF PROJECT VICINITY

The Project is located on the western edges of the Sierra Pelona Mountains. This rugged mountain range separates the Antelope Valley from the Santa Clarita Valley. West of the Project, the Santa Clara canyons rise up from the Santa Clara River at elevations starting at approximately 1,200 feet and reach up to 5,000 feet.

The Interstate 5 Corridor, which may be defined as the area visible by travelers on Interstate 5 between State Highway 138 on the north and the community of Castaic on the south, functions as a gateway and transitional landscape for travelers driving between the Los Angeles metropolitan area and the San Joaquin Valley. Elevations within the Interstate 5 Corridor in the vicinity of the Project range from approximately 2,100 to 3,000 feet. The deep canyon holding Pyramid Lake, along with its various lesser side canyons, are a point of interest within this landscape. The mostly temperate to hot climate affects vegetation types and water availability. All but the larger streams are dry through the summer. The predominant plant community at lower elevations is mixed chaparral, which is continuous on many slopes. Pine and juniper are present at higher elevations. Canyon and coast live oaks are present in dense woodlands along shaded slopes and canyons. (USFS 2005d).

The Project is generally accessed from Interstate 5 and State Highways 14, 126, and 138. The southern part of the Project vicinity includes steep to very steep ridges with sharp to rounded summits, and deep, narrow canyons. The lower elevation edge is marked by the urban interface with the community of Santa Clarita. The higher elevation edge is marked by a series of peaks and ridges. Steeper slopes are barren and show evidence of erosion. Canyons have steep, rocky sides with large boulders (USFS 2005d).

2.2 PERTINENT VISUAL RESOURCE MANAGEMENT PLANS

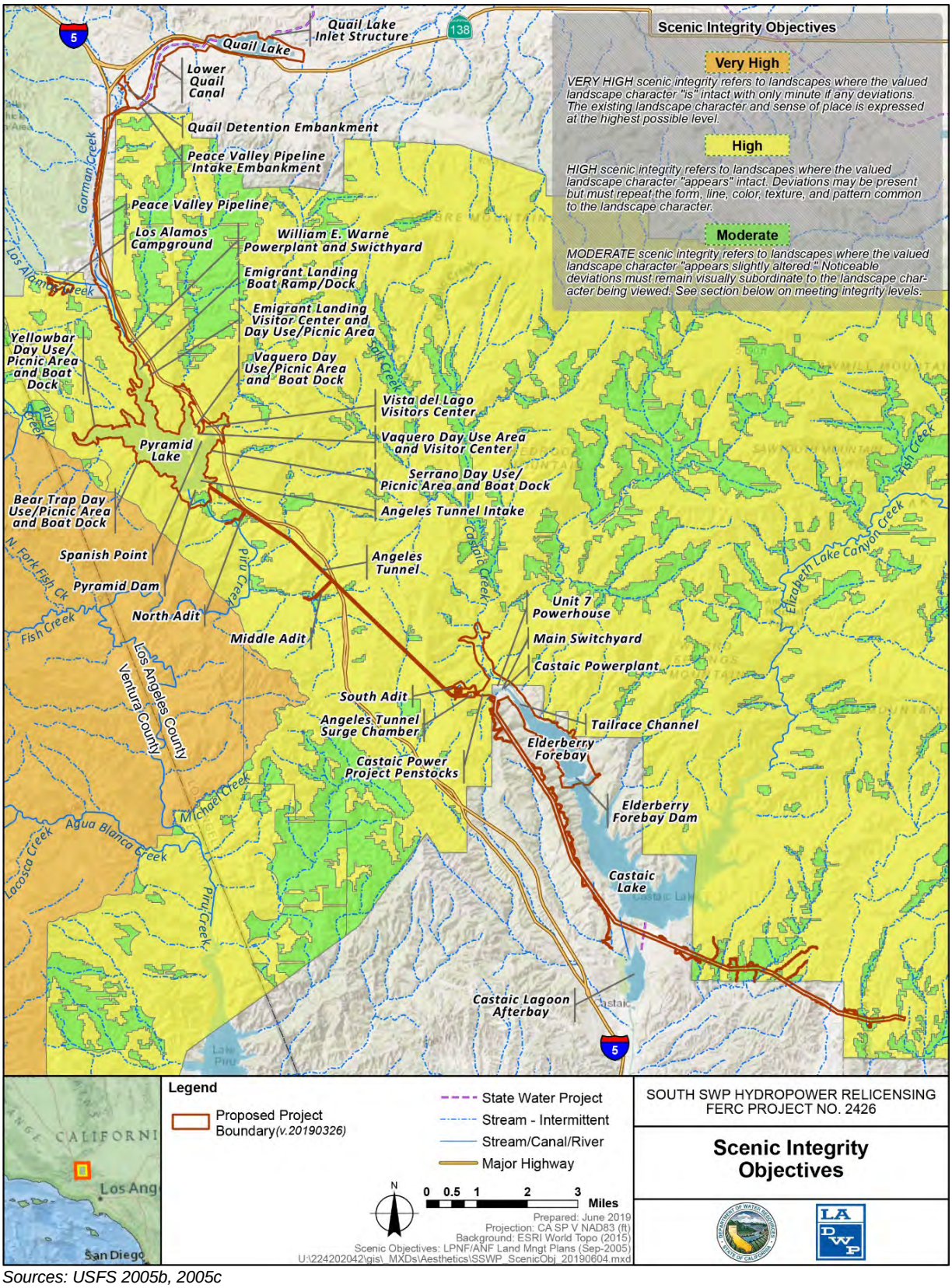
The Project is situated primarily on State, federal, and private lands. Pertinent management plans in the Project vicinity include federal land management plans for the ANF and LPNF, and lands administered by BLM. Each of these plans is described below as they relate to visual resources at the Project.

The Project lies within the Los Angeles County's Antelope Valley and Santa Clarita Valley planning areas, each of which has an area plan (i.e., Antelope Valley Area Plan and Santa Clarita Valley Area Plan); and includes planning guidance related to visual resources. However, these plans were prepared by a local government agency and do not apply to State and federal agencies.

2.2.1 Angeles and Los Padres National Forest Land Management Plans

Policies and programs associated with the ANF and LPNF apply only to NFS lands. Scenic integrity is the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character. To ensure that scenic integrity of NFS lands is maintained, USFS has established scenic integrity objectives (SIO) that define the minimum level to which landscapes are to be managed from an aesthetics standpoint. Figure 2.2-1 shows the SIOs for NFS lands in and around the Project boundary. Based on the SIO maps in the ANF and LPNF Land Management Plans (USFS 2005b, 2005c), the SIO for NFS lands within and around the Project boundary is predominately High (i.e., landscape appears unaltered), whereby deviations from the desired landscape character may be present, but must repeat the form, line, color, texture, pattern, and scale common to the landscape character. There are a few small areas with a Moderate SIO (i.e., landscape appears slightly altered), whereby noticeable deviations must remain visually subordinate to the landscape character being viewed. Project facilities on NFS lands include:

- Pyramid Dam and Lake
- Pyramid Lake recreation facilities, including Emigrant Landing Entrance Area, Emigrant Landing Boat Launch, Emigrant Landing Picnic and Fishing Areas One and Two, Emigrant Landing Swim and Picnic Area, Vista Del Lago Visitor Center, Vaquero Day Use Area, Spanish Point Boat-in Picnic Area, Serrano Boat-in Picnic Area, Bear Trap Boat-in Picnic Area, Yellow Bar Boat-in Picnic Area, Los Alamos Family Campground, and Los Alamos Group Campground
- Angeles Tunnel and Surge Chamber
- A portion of the Castaic Penstocks
- Portions of the Castaic Transmission Line (at the southern end of line)



Sources: USFS 2005b, 2005c

Figure 2.2-1. USFS Scenic Integrity Objectives for National Forest System Lands Within and Around the Project Boundary

2.2.2 Bureau of Land Management South Coast Resource Management Plan

BLM's South Coast Resource Management Plan guides the management of BLM-administered lands within and adjacent to the Project boundary as part of the Los Angeles County Management Area, which utilizes a visual resource management system to determine visual values, classes, and objectives. The lands within the Project boundary are managed to a visual resource management Class 3 (i.e., partially retain the existing character of the landscape; level of change to the characteristic landscape is moderate) (BLM 1994). Specifically, the BLM lands within the Project boundary are located adjacent to the eastern shoreline of Elderberry Forebay.

3.0 PROPOSED PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES

This section describes visual resource management considerations, and PM&E measures for Project facilities where feasible measures are identified. These measures include near-term actions, as well as actions or measures at the time of rehabilitation or modification of Project facilities.

3.1 PYRAMID LAKE

3.1.1 Pyramid Dam

Pyramid Dam is located deep in a canyon, and the upstream side of the dam is primarily visible from facilities at Pyramid Lake and by boaters on the reservoir. Viewpoints from Interstate 5 southbound are limited and short in duration due to the high speed of vehicle travel (i.e., 55 miles per hour [mph] and faster). Typically, only the top 5 to 9 feet of the upstream face of Pyramid Dam are visible; however, the vast majority of the time, the reservoir's water surface elevation is within 5 feet of the normal maximum water surface elevation, or 2,573 feet. The Angeles Tunnel Intake, white buildings associated with the spillway, and the metallic railings, guardrails, and chain-link fence along the top of the dam present moderate visual contrast, particularly when reflecting sunlight. To mitigate these visual effects, the Licensees will paint, treat, or stain these facilities to match one or more of the prominent darker colors found in the natural setting.

In addition, Pyramid Dam is viewed from its downstream side at the terminus of Golden State Highway in Piru Creek Canyon. The old paved road is gated approximately 3 miles before its terminus, which requires the public to walk or bike to the terminus, so public access and the viewing population are very limited. From this viewpoint, the visual contrast is low overall for the dam due to textures and colors that mimic the surrounding landscape. However, at ground level, the chain-link fence is visible in the immediate foreground, and the light gray colors and linear elements do not match the surrounding landscape. In the more distant foreground, a light-colored guardrail along the access road midway up the dam face does not match the surrounding landscape coloration and form. To mitigate these visual effects, the Licensees will treat or stain the chain-link fence and guardrails to match one or more of the prominent and complementary colors found in the natural setting.

3.1.2 Warne Powerplant

Warne Powerplant is located in a narrow canyon at the upstream end of Pyramid Lake on State lands, and is visible in foreground from Hardluck Road, Pyramid Lake Road, and the adjoining parking area. The powerplant is also partially seen at the end of foreground from Emigrant Landing Boat Launch. Warne Powerplant's appearance is a combination of tan columns and lintels with white panels and one smaller colorful tile panel, and was designed in accordance with DWR's architectural motif for the SWP. The powerplant presents visual contrast due to the white panels, light concrete structures, geometric shapes, colorful tile, and smooth textures that do not blend with

the rougher surrounding natural landscape textures, which are characterized by dark green brush, interspersed tan grasses, and exposed brown soils and rock.

To mitigate this visual effect on State lands, the Licensees will, when the Warne Powerplant building is in need of repainting or replacement, consider repainting with colors and/or using materials that blend better with the natural setting, if these colors and materials are consistent with DWR's architectural motif for the SWP.

3.1.3 Pyramid Lake Recreation Facilities

The recreation facilities at Pyramid Lake are nestled low in the canyon, with the predominant views from the local recreation area access roads and boaters on the reservoir. The site design and materials used in the recreation facilities were designed and approved by USFS. Since the time of the development of the existing recreation facilities (built in the 1970s) the ANF and LPNF have implemented updated land management plans (USFS 2005a). Today, any new or redeveloped/rehabilitated recreation developments are guided by the USFS' Built Environment Image Guide (BEIG) (USFS 2001); Forest Service Handbook 2309.13 (USFS 2018); and the ANF's and LPNF's Land Management Plans (USFS 2005b, 2005c). The Recreation Management Plan includes direction such that when existing recreation facilities and amenities (e.g., restrooms, shade structures, trash receptacles, tables, etc.) at Pyramid Lake on NFS lands are scheduled to be replaced, all features and amenities will be replaced with a uniform and consistent style and character corresponding to applicable USFS standards and guidelines, thereby enhancing the visual character of the recreation facilities. A few select elements at the existing recreation facilities do not blend well with the surrounding landscape, which are discussed below along with measures to mitigate their visual effects. The remaining recreation facility elements blend well with the surroundings and are visually subordinate to the overall recreation facility character being viewed.

3.1.3.1 Emigrant Landing Boat Launch

Emigrant Landing Boat Launch provides picnic facilities, boat launch, marina, and parking facilities. Overall, these facilities blend in well with the landscape from most viewpoints, except for the white doors and other light-colored features on the floating restroom buildings and a reflective metal light standard at the boat launch ramp. To mitigate the light standard's visual effects, the Licensees will replace or apply color treatments to the light standard that complement the natural setting. Regarding the white doors on the floating restroom buildings, the doors are typically colored white or a light color for visibility by reservoir boaters while located out on the reservoir. Further, the floating restroom buildings are only temporarily moored at the marina/boat launch area for maintenance purposes. Thus, the Licensees did not propose any mitigation measures for the white doors due to their safety function.

3.1.3.2 Emigrant Landing Swim and Picnic Area

Emigrant Landing Swim and Picnic Area provides picnic facilities and a swim beach area. Overall, these facilities blend in well with the landscape; except for a chain-link fence in the immediate foreground, along the riprapped shoreline within the swim beach boundary, that presents moderate visual contrast. To mitigate this visual effect, the Licensees will treat, stain, or replace the chain-link fencing with a style of fencing that either complements the marina or conforms generally to the applicable USFS' BEIG Southwest Province architectural styles.

3.1.3.3 Vaquero Day Use Area

Vaquero Day Use Area provides swimming, picnicking, and boat launch facilities. All of the facilities blend well with the surrounding landscape, with the exception of seven tall metal light standards in the parking area, the adjacent maintenance area, and transformer boxes. To mitigate these visual effects, the Licensees will:

- Treat, paint, or replace the light standards in the parking area with colors or materials that match one or more of the prominent and complementary darker tones found in the natural background

- Re-paint the transformer boxes using a darker green that more closely matches one of the prominent and complementary vegetative greens in the background

- Apply a treatment to the chain-link fence to provide a weathered appearance and install green or brown slats (diagonally) in the chain-link fence to screen items stored in the maintenance area

A lifeguard station on the swim beach does present high visual contrast, but the station needs to be highly visible for safety reasons.

3.1.3.4 Yellow Bar Boat-in Picnic Area

Yellow Bar Boat-in Picnic Area is located in the steep canyon of the westernmost arm of Pyramid Lake and is seen in the foreground by boaters. Overall, the facilities present low visual contrast, with the exception of the galvanized fence panels, white light standard near the restroom building, and the light-colored restroom exterior. These features present moderate and high visual contrast with the surrounding dark green vegetation and earth tones. To mitigate these visual effects, the Licensees, in coordination with the Forest Service, will:

- Apply a treatment to the metal fencing and railing to match one or more of the prominent and complementary tones found in the natural background

- Re-paint or treat the white top of the light standard using a darker tone matching one of the prominent and complementary vegetative or earth tones in the natural background

- Re-paint or treat the exterior of the restroom using darker tones matching one or more of the prominent and complementary vegetative or earth tones in the natural background

- Replace the restroom with a structure that generally conforms with the applicable USFS BEIG Southwest Province architectural styles and colors when the restroom building needs to be replaced

3.1.3.5 Bear Trap Boat-in Picnic Area

Bear Trap Boat-in Picnic Area is located in a steep canyon on the southwest side of Pyramid Lake, and is seen in the foreground by boaters. Overall, the facilities present low visual contrast, with the exception of the galvanized fence panels, the light-colored restroom exterior, and the dark brown shade structures. These features present moderate and high visual contrast with the surrounding dark green vegetation. To mitigate these visual effects, the Licensees will:

- Apply a treatment to the metal fencing and railing to match one or more of the prominent complementary tones found in the forested background

- Replace the restroom and shade structures with structures that generally conform with the applicable USFS' BEIG Southwest Province architectural styles and colors when they need to be replaced

3.1.3.6 Spanish Point Boat-in Picnic Area

Spanish Point Boat-in Picnic Area is located just south of and below the Vista Del Lago Visitor Center. All the recreation structures seen in the foreground from the reservoir by boaters blend well with the surrounding landscape. However, a cover for an emergency release valve at the Spanish Point potable water treatment facility, located above the beach, presents high visual contrast due to the cover's white color and geometric shape. The valve cover must retain its white color to protect it and the underlying valve from fatigue caused by thermal expansion and, therefore, cannot be re-coated in a darker color. To mitigate this visual effect, the Licensees will:

- Apply a treatment to the chain-link fence to provide a weathered appearance

- Install green or brown slats in the chain-link fence to screen the items being stored within the maintenance area.

- Replace the roof of the maintenance building with a design that generally conforms to the applicable USFS' BEIG Southwest Province architectural styles and colors when it needs to be replaced

In addition, to maintain consistency with the architectural styles and color schemes selected for Pyramid Lake, at such time when the Licensees will be replacing or substantially modifying the restroom and shade structure facilities, the Licensees will

replace those facilities with structures that generally conform with the applicable USFS' BEIG Southwest Province architectural styles and colors.

3.1.3.7 Vista Del Lago Visitor Center

The Vista Del Lago Visitor Center is visible in middleground to the north, primarily by reservoir boaters and vehicle passengers along Interstate 5. The orange roof of the structure does not blend in with the surrounding landscape. At such a time when the roof top will need replacing or a substantial upgrade, the Licensees will install a roof that generally conforms with the applicable USFS' BEIG Southwest Province architectural styles and colors.

3.2 ANGELES TUNNEL

3.2.1 Intake

As discussed above in Section 3.1.1 related to Pyramid Dam, the Angeles Tunnel Intake, located at the Pyramid Dam presents moderate visual contrast. To mitigate the visual effect, the Licensees will paint, treat, or stain the intake structure to match one or more of the dominant prominent darker colors found in the natural setting.

3.2.2 North Adit

While the Angeles Tunnel is not visible above the ground surface, the North Adit, located approximately 4,000 feet south of the terminus of Golden State Highway, is visible to the east in the foreground from the road. The North Adit face and drainage canal present high contrast with the surrounding landscape because the light-colored concrete and smooth texture does not blend with the tan rock formations with more rugged and rough textures. To mitigate this visual effect, the Licensees will apply a concrete stain color treatment to the faces of the North Adit structure and drainage canal that matches the dominant color of the existing rock face directly above the structure.

3.2.3 Surge Chamber

The Angeles Tunnel Surge Chamber is seen in the foreground from the Ridge Route Road looking in an eastward direction while driving. Its coloration of very light green with hints of yellow and gray presents a high visual contrast against the surrounding natural landscape. The surge chamber's shade of green is not similar to the surrounding dark greens of the native vegetation. To mitigate this visual effect, within 10 years after issuance of the new license, the Licensees will consult with USFS to discuss and implement a color treatment that will help the surge chamber blend better visually with the surrounding landscape.

3.3 CASTAIC TRANSMISSION LINES

The Castaic Transmission Line and its associated dual steel lattice towers spans 11.4 miles from the west shore of Elderberry Forebay, adjacent to Castaic Lake State

Recreation Area, and ends in San Francisquito Canyon. There are several views of the Castaic Transmission Line from several non-Project roadways and recreation sites, all on State, LADWP, or private lands. The portions of the transmission line located on NFS land (i.e., approximately 3.27 miles) are not readily visible from public viewpoints, and are therefore seldom seen. The visual contrast of the transmission towers varies throughout the span of the transmission line. Throughout much of the transmission line corridor located on State, LADWP, or private lands, the transmission line and towers are not prominent to public views; or are in the distant middleground. On NFS lands, at such time over the license term when the Licensees determine that upgrades, improvements, rehabilitation, removal and/or replacement of the transmission line towers or components are necessary, the Licensees will consult with USFS to perform the required level of scenery assessment in accordance with the National Environmental Policy Act.

3.4 QUAIL LAKE

3.4.1 Quail Lake Day Use Area

Quail Lake is located just east of Interstate 5 and immediately north of State Highway 138 in a relatively low lying flat valley surrounded by gentle rolling hills backed by rugged mountains to the north, south, and west of the lake. Quail Lake is the scenic feature in this area as the landscape transitions to desert as one travels east away from Quail Lake on State Highway 138. Quail Lake is seen from State Highway 138 in foreground and middleground, as vehicles travel at typical speeds of 55 mph and higher. State Highway 138 is designated as one of the “Priority Scenic Drives” in the Antelope Valley Area Plan. For vehicles, the primary place to stop and park is a large graveled parking area on the west side of the lake that is part of a Project recreational facility (Quail Lake Day Use Area). A chainlink fence, portions of which are topped with barbed wire, separates State land from adjoining private property, which is predominantly used for cattle grazing. All of the Project facilities associated with Quail Lake, both recreational and operational, are located on State lands, which do not have any specific scenic integrity requirements. However, some existing recreation facility features at the Quail Lake Day Use Area do not blend well with the surrounding landscape, which are discussed below along with measures to mitigate their visual effects.

Overall, the Quail Lake Day Use Area facilities are limited (i.e., barbed-wire fencing and portable restrooms) and small-in-scale, except when viewed in the immediate foreground by recreation visitors. These features present high visual contrast with the surrounding natural reservoir and shoreline vegetation setting. As proposed in the RMP and to mitigate these visual effects, the Licensees will:

- Replace the interior barbed-wire fencing at the parking area with wood or metal fencing that has smoother surfaces and that blends into the landscape better

- Provide ADA-compliant portable restroom that blends better with the natural setting and character of the site

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4.0 SCHEDULE FOR IMPLEMENTATION

This section includes a schedule for the implementation of the measures identified in Section 3.0, including, when possible, the year during which the measure will be completed. Table 4.0-1 provides the mitigation schedule for the measures discussed in Section 3.0.

Table 4.0-1. South SWP Project Visual Resources Mitigation Schedule

Project Area	Project Facility	Measure	Timeline
Pyramid Lake	Pyramid Dam	• Treat or stain the railings and guardrails atop the dam and along the downstream face of dam to match one or more of the prominent and complementary colors found in the natural setting • Treat or stain the existing chain-link fence at the terminus of Golden State Highway to match one or more of the prominent and complementary colors found in the natural setting	Within 7 years after issuance of the new license
	Warne Powerplant	• When the Warne Powerplant building is in need of repainting or replacement, consider repainting with colors and/or using materials that blend better with the natural setting, if these colors and materials are consistent with DWR's architectural motif for the SWP	When the building is scheduled to be repainted or replaced
	Emigrant Landing Boat Launch	• Replace or apply color treatments to the light standard that complement the natural setting	Within 7 years after issuance of the new license
	Emigrant Landing Swim and Picnic Area	• Treat, stain, or replace the chain-link fence with a style of fencing that either complements the marina or conforms to the applicable USFS' BEIG Southwest Province architectural styles selected for Pyramid Lake	Within 7 years after issuance of the new license

Table 4.0-1. South SWP Project Visual Resources Mitigation Schedule (continued)

Project Area	Project Facility	Measure	Timeline
Pyramid Lake	Vaquero Day Use Area maintenance area	• Re-paint the transformer boxes using a darker green that more closely matches one of the prominent and complementary vegetative greens in the background • Install green or brown slats (diagonally) on the chain-link fence to screen the items being stored within the maintenance area • Apply a treatment to the chain-link fence to provide a weathered appearance	Within 7 years after issuance of the new license
	Vaquero Day Use Area	• Treat, paint, or replace the light standards in the parking area with a color or materials that match one or more of the prominent and complementary darker tones found in the natural background	Within 7 years after issuance of the new license
	Yellow Bar Boat-in Picnic Area	• Apply a treatment to the metal fencing and railing to match one or more of the prominent and complementary tones found in the natural background • Re-paint or treat the white top of the light standard using a darker tone matching one of the prominent and complementary vegetative or earth tones in the natural background • Re-paint or treat the exterior of the restroom using darker tones matching one or more of the prominent and complementary vegetative or earth tones in the natural background	Within 7 years after issuance of the new license
		• Replace the restroom with a structure that generally conforms to the applicable USFS BEIG Southwest Province architectural styles and colors selected for Pyramid Lake	When the restroom structure is scheduled to be replaced

Table 4.0-1. South SWP Project Visual Resources Mitigation Schedule (continued)

Project Area	Project Facility	Measure	Timeline
Pyramid Lake	Bear Trap Boat-in Picnic Area	• Apply a treatment to the metal fencing and railing to match one or more of the prominent complementary tones found in the natural background	Within 7 years after issuance of the new license
		• Replace the restroom and shade structures with structures that generally conform to the applicable USFS' BEIG Southwest Province architectural style and color selected for Pyramid Lake	When the structure is scheduled to be replaced
	Spanish Point Boat-in Picnic Area	• Replace the restroom and shade structures with structures that generally conform to the applicable USFS' BEIG Southwest Province architectural styles and colors selected for Pyramid Lake	When the structures are scheduled to be replaced
	Spanish Point Boat-in Picnic Area (Maintenance Area)	• Apply a treatment to the chain-link fence to provide a weathered appearance • Install green or brown slats in the chain-link fence to screen the items being stored within the maintenance area	Within 7 years after issuance of the new license
		• Replace the roof for the maintenance building with a design that generally conforms to the applicable USFS' BEIG Southwest Province architectural styles and colors selected for Pyramid Lake	When the roof is scheduled to be replaced
	Vista Del Lago Visitor Center	• Replace the roof structure with a design that generally conforms to the applicable USFS' BEIG Southwest Province architectural styles and colors selected for Pyramid Lake	When the roof is scheduled to be replaced or substantially upgraded
	Spillway Buildings	• Licensees will consult with USFS to discuss and implement a color treatment that will help the white buildings associated with the spillway match one or more of the prominent darker colors found in the natural setting	Within 10 years after issuance of the new license

Table 4.0-1. South SWP Project Visual Resources Mitigation Schedule (continued)

Project Area	Project Facility	Measure	Timeline
Angeles Tunnel	Intake Structure	• Licensees will consult with USFS to discuss and implement a color treatment that will help the Tunnel Intake match one or more of the prominent darker colors found in the natural setting	Within 10 years after issuance of the new license
	North Adit	• Apply a concrete stain color treatment to the faces of the adit structure including the drainage canal that matches the dominant color of the existing rock face directly above the structure	Within 7 years after issuance of the new license
	Surge Chamber	• Licensees will consult with USFS to discuss and implement a color treatment that will help the surge chamber blend better visually with the surrounding landscape	Within 10 years after issuance of the new license
Castaic Transmissi on Line	Transmission Line towers on NFS land	• Licensees will consult with USFS to perform the necessary scenery analysis in accordance with the National Environmental Policy Act	When the Licensees determine that upgrades, improvements, rehabilitation, or replacement of the transmission line towers and/or components is necessary
Quail Lake	Quail Lake Day Use Area	As proposed in the RMP, Licensees will: • Replace the interior barbed-wire fencing at the parking area with wood or metal fencing that has smoother surfaces and that blends into the landscape better • Provide ADA-compliant portable restroom facility that blends better with the natural setting and character of the site	Within 4 years after issuance of the new license

Key:
BEIG = Built Environment Image Guide
USFS = U.S. Department of Agriculture, Forest Service
NFS = National Forest Service

5.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

5.1 CONSULTATION AND REPORTING

For Project activities conducted on NFS lands that are subject to this Plan, the Licensees will meet with the ANF and/or the LPNF to review any Licensees' activities that could affect visual resources as seen from NFS lands that are completed in the previous calendar year, as well as any Licensee activities planned for NFS lands for the current calendar year.

The Licensees do not anticipate any Project developmental activities that could affect visual resources for the BLM lands abutting the eastern shoreline of Elderberry Forebay. However, if any future developmental activities are planned for BLM lands that could affect visual resources, then the Licensees will review these activities with BLM.

5.2 PLAN REVISIONS

The Licensees, in consultation with the ANF and LPNF, will review, update, and/or revise this Plan as it pertains to visual resources on NFS lands; and in consultation with the BLM as it pertains to visual resources on BLM lands. Any updates to the Plan will be prepared in coordination and consultation with the ANF and LPNF; and the BLM, as necessary. The Licensees will provide the ANF, LPNF, and BLM (as needed) 60 days to provide written comments and recommendations before the Licensees file the updated Plan with FERC for approval. The updated Plan will include documentation of all relevant coordination and consultation. If the Licensees do not adopt a particular recommendation by the ANF, LPNF, and/or BLM, the filing will include the Licensees' reasons for not doing so. The Licensees will implement the Plan as approved by FERC. The Plan will not be considered revised until FERC issues its approval.

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6.0 REFERENCES

U.S. Department of Agriculture, Forest Service (USFS). 2018. Forest Service Handbook 2309.13 – Recreation Site Handbook, Chapter 10 – Planning and Design of Developed Recreation Sites and Facilities. FSH 2309.13-2018-1. January 25, 2018.

_____. 2005a. Land Management Plan Part 1, Southern California National Forests Vision. U.S. Department of Agriculture, Forest Service. Pacific Southwest Region. R5-MB-075. September 2005.

_____. 2005b. Land Management Plan Part 2, ANF Strategy. U.S. Department of Agriculture, Forest Service. Pacific Southwest Region. R5-MB-076. September 2005.

_____. 2005c. Land Management Plan Part 2, LPNF Strategy. U.S. Department of Agriculture, Forest Service. Pacific Southwest Region. R5-MB-078. September 2005.

_____. 2005d. Land Management Plan Part 3, Design Criteria for the Southern California National Forests Vision. U.S. Department of Agriculture, Forest Service. Pacific Southwest Region. R5-MB-080. September 2005.

_____. 2001. The Built Environment Image Guide (BEIG) for the National Forests and Grasslands. Pacific Southwest Region. FS-710. September 2001.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1994. South Coast Resource Management Plan and Record of Decision. California Desert District, Palm Springs-South Coast Resource Area. June 1994.

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Attachment 9

Historic Properties Management Plan
(Privileged and Confidential)

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SOUTH SWP HYDROPOWER

HISTORIC PROPERTIES MANAGEMENT PLAN

FERC typically completes Section 106 of the National Historic Preservation Act (NHPA) by entering into a Programmatic Agreement with the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) that typically requires the license applicant(s) to develop and implement a Historic Properties Management Plan (HPMP). The HPMP is a plan for considering and managing Project effects on historic properties. Through an approved HPMP, FERC can require the Licensees' consideration and appropriate management of effects of the Licensees' Proposal on historic properties throughout the term of the license – thereby allowing FERC to meet the requirements of NHPA Section 106 for its undertakings.

The HPMP included in this FLA contains sensitive, confidential, and privileged information. As such, the HPMP will only be distributed to interested Indian tribes, USFS, Angeles National Forest (ANF), Los Padres National Forest (LPNF), U.S. Department of the Interior, Bureau of Land Management (BLM), and the SHPO for review and comment as part of the NHPA Section 106 consultation process. Following consultation with the participating tribes, USFS, ANF, LPNF, BLM, and SHPO, the HPMP will be filed with FERC as "Privileged" in the License Application.

The Licensees included the draft HPMP in their Draft License Application (DLA) for the South SWP Hydropower, FERC Project Number 2426, filed with FERC on August 30, 2019. The Licensees requested a 90-day review of the DLA, including the draft HPMP. In addition, in a letter dated September 5, 2019, the Licensees requested a formal 30-day review of the DLA and draft HPMP by the tribes, USFS, and BLM, under NHPA Section 106. Written comments were provided on November 25, 2019, by ANF as part of its review of the DLA and draft HPMP, and relevant comments will be addressed in the final HPMP. On November 27, 2019, the Licensees also received comments on the draft HPMP as part of FERC's review of the DLA. The Licensees will address FERC's comments in the final HPMP. As of the date of this FLA filing, the Licensees are still engaging tribes and agencies on the preparation of the HPMP. The draft HPMP, as included in the Licensees' DLA, is being filed with this FLA. The Licensees plan to file the final HPMP with FERC upon the conclusion of consultation with the tribes, agencies, and SHPO, which the Licensees anticipate to be by June 2020.

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Appendix B

Study Plans, Field Results and Data Summaries, and Associated Data Files

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APPENDIX B

STUDY PLANS, FIELD RESULTS AND DATA SUMMARIES, AND ASSOCIATED DATA FILES

Appendix B includes the Licensees' study plans, field results and data summaries, and associated data files, for a total of 2,519 files representing 2.75 GB of data. Appendix B will be filed separately with the Federal Energy Regulatory Commission (FERC) on a Disc.

Note that some of the files within the ZIP folders included on the Disc are not in FERC e-filing formats, such as CPG and SHP.XML files. The Licensees can be contacted for a copy of this Appendix B.

Table B-1, below, lists the contents of Appendix B, including the total amount of data contained on the Disc.

Table B-1. Contents of Appendix B

Contents
Study Plans, Field Results and Data Summaries, and Associated Data Files
Study 4.1.1 Aquatic Invasive Species
Study 4.1.2 Quail Lake Fisheries Assessment
Study 4.1.3 Pyramid Reach Fish Populations Study
Study 4.1.4 Special-Status Aquatic Amphibians and Semi-Aquatic Snakes
Study 4.1.5 Botanical Resources
Study 4.1.6 Non-Native Invasive Plants
Study 4.1.7 Special-Status Terrestrial Wildlife Species – California Wildlife Habitat Relationships
Study 4.1.8 ESA-Listed Plants
Study 4.1.9 ESA-Listed Amphibians – California Red-legged Frog
Study 4.1.10 ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher, Least Bell's Vireo, and Yellow-billed Cuckoo Riparian Habitat Evaluations
Study 4.1.11 Recreation Facilities Demand Analysis and Condition Assessment
Study 4.1.12 Cultural Resources
Study 4.1.13 Tribal Resources
Study 4.1.14 Indicators of Hydrologic Alteration
Study 4.1.15 Scenic Integrity
Study 4.1.16 Water Quality and Temperature
Study 4.1.17 Fish Entrainment Risk Assessment
Study 4.1.18 ESA-Listed Terrestrial Wildlife Species – California Wildlife Habitat Relationships
Study 4.1.19 Whitewater Boating
Study 4.1.20 Special-Status Raptors
Study 4.1.21 Pyramid Reach Benthic Macroinvertebrates
Study 4.1.22 Pyramid Lake Tributaries Fish Passage Barriers
Total Size: 2.75 GB on Disc

Appendix C

PM&E Consultation Materials

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AGENDA

South SWP Hydropower Relicensing
Draft License Application
PM&E Kick-off Meeting

FERC Project No. 2426

Date: February 14, 2019

Time: 09:00 A.M. - 4:00 P.M.*

Location: Courtyard Marriott, 28523 Westinghouse Place, Valencia, CA 91355

Objectives: To discuss Study Status and PM&E collaboration relative to the South SWP Hydropower Draft License Application

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- Introduction & Purpose
- Safety Moment
- Relicensing Schedule
- Study Status Update
- PM&E Collaboration
- Action Items and Next Steps

*These agenda items may be addressed in a different order and may go faster depending on discussions by participants at the meeting.

PM&E Kickoff Meeting
Thursday, 9:00 am – 4:00 pm / February 14, 2019
Courtyard Marriott Valencia, Ca
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Bowes, Stephen*	National Parks Service	415-623-2321	Stephen_bowes@nps.gov	
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* Call in via Skype

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Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	
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McNeil, Jeremiah	DWR – SFD	916-563-0359	Jeremiah.Mcneil@water.ca.gov	
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Perez, Jarome	USFS	707- 562-8737	jeromeperez@fs.fed.us	
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Rubin, Katherine	LADWP	213-367-0436	Katherine.rubin@ladwp.com	
Salazar, Joseph	DWR – SFD	661-944-8449	joseph.salazar@water.ca.gov	
Schmoker, Kelly	CDFW	949-581-1015	Kelly.Schmoker@wildlife.ca.gov	
Seastrand, Justin	USFS	626-574-5235	jseastrand@fs.fed.us	
Swiger, Mike	VNF	202-298-1891	mas@vnf.com	
Sy, Anton*	LADWP	213-367-2332	Anton.Sy@ladwp.com	
Tang, Victoria	CDFW	916-445-0411	Victoria.Tang@wildlife.ca.gov	
Taylor, Robert	USFS	909-382-2660	rgtaylor@fs.fed.us	
Velazquez, Gabino	DWR – SFD	661-944-8555	gabino.velazquez@water.ca.gov	

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
Ware, Raphaela	FWS	8005-644-1766	raphaela_ware@fws.gov	RW
Williams, Victoria	DWR-SFD	661.944.8571	Victoria.Williams@water.ca.gov;	VW
Wood, Julia	VNF	202-298-1938	JSW@vnf.com	JSW
Zewdu, Simon	LADWP	213-367-2525	Simon.zewdu@ladwp.com	
JAMAHL BUTLER	USFS	818-899-1900	NJBUTLER@FS.FED.US	1/13
Kelsha Anderson	USFS	626-632-1709	kelsha.anderson@usda.gov	

* Call in via Skype

* Call in via Skype

From:	Burr, Douglas
To:	Taylor, Robert G -FS; Schmoker, Kelly@Wildlife; Padgett, Karmina@Waterboards; Bowes, Stephen; raphaela_ware@fws.gov; Tang, Victoria@Wildlife; Henriquez-Santos, Jose O -FS; Flores, Carlos - FS; raphaela_ware@fws.gov; njbutler@fs.fed.us; kelsha.anderson@usda.gov
Cc:	McNeil, Jeremiah@DWR; Goebl, Scott@DWR; Lee, Lisa D.@DWR; Miller, Aaron S.@DWR; Gleim, James@DWR; Knittweis, Gwen@DWR; Miller, Jill (Sacramento); Chua, Pjoy; Gamez, Ramon; Rorie, Bryan; Sy, Anton; Lynch, Jim; Gilbert, Kirby; torresraphael13@yahoo.com; Mike Swiger; Hedrick, Robert@DWR; Salazar, Joseph@DWR; Victoria.Williams@water.ca.gov; Julia Wood; Velazquez, Gabino@DWR; D"Artois, Melanie; Zewdu, Simon; Driscoll, Syndi; Gonzalez, Brian; Grison, Chloe; Lewis, Edward Ronald; Rubin, Katherine
Subject:	RE: Kick-Off Meeting for SSWP PM&E Development - Follow up Action Items - PM&E List
Date:	Friday, February 15, 2019 12:41:00 PM
Attachments:	image001.png image003.png image004.png image005.png image006.png image007.png image008.png image002.png

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All,
I want to extend the team's appreciation for participating in the South SWP Hydropower Relicensing PM&E Development Kickoff Meeting yesterday.

Please find the PM&E List developed during the meeting below.

1. Wildlife Movement
2. Safety
3. Law Enforcement
4. Accessibility Suitability Plan at Pyramid Recreation Facilities
5. Aquatic Invertebrate Management Plan
6. Pyramid Reach Sedimentation
7. Trash / Litter Control
8. Sensitive Area Management / Signage
9. Signage Plan
10. Water Quality
11. Visual Resources Management Plan
12. Erosion Control
13. Hazardous Materials Management Plan
14. Transportation
15. Aquatic Invasive Species
16. Integrated Vegetation - Native / Non-Native
17. Recreation
18. Cultural Resources
19. Fish Stocking
20. Fire Management and Response
21. Pyramid Reach Flow – Releases
22. Monitoring and Management – Stream Flow
23. Quail Lake Flow Monitoring and Management
24. Sediment Transport (In and Out)
25. Biological Monitoring (All Species)
26. Reporting Requirements
27. Adaptive Management (for all above)

28. Collaboration Implementation of Discussions Post-License
29. Predator Control

If you have any adjustments or additions to the list above please provide them by Friday, February 22, 2019.

Also, towards the end of the meeting alternative locations for future meetings were discussed. Our next guaranteed meeting is the USR meeting which will likely be held the week of May 24th or May 31st. If you have thoughts on locations for this meeting or other future potential PM&E meetings please reply all to this email so we can evaluate the various options.

Thanks again and have a great weekend.

Doug Burr, P.G., PMP
Supervising Geologist
Project Manager, Waterpower & Dams
Stantec
3301 C Street, Sacramento, CA 95816
Direct line - (916) 418-8356
Mobile line - (916) 761-3793
Facsimile - (916) 924-9102
Douglas.Burr@stantec.com

-----Original Appointment-----
From: Burr, Douglas
Sent: Friday, December 28, 2018 9:12 AM
To: Burr, Douglas; McNeil, Jeremiah@DWR; Goebl, Scott@DWR; Lee, Lisa D.@DWR; Miller, Aaron S.@DWR; Gleim, James@DWR; Miller, Jill (Sacramento); Chua, Pjoy; Taylor, Robert G -FS; Knittweis, Gwen@DWR; Schmoker, Kelly@Wildlife; Padgett, Karmina@Waterboards; nathan.fisch@waterboards.ca.gov; Pareti, Jennifer@Wildlife; William Foster - NOAA Federal; Chang, Lena; Gamez, Ramon; Sy, Anton; Bryan Rorie (Bryan.Rorie@stantec.com); Bowes, Stephen; Lynch, Jim; Kirby Gilbert (kirby.gilbert@stantec.com); torresraphael13@yahoo.com; Mike Swiger; Hedrick, Robert@DWR; Salazar, Joseph@DWR; Victoria.Williams@water.ca.gov; Julia Wood
Cc: Seastrand, Justin -FS; Velazquez, Gabino@DWR; raphaela_ware@fws.gov; D'Artois, Melanie; Perez, Jerome - FS; Tang, Victoria@Wildlife; Henriquez-Santos, Jose O -FS; Flores, Carlos - FS; Zewdu, Simon
Subject: Kick-Off Meeting for SSWP PM&E Development
When: Thursday, February 14, 2019 9:00 AM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Courtyard by Marriot Valencia, 28523 Westinghouse Place, Valencia, CA 91355

All, Please find the Agenda for this meeting attached.

Thank you,

Doug

All, this meeting will be held from 9:00 AM to 4:00 PM at the Courtyard by Marriot in Valencia, CA.

Please find the address and contact information below.

28523 Westinghouse Place
Valencia, CA 91355
Ph: 661-257-3220
Fax: 661-290-2802

This meeting invite has been updated to reflect this time and location.

Thank you,

Doug

All, this is a placeholder for the SSWP PM&E the Kick-Off Meeting Development process. This invite will be updated with the meeting location and time in early this month.

Regards,

Doug Burr, P.G., PMP
Supervising Geologist
Project Manager, Waterpower & Dams
Stantec
3301 C Street, Sacramento, CA 95816
Direct line - (916) 418-8356
Mobile line - (916) 761-3793
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Douglas.Burr@stantec.com

From:	Burr, Douglas
To:	Taylor, Robert G -FS; Schmoker, Kelly@Wildlife; Padgett, Karmina@Waterboards; Bowes, Stephen; raphaela_ware@fws.gov; Tang, Victoria@Wildlife; Henriquez-Santos, Jose O -FS; Flores, Carlos - FS; raphaela_ware@fws.gov; njbutler@fs.fed.us; kelsha.anderson@usda.gov
Cc:	McNeil, Jeremiah@DWR; Goebl, Scott@DWR; Lee, Lisa D.@DWR; Miller, Aaron S.@DWR; Gleim, James@DWR; Knittweis, Gwen@DWR; Miller, Jill (Sacramento); Chua, Pjoy; Gamez, Ramon; Rorie, Bryan; Sy, Anton; Lynch, Jim; Gilbert, Kirby; torresraphael13@yahoo.com; Mike Swiger; Hedrick, Robert@DWR; Salazar, Joseph@DWR; Victoria.Williams@water.ca.gov; Julia Wood; Velazquez, Gabino@DWR; D"Artois, Melanie; Zewdu, Simon; Driscoll, Syndi; Gonzalez, Brian; Grison, Chloe; Lewis, Edward Ronald; Rubin, Katherine
Subject:	RE: Kick-Off Meeting for SSWP PM&E Development - Follow up Action Items - PM&E List
Date:	Friday, April 5, 2019 10:14:00 AM
Attachments:	image001.png image010.png image011.png image012.png image013.png image014.png image015.png image003.png

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Good Morning Relicensing Participants,

At our South SWP Hydropower (SSWP) relicensing meeting on February 14, 2019 in Valencia, California, the Licensees asked you to brainstorm about potential measures to develop and include in their September 2019 Draft License Application (DLA). The Licensees have reviewed your list of ideas in light of the results of the relicensing studies and they propose collaborative discussion with the Relicensing Participants or independent development of the following measures, some of which would require preparation of a plan.

1. Visual Resources Management Plan (collaborative)
2. Recreation Plan (collaborative and would include recreation signage, litter control, accessibility)
3. Cultural Resources (The Licensees will collaboratively develop a Historic Properties Management Plan through the NHPA Section 106 process. It will address management of sensitive cultural resource areas)
4. Fish Stocking Measure (collaborative)
5. Pyramid Reach Flow Releases (this measure will be developed collaboratively)
6. Erosion Control Management Plan (collaborative)
7. Hazardous Materials Management Plan (collaborative)
8. Safety Plan (This plan would include Critical Energy Infrastructure Information [CEII], so would not be developed collaboratively. It would include safety-related signage.)
9. Transportation System Management Plan (collaborative)
10. Aquatic Invasive Species Management Plan (collaborative and will mention aquatic invasive invertebrates)
11. Integrated Vegetation Management Plan (collaborative and will address management of sensitive areas for plants and natural communities)
12. Fire Prevention and Response Plan (collaborative)

Whereas, for some of these measures/plans, in-person meetings would be the best collaborative approach, conference calls and email exchanges may be appropriate for others. Because the DLA must be filed on or before September 3, 2019, we will want balance our collective time and travel commitments with the ability to achieve concurrence and results. So we wish to consider the most

efficient and effective means of developing these measures.

As a next step, the Licensees suggest a conference call to reach agreement on issues for discussion and agree on a process to begin those discussions. Depending on the specific issue or measure, the process could begin with the Licensees or Relicensing Participants preparing a first draft to jump start the collaboration process, or it could include additional meetings/calls to further clarify the issue before we start drafting the details of a measure. At a minimum, the process call would include setting a schedule (meeting/call dates, and venues for meetings) for each issue and identifying who should participate in each meeting/call. We suggest grouping meetings/calls by subject matter to efficiently and effectively use staff time.

Assuming scheduling this process call is acceptable to you, **please expect Stantec to contact you in the next few days to schedule a date and time for the process call.**

Thank you,

Doug Burr, P.G., PMP
Supervising Geologist
Project Manager, Waterpower & Dams
Stantec
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Douglas.Burr@stantec.com

AGENDA

South SWP Hydropower Relicensing
PM&E Process Call Meeting

FERC Project No. 2426

Date: April 30, 2019

Time: 2:00 P.M. - 4:00 P.M.*

Location: Skype Invitation. (916) 330-5000, Conference number: 856045785

Objectives: To discuss PM&E development and collaboration relative to the South SWP Hydropower Draft License Application

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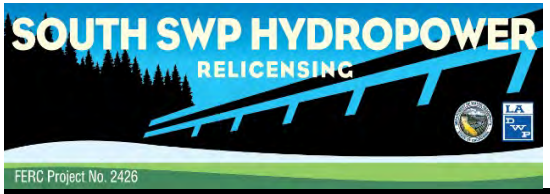
- Welcome & Introductions
- Meeting Purpose
- Overview of ILP Process and DLA Schedule
  - DLA Filing Date – September 3, 2019
- PM&E Collaboration Process Discussion
  - Review Previously Identified PM&E Measures and Approach for Collaboration
    1. Pyramid Lake Fish Stocking Measure
    2. Erosion and Sediment Control Management Plan
    3. Hazardous Materials Management Plan
    4. Fire Prevention and Response Plan
    5. Pyramid Reach Flow Releases Measure
    6. Recreation Management Plan
    7. Visual Resources Management Plan
    8. Integrated Vegetation Management Plan
    9. Aquatic Invasive Species Management Plan
    10. Transportation System Management Plan
    11. Project Safety Plan
    12. Cultural Resources (HPMP)
- Action Items and Next Steps

*These agenda items may be addressed in a different order and may go faster depending on discussions by participants at the meeting.



SSWP Relicensing PM&E Process Call
Tuesday, 2:00 PM – 4:00 PM / April 30, 2019
Sign-In Sheet

Name	Organization	Phone Number	E mail	Initial
Tang, Victoria	CDFW		Victoria.Tang@wildlife.ca.gov	
Schmoker, Kelly	CDFW		Kelly.schmoker@wildlife.ca.gov	
Hedrick, Robert	DWR		Robert.Hedrick@water.ca.gov	
Stoddard, Tera	DWR		Tera.Stoddard@water.ca.gov	
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	
Goebl, Scott	DWR-HLPCO	916-557-4561	Scott.Goebl@water.ca.gov	
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McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	
Miller, Aaron S.	DWR-HLPCO	916-557-4560	Aaron.S.Miller@water.ca.gov	
Parsons, Jeff	DWR-HLPCO		Jeffrey.Parsons@water.ca.gov	
Sandoval, Ricardo	DWR-HLPCO		Ricardo.Sandoval@water.ca.gov	
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	
Torres, Ralph	DWR-HLPCO	916-798-9825	torresraphael13@yahoo.com	
Velazquez, Gabino	DWR-SFD		Gabino.Velazquez@water.ca.gov	
Williams, Victoria	DWR-SFD		Victoria.Williams@water.ca.gov	
Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	
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D'Artois, Melanie	LADWP		Melanie.D'Artois@ladwp.com	

* Call in via Skype

Name	Organization	Phone Number	E mail	Initial
Driscoll, Syndi	LADWP	213-367-4363	Syndi.Driscoll@ladwp.com	
Fick, Robert	LADWP		Robert.Fick@ladwp.com	
Gamez, Ramon	LADWP	213-367-4853	Ramon.Gamez@ladwp.com	
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Rubin, Katherine	LADWP	213-367-0436	Katherine.Rubin@ladwp.com	
Sy, Anton	LADWP	213-367-2332	Anton.Sy@ladwp.com	
Zewdu, Simon	LADWP	213-367-2525	simon.zewdu@ladwp.com	
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Barrientez, Michael	Stantec	(916) 418-8264	Michael.Barrientez@stantec.com	
Burr, Doug	Stantec	(916) 761-3793	Douglas.Burr@stantec.com	
Gilbert, Kirby	Stantec	(425) 896-6954	Kirby.gilbert@stantec.com	
Miller, Jill	Stantec	(916) 418-8439	jill.miller2@stantec.com	
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	
Anderson, Kelsha	USDA		kelsha.anderson@usda.gov	
Butler, Jamahl	USFS	818-899-1900	njbutler@fs.fed.us	
Flores, Carlos	USFS		carlosflores@fs.fed.us	

* Call in via Skype

Name	Organization	Phone Number	E mail	Initial
Henriquez-Santos, Jose O.	USFS		jhenriquezsantos@fs.fed.us	
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Swiger, Mike	VNF		mas@vnf.com	
Wood, Julia	VNF		JSW@vnf.com	
Moyle, Joanna	DWR – SFD			
Westbrook, Aaron	Cascade Power Plant			
Gomez, Edward	LADWP			

* Call in via Skype

South SWP Hydropower, FERC Project No. 2426-227

AGENDA

Draft License Application PM&E Meeting

Date:	June 18, 2019
Time:	12:30 pm – 4:00 pm*
Location:	Hilton Garden Inn 199 N. 2nd Avenue Arcadia, California 91006
Objectives:	To collaborate on the potential development of a integrated vegetation management plan relative to the South SWP Hydropower Draft License Application.

- Welcome
- Introductions & Purpose
- Safety Moment
- Integrated Vegetation Management Plan Outline
- Action Items and Next Steps
- Adjourn

*These agenda items may be addressed in a different order and may go faster depending on discussions by participants at the meeting.

SOUTH SWP HYDROPOWER RELICENSING

FERC Project No. 2426

SSWP Relicensing PM&E Meeting
Tuesday, 12:30 PM – 4:00 PM / June 18, 2019
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Schmoker, Kelly	CDFW		Kelly.schmoker@wildlife.ca.gov	
Tang, Victoria	CDFW		Victoria.Tang@wildlife.ca.gov	
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	
Goebl, Scott	DWR-HLPCO	916-557-4561	Scott.Goebl@water.ca.gov	
Hedrick, Robert	DWR-HLPCO	916-653-5761	Robert.Hedrick@water.ca.gov	
Knittweis, Gwen	DWR-HLPCO	916-557-4554	Gwen.Knittweis@water.ca.gov	
Lee, Lisa D.	DWR-HLPCO	916-557-4557	Lisa.Lee@water.ca.gov	
McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	
Miller, Aaron S.	DWR-HLPCO	916-557-4560	Aaron.S.Miller@water.ca.gov	
Parsons, Jeff	DWR-HLPCO	916-557-4558	Jeffrey.Parsons@water.ca.gov	
Stoddard, Tera	DWR-HLPCO	916-557-4553	Tera.Stoddard@water.ca.gov	
Torres, Ralph	DWR-HLPCO	916-798-9825	torresraphael13@yahoo.com	
McElvain, Doug	DWR-SFD	661-944-8445	Doug.McElvain@water.ca.gov	
Moyle, Joanalyn	DWR-SFD	(661-944-8537	Joanalyn.Moyle@water.ca.gov	
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	
Velazquez, Gabino	DWR-SFD		Gabino.Velazquez@water.ca.gov	
Williams, Victoria	DWR-SFD		Victoria.Williams@water.ca.gov	
Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	
Chua, Pjoy T.	LADWP	213-367-1750	Pjoy.chua@ladwp.com	

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
D'Artois, Melanie	LADWP		Melanie.D'Artois@ladwp.com	
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Gamez, Ramon	LADWP	213-367-4853	Ramon.Gamez@ladwp.com	
Gomez, Edgar	LADWP		Edgar.Gomez@ladwp.com	
Gonzalez, Brian	LADWP		brian.gonzalez@ladwp.com	
Grison, Chloe	LADWP		chloe.grison@ladwp.com	
Hirashima, Scott	LADWP		Scott.Hirashima@ladwp.com	
Parker, Nadia	LADWP	213-367-1745	Nadia.Parker@ladwp.com	
Peace, Graham	LADWP		Graham.Peace@ladwp.com	
Rubin, Katherine	LADWP	213-367-0436	Katherine.Rubin@ladwp.com	
Sy, Anton	LADWP	213-367-2332	Anton.Sy@ladwp.com	
Westbrook, Aaron	LADWP		Aaron.Westbrook@ladwp.com	
Zewdu, Simon	LADWP	213-367-2525	simon.zewdu@ladwp.com	
Bowes, Stephen	NPS	415-623-2321	stephen_bowes@nps.gov	
Gilbert, Kirby	Stantec	(425) 896-6954	Kirby.gilbert@stantec.com	
Miller, Jill	Stantec	(916) 418-8439	jill.miller2@stantec.com	
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	
Anderson, Kelsha	USDA		kelsha.anderson@usda.gov	
Butler, Jamahl	USFS	818-899-1900	njbutler@fs.fed.us	
Flores, Carlos	USFS		carlosflores@fs.fed.us	

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
Henriquez-Santos, Jose O.	USFS		jhenriquezsantos@fs.fed.us	
Taylor, Robert G.	USFS	909-382-2660	rgtaylor@fs.fed.us	RT
Ware, Raphaela	USFWS	805-677-3319	raphaela_ware@fws.gov	
Swiger, Mike	VNF		mas@vnf.com	
Wood, Julia	VNF		JSW@vnf.com	
Simpson, Lloyd	USFS - botany			✓

* Call in via Skype

South SWP Hydropower, FERC Project No. 2426-227

AGENDA

Draft License Application PM&E Meeting

Date: June 19, 2019

Time: 9:00 am – 3:00 pm*

Location: Hilton Garden Inn
199 N. 2nd Avenue
Arcadia, California 91006

Objectives: To collaborate on potential development of PM&E management plans for visual resources and recreation management relative to the South SWP Hydropower Draft License Application.

- Introductions & Purpose
- Safety Moment
- Visual Resources Management Plan Outline
- Recreation Management Plan Outline
- Action Items and Next Steps
- Adjourn

*These agenda items may be addressed in a different order and may go faster depending on discussions by participants at the meeting.

SOUTH SWP HYDROPOWER RELICENSING

FERC Project No. 2426

SSWP Relicensing PM&E Meeting
Wednesday, 9:00 AM – 3:00 PM / June 19, 2019
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Schmoker, Kelly	CDFW		Kelly.schmoker@wildlife.ca.gov	
Tang, Victoria	CDFW		Victoria.Tang@wildlife.ca.gov	
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	
Goebl, Scott	DWR-HLPCO	916-557-4561	Scott.Goebl@water.ca.gov	
Hedrick, Robert	DWR-HLPCO	916-653-5761	Robert.Hedrick@water.ca.gov	
Knittweis, Gwen	DWR-HLPCO	916-557-4554	Gwen.Knittweis@water.ca.gov	
Lee, Lisa D.	DWR-HLPCO	916-557-4557	Lisa.Lee@water.ca.gov	
McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	
Miller, Aaron S.	DWR-HLPCO	916-557-4560	Aaron.S.Miller@water.ca.gov	
Parsons, Jeff	DWR-HLPCO	916-557-4558	Jeffrey.Parsons@water.ca.gov	
Stoddard, Tera	DWR-HLPCO	916-557-4553	Tera.Stoddard@water.ca.gov	TS
Torres, Ralph	DWR-HLPCO	916-798-9825	torresraphael13@yahoo.com	
McElvain, Doug	DWR-SFD	661-944-8445	Doug.McElvain@water.ca.gov	
Moyle, Joanalyn	DWR-SFD	(661)-944-8537	Joanalyn.Moyle@water.ca.gov	
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	
Velazquez, Gabino	DWR-SFD		Gabino.Velazquez@water.ca.gov	
Williams, Victoria	DWR-SFD		Victoria.Williams@water.ca.gov	
Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
Chua, Pjoy T.	LADWP	213-367-1750	Pjoy.chua@ladwp.com	
D'Artois, Melanie	LADWP		Melanie.D'Artois@ladwp.com	
Driscoll, Syndi	LADWP	213-367-4363	Syndi.Driscoll@ladwp.com	
Fick, Robert	LADWP		Robert.Fick@ladwp.com	
Gamez, Ramon	LADWP	213-367-4853	Ramon.Gamez@ladwp.com	
Gomez, Edgar	LADWP		Edgar.Gomez@ladwp.com	
Gonzalez, Brian	LADWP		brian.gonzalez@ladwp.com	
Grison, Chloe	LADWP		chloe.grison@ladwp.com	
Hirashima, Scott	LADWP		Scott.Hirashima@ladwp.com	
Parker, Nadia	LADWP	213-367-1745	Nadia.Parker@ladwp.com	
Peace, Graham	LADWP		Graham.Peace@ladwp.com	
Rubin, Katherine	LADWP	213-367-0436	Katherine.Rubin@ladwp.com	
Sy, Anton	LADWP	213-367-2332	Anton.Sy@ladwp.com	
Westbrook, Aaron	LADWP		Aaron.Westbrook@ladwp.com	
Zewdu, Simon	LADWP	213-367-2525	simon.zewdu@ladwp.com	
Bowes, Stephen	NPS	415-623-2321	stephen_bowes@nps.gov	
Gilbert, Kirby	Stantec	425-896-6954	Kirby.gilbert@stantec.com	
Miller, Jill	Stantec	916-418-8439	jill.miller2@stantec.com	
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	
Anderson, Kelsha	USDA		kelsha.anderson@usda.gov	

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
Butler, Jamahl	USFS	818-899-1900	njbutler@fs.fed.us	
Flores, Carlos	USFS		carlosflores@fs.fed.us	
Henriquez-Santos, Jose O.	USFS		jhenriquezsantos@fs.fed.us	
Taylor, Robert G.	USFS	909-382-2660	rgtaylor@fs.fed.us	
Ware, Raphaela	USFWS	805-677-3319	raphaela_ware@fws.gov	
Swiger, Mike	VNF		mas@vnf.com	
Wood, Julia	VNF		JSW@vnf.com	
Muradyan, Joseph	DWR			

* Call in via Skype

South SWP Hydropower, FERC Project No. 2426-227

AGENDA

Recreation PM&E Site Visit

Date: July 31, 2019
Time: 9:00 AM – 3:00 PM
Location: SSWP Project Recreation Sites
Objectives: To continue collaboration and conduct a site visit to view and discuss project related facilities, signage, and accessibility in relation to the protection, mitigation, and enhancement (PM&E) Recreation Management Plan for the South SWP Hydropower Draft License Application. The intent is to obtain input from the USFS on locations and priorities to apply their Forest Service Accessibility Guidelines. Participants should bring appropriate clothing, sturdy footwear, their own food/lunch/drinks (minimal lunch options while on site), and be prepared to walk on unpaved road sections.

- Meet at Vista Del Lago Visitor Center — 9:00 AM
  - Welcome, Sign-In, and Introductions
  - Meeting Purpose / Site Visit Logistics
  - Job Hazards Analysis / Safety Moment
- Mobilize to Area Below Vista Del Lago Visitor Center (15 mins) — 9:45 AM
  - Spanish Point
  - Vaquero
- Mobilize to Emigrant Landing (15 mins) — 11:00 AM
  - Picnic and Fishing Area One
  - Picnic and Fishing Area Two
  - Boat Launch
  - Swim and Picnic Area
- Working Lunch (please bring your own lunch, water will be available)
- Mobilize to Los Alamos Campgrounds (15 mins) — 1:00 PM
  - Los Alamos Campground Loops 1-4
  - Group Campsites
- Next Steps and Action Items (30 mins) — 2:30 PM
  - Should time permit, visit Frenchman's Flat for those interested/available
- Adjourn — 3:00 PM

  *Meeting end time may be adjusted depending on progress

SOUTH SWP HYDROPOWER RELICENSING

FERC Project No. 2426

SSWP Relicensing Recreation Site Visit
Wednesday, 8:45 AM – 3:00 PM / July 31, 2019
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Flores, Carlos	USFS	626 574 5274	carlos.a.flores@usda.gov	C.F.
Gilbert, Kirby	Stantec	(425) 896-6954	Kirby.gilbert@stantec.com	KWL
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	
Gomez, Edgar	LADWP		Edgar.Gomez@ladwp.com	
Hedrick, Robert	DWR-HLPCO	916-653-5761	Robert.Hedrick@water.ca.gov	
Henriquez-Santos, Jose	USFS	(626)574-5277	jose.henriquez-santos@usda.gov	
Hirashima, Scott	LADWP		Scott.Hirashima@ladwp.com	
Knittweis, Gwen	DWR-HLPCO	916-557-4554	Gwen.Knittweis@water.ca.gov	
Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	
McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	
Miller, Jill	Stantec	(916) 418-8439	jill.miller2@stantec.com	
Moyle, Joanalyn	DWR-SFD	(661)944-8537	Joanalyn.Moyle@water.ca.gov	
Muradyan, Joe	DWR-HLPCO	916-557-4574	Ovsep.Muradyan@water.ca.gov	
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	
Parker, Nadia	LADWP	213-367-1745	Nadia.Parker@ladwp.com	
Pjoy, Chua	LADWP	213-367-1750	pjoy.chua@ladwp.com	
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	
Stoddard, Tera	DWR-HLPCO	916-557-4553	Tera.Stoddard@water.ca.gov	
Aaron Miller	DWR-HLPCO	707 562-9109	dawn.alvarez@usda.gov	
Alvarez, Dawn	USFS			

Name	Organization	Phone Number	E-mail	Initial
Taylor, Robert	USFS	909-382-2660	robert.taylor2@usda.gov	RT
Travers, Joshua	USFS		joshua.travers@usda.gov	JT
Uyehara, Julie	USFS		julie.uyehara@usda.gov	
Velazquez, Gabino	DWR		Gabino.Velazquez@water.ca.gov	
Wood, Julia	VNF		JSW@vnf.com	
VELDHUIZEN, TANYA	DWR	916-539-6741	tanyav@water.ca.gov	TV
DARON ALVAREZ	USFS			DA

South SWP Hydropower, FERC Project No. 2426-227

AGENDA

South SWP Hydropower Relicensing PM&E Call

Date: August 2, 2019
Time: 9:00 am – 3:00 pm
Location: Skype Invitation. (916) 330-5000, Conference number: 633717896
Objectives: To review relicensing participant's redline comments on each of the potential protection, mitigation, and enhancement (PM&E) plans identified below and continue collaborative discussions on plan development for inclusion in the South SWP Hydropower Draft License Application.

- Welcome and Roll Call 9:00am
- Review Agenda
- Introductions and Meeting Purpose
- PM&E Plan Discussions 9:30am
    - Review Redline Comments on PM&E Plans
        - Erosion and Sediment Control Management Plan 10:30am
        - Break (10mins)
        - Hazardous Materials Management Plan 11:30am
        - Break (10mins)
        - Fire Prevention and Response Plan 12:30pm
        - Break (10mins)
        - Visual Resources Management Plan 1:30pm
        - Break (10mins)
    - Integrated Vegetation Management Plan (Status Update) 2:30pm
- Action Items and Next Steps 3:00pm

*Meeting end time may be adjusted depending on progress and breaks can be adjusted as needed.

SSWP Relicensing PM&E Call
Friday, 9:00 AM – 3:00 PM / August 2, 2019
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Schmoker, Kelly	CDFW		Kelly.schmoker@wildlife.ca.gov	X
Tang, Victoria	CDFW		Victoria.Tang@wildlife.ca.gov	
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	X
Goebl, Scott	DWR-HLPCO	916-557-4561	Scott.Goebl@water.ca.gov	X
Hedrick, Robert	DWR-HLPCO	916-653-5761	Robert.Hedrick@water.ca.gov	
Knittweis, Gwen	DWR-HLPCO	916-557-4554	Gwen.Knittweis@water.ca.gov	X
Lee, Lisa D.	DWR-HLPCO	916-557-4557	Lisa.Lee@water.ca.gov	
McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	X
Miller, Aaron S.	DWR-HLPCO	916-557-4560	Aaron.S.Miller@water.ca.gov	X
Muradyan, Ovsep (Joseph)	DWR-HLPCO		Ovsep.Muradyan@water.ca.gov	X
Parsons, Jeff	DWR-HLPCO	916-557-4558	Jeffrey.Parsons@water.ca.gov	X
Stoddard, Tera	DWR-HLPCO	916-557-4553	Tera.Stoddard@water.ca.gov	X
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Llamas, Francisco	DWR-HLPCO		francisco.llamas@water.ca.gov	
McElvain, Doug	DWR-SFD	661-944-8445	Doug.McElvain@water.ca.gov	
Moyle, Joanalyn	DWR-SFD	661-944-8537	Joanalyn.Moyle@water.ca.gov	X
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	X
Velazquez, Gabino	DWR-SFD		Gabino.Velazquez@water.ca.gov	

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Driscoll, Syndi	LADWP	213-367-4363	Syndi.Driscoll@ladwp.com	X X
Fick, Robert	LADWP		Robert.Fick@ladwp.com	X X
Gamez, Ramon	LADWP	213-367-4853	Ramon.Gamez@ladwp.com	
Gomez, Edgar	LADWP		Edgar.Gomez@ladwp.com	X
Gonzalez, Brian	LADWP		brian.gonzalez@ladwp.com	X X
Grison, Chloe	LADWP		chloe.grison@ladwp.com	
Hirashima, Scott	LADWP		Scott.Hirashima@ladwp.com	
Parker, Nadia	LADWP	213-367-1745	Nadia.Parker@ladwp.com	X
Peace, Graham	LADWP		Graham.Peace@ladwp.com	
Rubin, Katherine	LADWP	213-367-0436	Katherine.Rubin@ladwp.com	X
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Westbrook, Aaron	LADWP		Aaron.Westbrook@ladwp.com	X LATE
Zewdu, Simon	LADWP	213-367-2525	simon.zewdu@ladwp.com	
Bowes, Stephen	NPS	415-623-2321	stephen_bowes@nps.gov	
Burr, Doug	Stantec	916-418-8356	douglas.burr@stantec.com	X X
Gilbert, Kirby	Stantec	425-896-6954	Kirby.gilbert@stantec.com	X X

* Call in via Skype

Name	Organization	Phone Number	E-mail	Initial
Miller, Jill	Stantec	916-418-8439	jill.miller2@stantec.com	X
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	X
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	X
Anderson, Kelsha	USDA		kelsha.anderson@usda.gov	
Butler, Jamahl	USFS	818-899-1900	njbutler@fs.fed.us	
Flores, Carlos	USFS		carlosflores@fs.fed.us	
Henriquez-Santos, Jose O.	USFS		jhenriquezsantos@fs.fed.us	X
Seastrand, Justin	USFS		jseastrand@fs.fed.us	
Still, Nathan	USFS		nathan.sill@usda.gov	
Simpson, Lloyd	USFS			X
Taylor, Robert G.	USFS	909-382-2660	rgtaylor@fs.fed.us	X
Ware, Raphaela	USFWS	805-677-3319	raphaela_ware@fws.gov	
Swiger, Mike	VNF		mas@vnf.com	X
Wood, Julia	VNF		JSW@vnf.com	X
ALVARE DAWN				X
UYEHARA, JULIA/JAIME	USFS LANF			X
JAIME	USFS LANF			X
WELCH LESLIE	USFS ANF			X
TRAVIS, DIANE	USFS			X

* Call in via Skype

South SWP Hydropower, FERC Project No. 2426-227

AGENDA

South SWP Hydropower Relicensing Integrated Vegetation Management and Recreation Management

PM&E Collaboration Call

Date: November 1, 2019
Time: 8:30 am – 12:30 pm
Location: Skype Invitation. (916) 330-5000, Conference number: 770787788#
Objectives: To review relicensing participants' redline comments on the Integrated Vegetation Management and the Recreation Management PM&E plans and continue collaborative discussions on plan development for inclusion in the South SWP Hydropower Final License Application.

- Welcome and Roll Call
- Review Agenda
- Meeting Purpose and Status Update
- PM&E Plan Discussions
    - Review Redline Comments on PM&E Plans
        - Integrated Vegetation Management Plan
        - Recreation Management Plan
- Action Items and Next Steps

*Meeting end time may be adjusted depending on progress

SSWP Relicensing Integrated Vegetation Management Plan PM&E Call
Friday, 8:30 AM – 12:30 PM / November 1, 2019
Sign-In Sheet

Name	Organization	Phone Number	E-mail	Initial
Schmoker, Kelly	CDFW		Kelly.schmoker@wildlife.ca.gov	X
Ngo, Mary	CDFW		Mary.Ngo@wildlife.ca.gov	
Tang, Victoria	CDFW		Victoria.Tang@wildlife.ca.gov	
Laumbach, Blaine	DWR		Blaine.Laumbach@water.ca.gov	X
Veldhuizen, Tanya	DWR		Tanya.Veldhuizen@water.ca.gov	X
Gleim, James	DWR-HLPCO	916-541-9025	James.Gleim@water.ca.gov	
Goebl, Scott	DWR-HLPCO	916-557-4561	Scott.Goebl@water.ca.gov	
Knittweis, Gwen	DWR-HLPCO	916-557-4554	Gwen.Knittweis@water.ca.gov	
Lee, Lisa D.	DWR-HLPCO	916-557-4557	Lisa.Lee@water.ca.gov	
McNeil, Jeremiah	DWR-HLPCO	916-557-4555	Jeremiah.McNeil@water.ca.gov	
Miller, Aaron S.	DWR-HLPCO	916-557-4560	Aaron.S.Miller@water.ca.gov	X
Muradyan, Ovsep (Joseph)	DWR-HLPCO		Ovsep.Muradyan@water.ca.gov	
Stoddard, Tera	DWR-HLPCO	916-557-4553	Tera.Stoddard@water.ca.gov	
Salazar, Joseph	DWR-SFD	661-944-8449	Joseph.Salazar@water.ca.gov	X
Lynch, Jim	HDR	916-679-8740	Jim.Lynch@hdrinc.com	
Ettleman, Robert	LA Parks		rettleman@parks.lacounty.gov	
De Vera, Rolando	LADWP	661-294-3254	Rolando.DeVera@ladwp.com	
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* Call in via Skype – attendance indicated with an "X" marked by facilitator

Name	Organization	Phone Number	E-mail	Initial
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Hirashima, Scott	LADWP	213-367-0852	Scott.Hirashima@ladwp.com	
Parker, Nadia	LADWP	213-367-1745	Nadia.Parker@ladwp.com	X
Rubin, Katherine	LADWP	213-367-0436	Katherine.Rubin@ladwp.com	X
Sy, Anton	LADWP	213-367-2332	Anton.Sy@ladwp.com	X
Westbrook, Aaron	LADWP	661-294-3221	Aaron.Westbrook@ladwp.com	
Zewdu. Simon	LADWP	213-367-2525	Simon.Zewdu@ladwp.com	
Bowes, Stephen	NPS	415-623-2321	stephen_bowes@nps.gov	
Burr, Doug	Stantec	916-418-8356	douglas.burr@stantec.com	
Gilbert, Kirby	Stantec	425-896-6954	Kirby.gilbert@stantec.com	X
Messier, Indya	Stantec		Indya.Messier@stantec.com	IM
Miller, Jill	Stantec	916-418-8439	jill.miller2@stantec.com	X
Rorie, Bryan	Stantec	916-669-5974	Bryan.Rorie@stantec.com	BR
Padgett, Karmina	SWRCB	916-323-4642	Karmina.Padgett@Waterboards.ca.gov	
Anderson, Kelsha	USDA		kelsha.anderson@usda.gov	
Travers, Joshua	USDA		joshua.travers@usda.gov	X
Alvarez, Dawn	USFS		dawn.alvarez@usda.gov	
Ash, Aaron	USFS		aaron.ash@usda.gov	

* Call in via Skype – attendance indicated with an "X" marked by facilitator

Name	Organization	Phone Number	E-mail	Initial
Butler, Jamahl	USFS	818-899-1900	njbutler@fs.fed.us	X
Flores, Carlos	USFS		carlosflores@fs.fed.us	
Henriquez-Santos, Jose O.	USFS		jhenriquezsantos@fs.fed.us	X
Seastrand, Justin	USFS		jseastrand@fs.fed.us	X
Shaw, Susan	USFS		susan.shaw@usda.gov	
Taylor, Robert G.	USFS	909-382-2660	rgtaylor@fs.fed.us	X
Uyehara, Julia	USFS		julie.uyehara@usda.gov	
Ware, Raphaela	USFWS	805-677-3319	raphaela_ware@fws.gov	
Brandt, Joseph	USFWS		joseph_brandt@fws.gov	
Holson, John	Stantec	916-397-9832	John.Holson@Stantec.com	JH
JULIA	LADWP LEGAL			X
MOYLE, JOANNA	SFD			X
KYLE	LADWP			X
LLOYD	USFS			X
LESLIE	USFS			X

* Call in via Skype – attendance indicated with an "X" marked by facilitator

Name	Organization	Phone Number	E-mail	Initial

* Call in via Skype – attendance indicated with an "X" marked by facilitator

Appendix D

USDA-NRCS Custom Soil Resource Report of the Quail Lake, Lower Quail Canal, and Quail Detention Embankment Areas

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United States Department of Agriculture

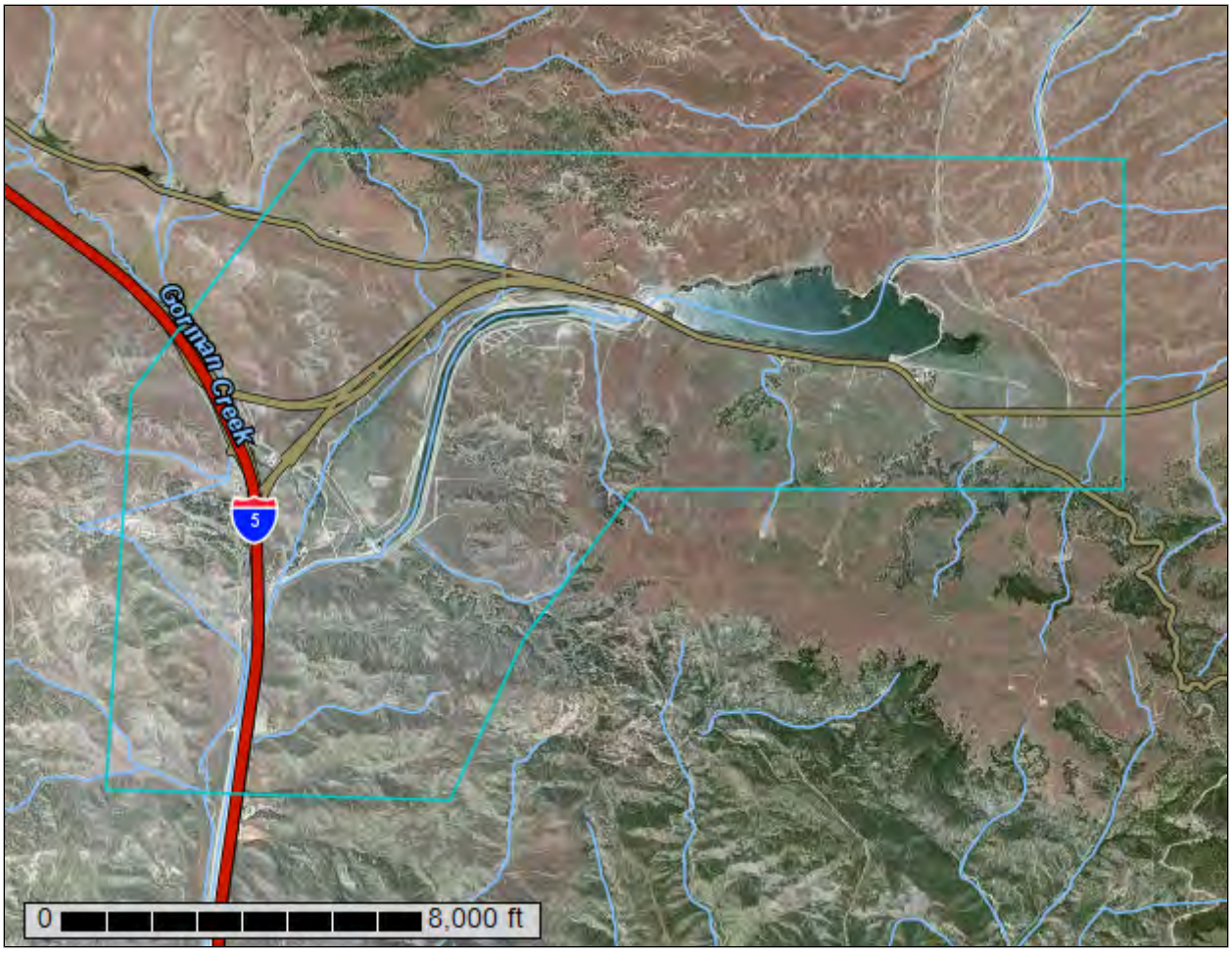
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Angeles National Forest Area, California, and Antelope Valley Area, California

Quail Lake and Lower Quail Canal



November 9, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

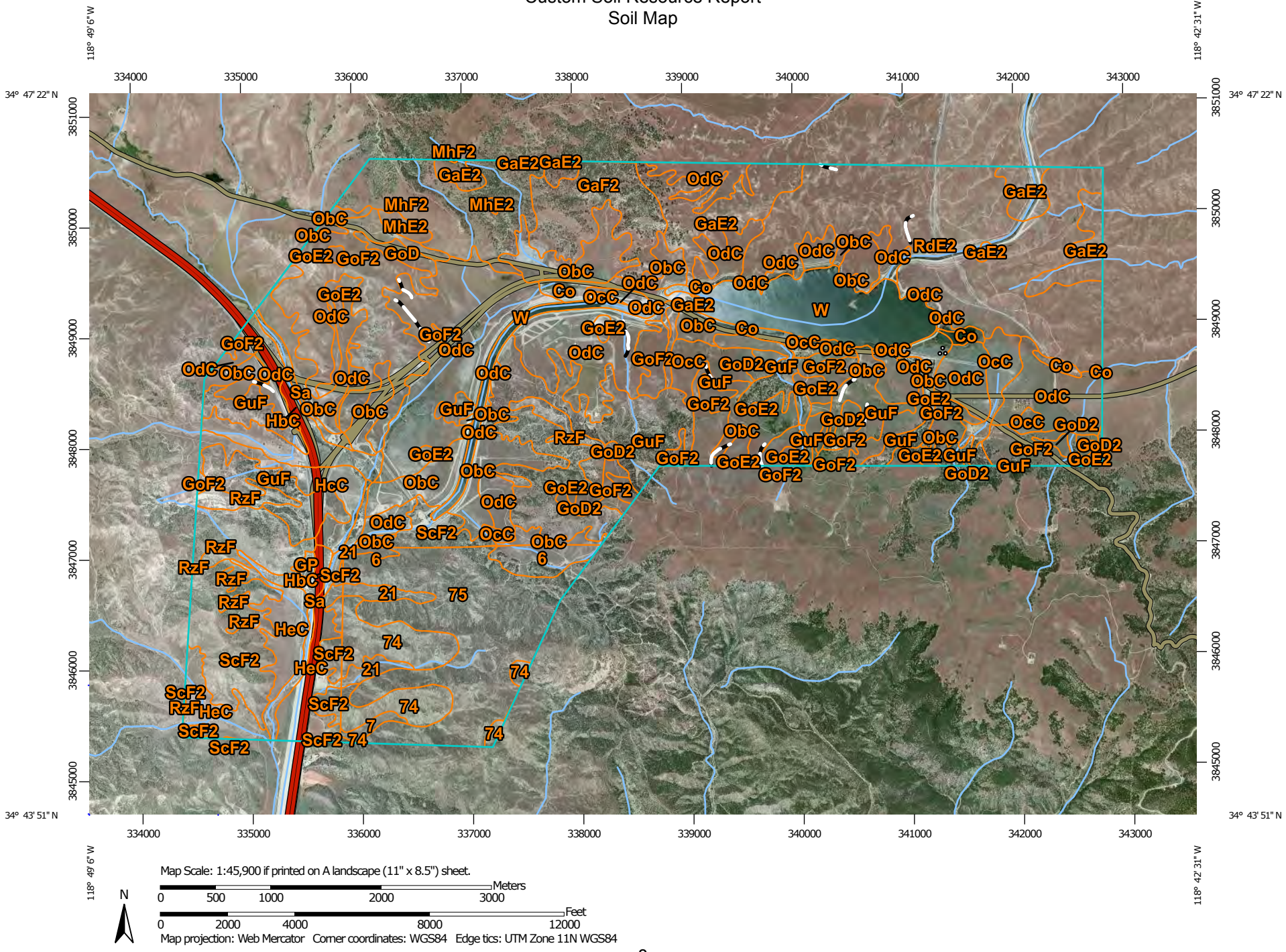
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Angeles National Forest Area, California (CA776)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
6	Typic Haploxeralfs, 3 to 50 percent slopes	58.9	0.8%
7	Hanford family, 3 to 25 percent slopes	13.5	0.2%
21	Riverwash	43.5	0.6%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	175.9	2.4%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	513.1	7.0%
Subtotals for Soil Survey Area		**804.9**	**11.0%**
Totals for Area of Interest		**7,293.8**	**100.0%**

Antelope Valley Area, California (CA675)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Co	Chino loam	63.5	0.9%
GaE2	Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded	302.2	4.1%
GaF2	Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded	202.2	2.8%
GoD	Gorman sandy loam, 9 to 15 percent slopes	22.3	0.3%
GoD2	Gorman sandy loam, 9 to 15 percent slopes, eroded	94.3	1.3%
GoE2	Gorman sandy loam, 15 to 30 percent slopes, eroded	146.4	2.0%
GoF2	Gorman sandy loam, 30 to 50 percent slopes, eroded	743.1	10.2%
GP	Gravel pits	7.0	0.1%
GuF	Gullied land	721.3	9.9%
HbC	Hanford coarse sandy loam, 2 to 9 percent slopes	130.2	1.8%
HcC	Hanford sandy loam, 2 to 9 percent slopes	88.3	1.2%
HeC	Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	231.0	3.2%
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	22.7	0.3%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	263.1	3.6%
ObC	Oak Glen sandy loam, 2 to 9 percent slopes	579.8	7.9%

Antelope Valley Area, California (CA675)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
OcC	Oak Glen gravelly sandy loam, 2 to 9 percent slopes	107.1	1.5%
OdC	Oak Glen loam, 2 to 9 percent slopes	1,037.7	14.2%
RdE2	Ramona sandy loam, 9 to 30 percent slopes, eroded	841.9	11.5%
RzF	Rough broken land	100.6	1.4%
Sa	Sandy alluvial land	67.3	0.9%
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	401.4	5.5%
W	Water	315.4	4.3%
Subtotals for Soil Survey Area		**6,489.0**	**89.0%**
Totals for Area of Interest		**7,293.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Angeles National Forest Area, California

6—Typic Haploxeralfs, 3 to 50 percent slopes

Map Unit Setting

National map unit symbol: hm7m
Elevation: 2,450 to 3,400 feet
Mean annual precipitation: 11 to 16 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Typic haploxeralfs and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Typic Haploxeralfs

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 36 inches: gravelly clay loam
H3 - 36 to 59 inches: weathered bedrock

Properties and qualities

Slope: 3 to 50 percent
Depth to restrictive feature: 15 to 50 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Minor Components

Mollic haploxerolls

Percent of map unit: 10 percent

7—Hanford family, 3 to 25 percent slopes

Map Unit Setting

National map unit symbol: hm80
Elevation: 2,700 to 4,400 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Hanford family and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford Family

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 13 inches: sandy loam
H2 - 13 to 36 inches: fine sandy loam, sandy loam
H2 - 13 to 36 inches: sandy loam
H3 - 36 to 60 inches:

Properties and qualities

Slope: 3 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A

Minor Components

Typic haploxeralfs
Percent of map unit: 5 percent

Vista family
Percent of map unit: 5 percent

Trigo family
Percent of map unit: 5 percent

Hanford family
Percent of map unit: 5 percent

Riverwash
Percent of map unit: 5 percent
Landform: Channels

21—Riverwash

Map Unit Setting
National map unit symbol: hm6p
Elevation: 1,800 to 4,800 feet
Mean annual precipitation: 14 to 30 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Riverwash: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting
Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile
H1 - 0 to 60 inches: extremely stony coarse sand

Properties and qualities
Slope: 2 to 10 percent
Percent of area covered with surface fragments: 25.0 percent
Natural drainage class: Excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Frequency of flooding: Frequent
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Minor Components

Hanford family
Percent of map unit: 7 percent

Vista family
Percent of map unit: 6 percent

Capistrano family
Percent of map unit: 6 percent

Tujunga family
Percent of map unit: 6 percent

74—Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes

Map Unit Setting
National map unit symbol: hm87
Elevation: 2,200 to 3,730 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Scarps
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 10 inches: unweathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Minor Components

Rubble land

Percent of map unit: 4 percent

Unnamed, colluvial soils

Percent of map unit: 3 percent

Trigo family, fine textured

Percent of map unit: 3 percent

75—Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: hm88
Elevation: 2,400 to 4,000 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Haploxeralfs and similar soils: 15 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxeralfs

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 15 inches: gravelly clay loam, gravelly sandy clay loam
H2 - 6 to 15 inches: unweathered bedrock
H3 - 15 to 19 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 7 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Minor Components

Osito family

Percent of map unit: 3 percent

Unnamed, moderately deep soils

Percent of map unit: 3 percent

Modesto family

Percent of map unit: 3 percent

Rock outcrop

Percent of map unit: 2 percent

Vertic xerochrepts
Percent of map unit: 2 percent

Caperton family
Percent of map unit: 2 percent

Antelope Valley Area, California

Co—Chino loam

Map Unit Setting

National map unit symbol: hcdd
Elevation: 3,100 feet
Mean annual precipitation: 8 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 230 to 340 days
Farmland classification: Prime farmland if irrigated and drained

Map Unit Composition

Chino and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chino

Setting

Landform: Valleys
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 16 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: WET MEADOW 9-20" (R019XD067CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Hanford
Percent of map unit: 2 percent

Mocho
Percent of map unit: 1 percent

Sorrento
Percent of map unit: 1 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

GaE2—Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcdk
Elevation: 100 to 4,000 feet
Mean annual precipitation: 8 to 20 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

Gaviota and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gaviota

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Very low (about 1.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Millsholm
Percent of map unit: 4 percent

Rock outcrop
Percent of map unit: 3 percent

Unnamed
Percent of map unit: 3 percent
Landform: Drainageways

GaF2—Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded

Map Unit Setting
National map unit symbol: hcdl
Elevation: 100 to 4,000 feet
Mean annual precipitation: 8 to 20 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition
Gaviota and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gaviota

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 14 inches: sandy loam
H2 - 14 to 17 inches: unweathered bedrock

Properties and qualities
Slope: 30 to 50 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Millsholm
Percent of map unit: 5 percent

Rock outcrop
Percent of map unit: 2 percent

Saugus
Percent of map unit: 2 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

GoD—Gorman sandy loam, 9 to 15 percent slopes

Map Unit Setting
National map unit symbol: hcdq
Elevation: 4,000 to 4,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Gorman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gorman

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Alluvium derived from granite

Typical profile
H1 - 0 to 43 inches: sandy loam
H2 - 43 to 84 inches: sandy clay loam

Properties and qualities
Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed
Percent of map unit: 10 percent

Oak glen
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

GoD2—Gorman sandy loam, 9 to 15 percent slopes, eroded

Map Unit Setting
National map unit symbol: hcdr
Elevation: 4,000 to 4,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Gorman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gorman

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 30 inches: sandy loam
H2 - 30 to 60 inches: sandy clay loam

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Oak glen

Percent of map unit: 4 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

GoE2—Gorman sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcds
Elevation: 4,000 to 4,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 55 degrees F

Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gorman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gorman

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 43 inches: sandy loam
H2 - 43 to 60 inches: sandy clay loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Oak glen

Percent of map unit: 4 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

GoF2—Gorman sandy loam, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcdt
Elevation: 4,000 to 4,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gorman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gorman

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 25 inches: sandy loam
H2 - 25 to 60 inches: sandy clay loam

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed
Percent of map unit: 10 percent

Oak glen
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

GP—Gravel pits

Map Unit Composition
Gravel pits: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gravel Pits

Setting
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and gravelly alluvium

GuF—Gullied land

Map Unit Composition
Gullied land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gullied Land

Setting
Landform position (two-dimensional): Backslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum

Typical profile
H1 - 0 to 60 inches: variable

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Minor Components

Gorman
Percent of map unit: 3 percent

Ramona
Percent of map unit: 3 percent

Seridan
Percent of map unit: 3 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

HbC—Hanford coarse sandy loam, 2 to 9 percent slopes

Map Unit Setting
National map unit symbol: hcf2
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Hanford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
H1 - 0 to 8 inches: coarse sandy loam
H2 - 8 to 39 inches: sandy loam, coarse sandy loam
H2 - 8 to 39 inches: gravelly loamy coarse sand, gravelly coarse sandy loam
H3 - 39 to 70 inches:
H3 - 39 to 70 inches:

Properties and qualities
Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Greenfield

Percent of map unit: 8 percent

Ramona

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 2 percent

HcC—Hanford sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf5
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 70 inches: fine sandy loam, sandy loam
H2 - 8 to 70 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 14.5 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Greenfield

Percent of map unit: 10 percent

Unnamed

Percent of map unit: 5 percent

HeC—Hanford sandy loam, calcareous variant, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf7
Elevation: 2,800 to 3,000 feet
Mean annual precipitation: 10 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford Variant

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 36 inches: fine sandy loam, coarse sandy loam
H2 - 16 to 36 inches: sandy loam
H3 - 36 to 56 inches: sandy loam, coarse sandy loam
H4 - 56 to 80 inches:
H4 - 56 to 80 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Hanford

Percent of map unit: 5 percent

MhE2—Millsholm rocky loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcfs
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 50 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 110 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Millsholm and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsholm

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Gaviota

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 3 percent
Landform: Drainageways

Castaic

Percent of map unit: 2 percent

MhF2—Millsholm rocky loam, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcft
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 50 inches

Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 110 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Millsholm and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsholm

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 5 percent

Castaic

Percent of map unit: 3 percent

Gaviota

Percent of map unit: 1 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

ObC—Oak Glen sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcg1
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Oak glen and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oak Glen

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 32 inches: sandy loam
H2 - 32 to 60 inches: fine sandy loam, sandy loam, coarse sandy loam
H2 - 32 to 60 inches:
H2 - 32 to 60 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Hanford
Percent of map unit: 10 percent

Unnamed
Percent of map unit: 5 percent

OcC—Oak Glen gravelly sandy loam, 2 to 9 percent slopes

Map Unit Setting
National map unit symbol: hcg2
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Oak glen and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oak Glen

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
H1 - 0 to 32 inches: gravelly sandy loam
H2 - 32 to 60 inches: gravelly fine sandy loam, gravelly sandy loam, gravelly coarse sandy loam
H2 - 32 to 60 inches:
H2 - 32 to 60 inches:

Properties and qualities
Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Oak glen

Percent of map unit: 5 percent

OdC—Oak Glen loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcg4
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Oak glen and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oak Glen

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 40 inches: loam
H2 - 40 to 60 inches: fine sandy loam, sandy loam, coarse sandy loam
H2 - 40 to 60 inches:
H2 - 40 to 60 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R020XE024CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Oak glen

Percent of map unit: 5 percent

RdE2—Ramona sandy loam, 9 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcgm
Elevation: 2,700 to 3,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ramona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: sandy loam
H2 - 12 to 23 inches: fine sandy loam
H3 - 23 to 90 inches: sandy clay loam

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Vernalis

Percent of map unit: 5 percent

Gullied land

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 4 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

RzF—Rough broken land

Map Unit Setting

National map unit symbol: hch4
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Rough broken land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rough Broken Land

Setting

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank

Down-slope shape: Concave
Across-slope shape: Concave

Typical profile
H1 - 0 to 60 inches: variable

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Minor Components

Gullied land
Percent of map unit: 5 percent

Badlands
Percent of map unit: 5 percent

Rock outcrop
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Flood plains

Sa—Sandy alluvial land

Map Unit Setting
National map unit symbol: hch5
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition
Sandy alluvial land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile
H1 - 0 to 10 inches: sand
H2 - 10 to 30 inches: stratified sand to loam
H3 - 30 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 10 inches
Frequency of flooding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B
Ecological site: SANDY 9-20" (R020XE025CA)

Minor Components

Riverwash

Percent of map unit: 10 percent
Landform: Drainageways

Unnamed

Percent of map unit: 5 percent

ScF2—Saugus loam, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hch8
Elevation: 600 to 2,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Saugus and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saugus

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Weakly consoildated alluvium

Typical profile

H1 - 0 to 15 inches: loam
H2 - 15 to 42 inches: loam, sandy loam
H2 - 15 to 42 inches: weathered bedrock
H3 - 42 to 46 inches:

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Gaviota

Percent of map unit: 5 percent

Rough broken land

Percent of map unit: 5 percent

Balcom

Percent of map unit: 3 percent

Castaic

Percent of map unit: 2 percent

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

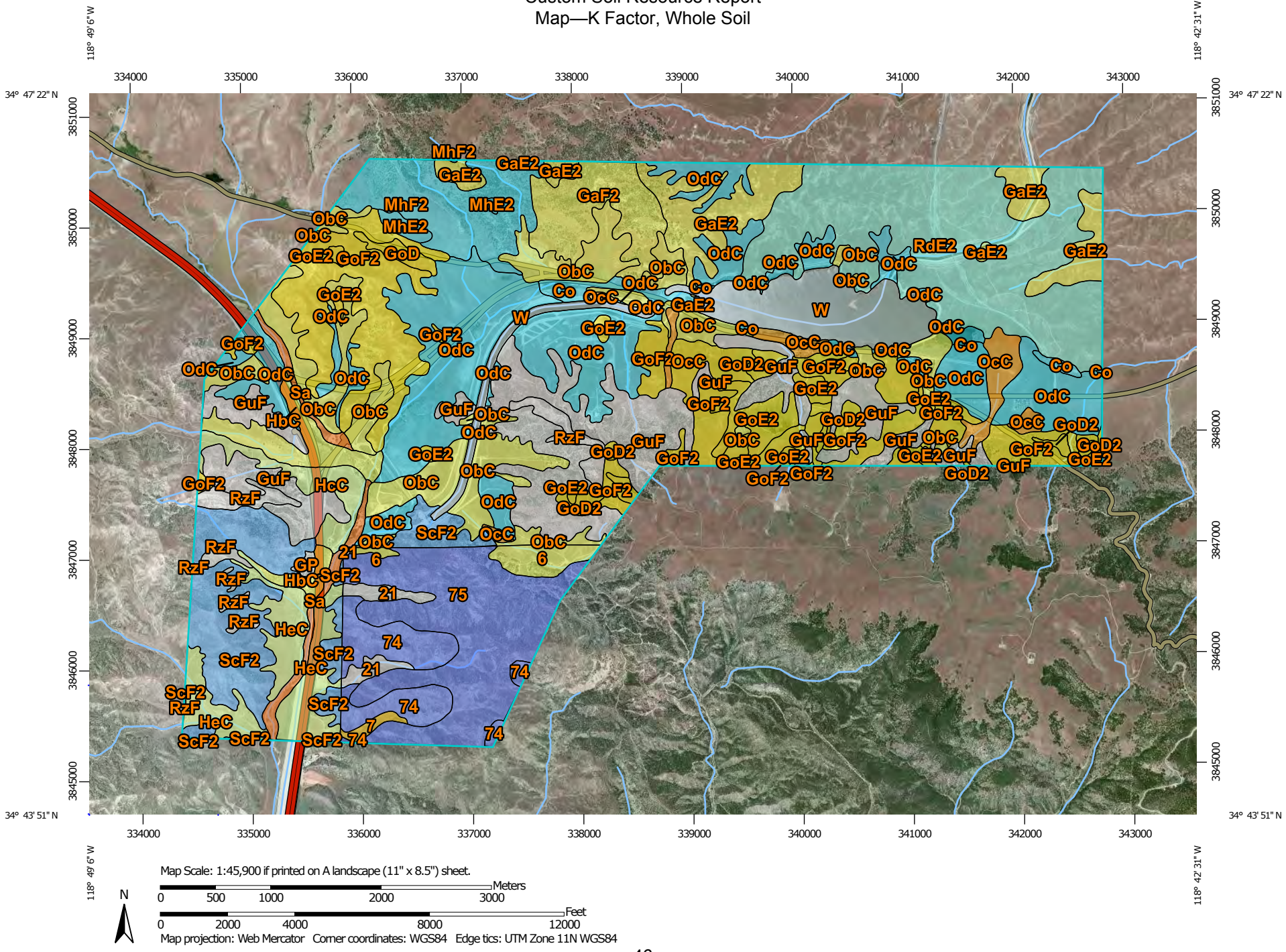
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Custom Soil Resource Report
Map—K Factor, Whole Soil



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
6	Typic Haploxeralfs, 3 to 50 percent slopes	.20	58.9	0.8%
7	Hanford family, 3 to 25 percent slopes	.15	13.5	0.2%
21	Riverwash		43.5	0.6%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	.49	175.9	2.4%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	.49	513.1	7.0%
Subtotals for Soil Survey Area			**804.9**	**11.0%**
Totals for Area of Interest			**7,293.8**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Co	Chino loam	.37	63.5	0.9%
GaE2	Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded	.20	302.2	4.1%
GaF2	Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded	.20	202.2	2.8%
GoD	Gorman sandy loam, 9 to 15 percent slopes	.17	22.3	0.3%
GoD2	Gorman sandy loam, 9 to 15 percent slopes, eroded	.17	94.3	1.3%
GoE2	Gorman sandy loam, 15 to 30 percent slopes, eroded	.17	146.4	2.0%
GoF2	Gorman sandy loam, 30 to 50 percent slopes, eroded	.17	743.1	10.2%
GP	Gravel pits		7.0	0.1%
GuF	Gullied land		721.3	9.9%
HbC	Hanford coarse sandy loam, 2 to 9 percent slopes	.20	130.2	1.8%
HcC	Hanford sandy loam, 2 to 9 percent slopes	.24	88.3	1.2%
HeC	Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	.24	231.0	3.2%

K Factor, Whole Soil— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	.37	22.7	0.3%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	.37	263.1	3.6%
ObC	Oak Glen sandy loam, 2 to 9 percent slopes	.20	579.8	7.9%
OcC	Oak Glen gravelly sandy loam, 2 to 9 percent slopes	.10	107.1	1.5%
OdC	Oak Glen loam, 2 to 9 percent slopes	.37	1,037.7	14.2%
RdE2	Ramona sandy loam, 9 to 30 percent slopes, eroded	.32	841.9	11.5%
RzF	Rough broken land		100.6	1.4%
Sa	Sandy alluvial land	.05	67.3	0.9%
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	.43	401.4	5.5%
W	Water		315.4	4.3%
Subtotals for Soil Survey Area			**6,489.0**	**89.0%**
Totals for Area of Interest			**7,293.8**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

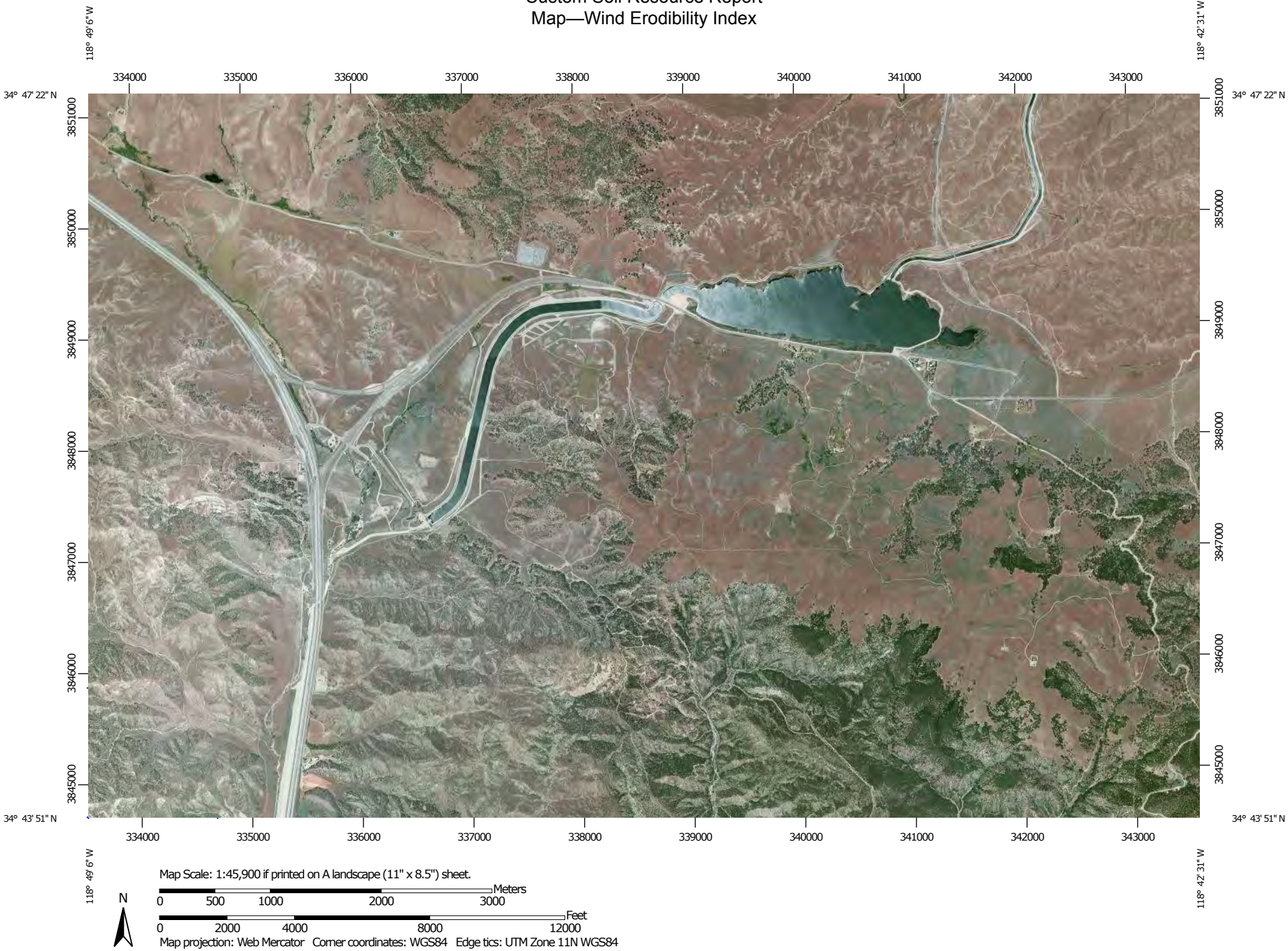
Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Wind Erodibility Index

The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Custom Soil Resource Report
Map—Wind Erodibility Index



Map Scale: 1:45,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Soil Rating Lines

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Soil Rating Points

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Wind Erodibility Index

Wind Erodibility Index— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
6	Typic Haploxeralfs, 3 to 50 percent slopes	48	58.9	0.8%
7	Hanford family, 3 to 25 percent slopes	86	13.5	0.2%
21	Riverwash	180	43.5	0.6%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	56	175.9	2.4%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	56	513.1	7.0%
Subtotals for Soil Survey Area			**804.9**	**11.0%**
Totals for Area of Interest			**7,293.8**	**100.0%**

Wind Erodibility Index— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
Co	Chino loam	48	63.5	0.9%
GaE2	Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded	56	302.2	4.1%
GaF2	Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded	56	202.2	2.8%
GoD	Gorman sandy loam, 9 to 15 percent slopes	86	22.3	0.3%
GoD2	Gorman sandy loam, 9 to 15 percent slopes, eroded	86	94.3	1.3%
GoE2	Gorman sandy loam, 15 to 30 percent slopes, eroded	86	146.4	2.0%
GoF2	Gorman sandy loam, 30 to 50 percent slopes, eroded	86	743.1	10.2%
GP	Gravel pits		7.0	0.1%
GuF	Gullied land		721.3	9.9%
HbC	Hanford coarse sandy loam, 2 to 9 percent slopes	86	130.2	1.8%
HcC	Hanford sandy loam, 2 to 9 percent slopes	86	88.3	1.2%

Wind Erodibility Index— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
HeC	Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	86	231.0	3.2%
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	48	22.7	0.3%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	48	263.1	3.6%
ObC	Oak Glen sandy loam, 2 to 9 percent slopes	86	579.8	7.9%
OcC	Oak Glen gravelly sandy loam, 2 to 9 percent slopes	56	107.1	1.5%
OdC	Oak Glen loam, 2 to 9 percent slopes	56	1,037.7	14.2%
RdE2	Ramona sandy loam, 9 to 30 percent slopes, eroded	86	841.9	11.5%
RzF	Rough broken land		100.6	1.4%
Sa	Sandy alluvial land	220	67.3	0.9%
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	56	401.4	5.5%
W	Water		315.4	4.3%
Subtotals for Soil Survey Area			**6,489.0**	**89.0%**
Totals for Area of Interest			**7,293.8**	**100.0%**

Rating Options—Wind Erodibility Index

Units of Measure: tons per acre per year

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix E

USDA-NRCS Custom Soil Resource Report of the Peace Valley Areas

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United States Department of Agriculture

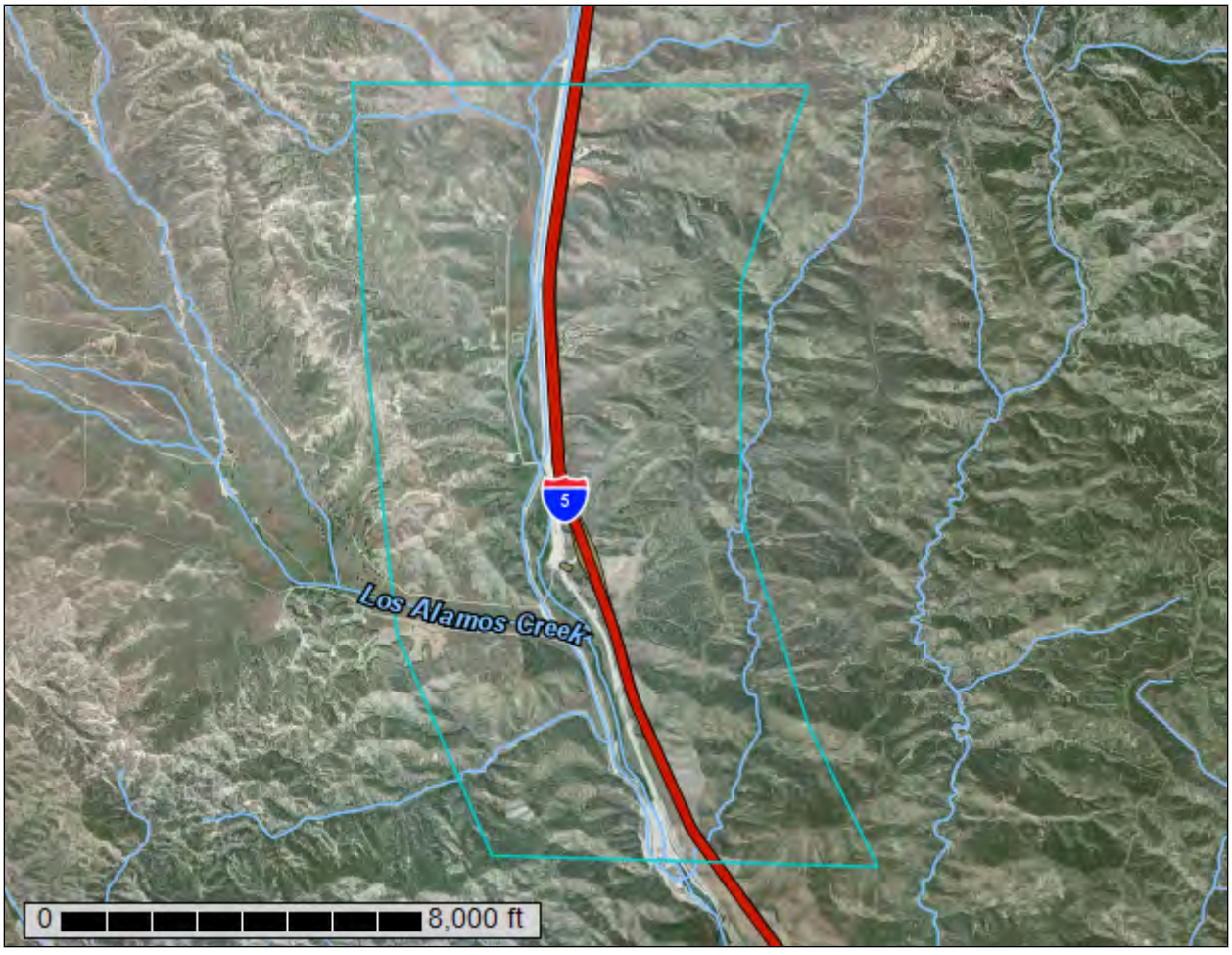
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Angeles National Forest Area, California, and Antelope Valley Area, California

Peace Valley



November 9, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

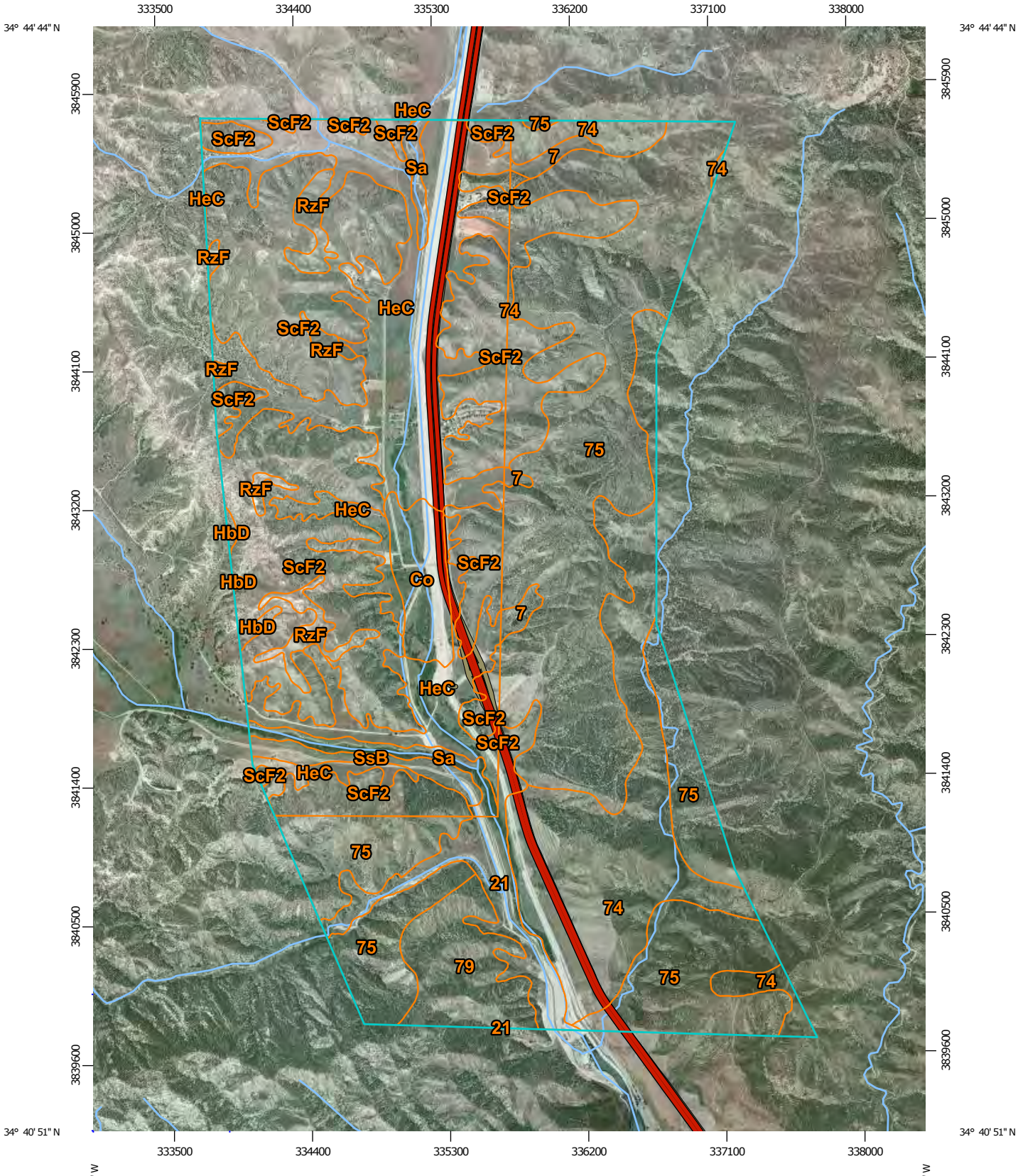
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:35,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 500 1000 2000 3000

Feet: 0 1500 3000 6000 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Angeles National Forest Area, California (CA776)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
7	Hanford family, 3 to 25 percent slopes	28.7	0.7%
21	Riverwash	141.7	3.3%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	670.1	15.6%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	1,279.2	29.7%
79	Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes	140.6	3.3%
Subtotals for Soil Survey Area		**2,260.3**	**52.6%**
Totals for Area of Interest		**4,300.3**	**100.0%**

Antelope Valley Area, California (CA675)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Co	Chino loam	86.0	2.0%
HbD	Hanford coarse sandy loam, 9 to 15 percent slopes	10.4	0.2%
HeC	Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	709.5	16.5%
RzF	Rough broken land	81.0	1.9%
Sa	Sandy alluvial land	57.5	1.3%
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	1,056.9	24.6%
SsB	Sorrento loam, 2 to 5 percent slopes	38.7	0.9%
Subtotals for Soil Survey Area		**2,040.0**	**47.4%**
Totals for Area of Interest		**4,300.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape,

however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and

relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Angeles National Forest Area, California

7—Hanford family, 3 to 25 percent slopes

Map Unit Setting

National map unit symbol: hm80
Elevation: 2,700 to 4,400 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Hanford family and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford Family

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 13 inches: sandy loam
H2 - 13 to 36 inches: fine sandy loam, sandy loam
H2 - 13 to 36 inches: sandy loam
H3 - 36 to 60 inches:

Properties and qualities

Slope: 3 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A

Minor Components

Typic haploxeralfs

Percent of map unit: 5 percent

Vista family

Percent of map unit: 5 percent

Trigo family
Percent of map unit: 5 percent

Hanford family
Percent of map unit: 5 percent

Riverwash
Percent of map unit: 5 percent
Landform: Channels

21—Riverwash

Map Unit Setting

National map unit symbol: hm6p
Elevation: 1,800 to 4,800 feet
Mean annual precipitation: 14 to 30 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 60 inches: extremely stony coarse sand

Properties and qualities

Slope: 2 to 10 percent
Percent of area covered with surface fragments: 25.0 percent
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Frequency of flooding: Frequent
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Minor Components

Hanford family
Percent of map unit: 7 percent

Vista family
Percent of map unit: 6 percent

Capistrano family
Percent of map unit: 6 percent

Tujunga family
Percent of map unit: 6 percent

74—Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes

Map Unit Setting
National map unit symbol: hm87
Elevation: 2,200 to 3,730 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities
Slope: 60 to 100 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock

Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Scarps
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 10 inches: unweathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Minor Components

Rubble land

Percent of map unit: 4 percent

Unnamed, colluvial soils

Percent of map unit: 3 percent

Trigo family, fine textured

Percent of map unit: 3 percent

75—Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: hm88
Elevation: 2,400 to 4,000 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Haploxeralfs and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities
Slope: 30 to 70 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities
Slope: 30 to 70 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxeralfs

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 15 inches: gravelly clay loam, gravelly sandy clay loam
H2 - 6 to 15 inches: unweathered bedrock
H3 - 15 to 19 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 7 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Minor Components

Osito family

Percent of map unit: 3 percent

Unnamed, moderately deep soils

Percent of map unit: 3 percent

Modesto family

Percent of map unit: 3 percent

Rock outcrop

Percent of map unit: 2 percent

Vertic xerochrepts

Percent of map unit: 2 percent

Caperton family

Percent of map unit: 2 percent

79—Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes

Map Unit Setting

National map unit symbol: hm8c
Elevation: 2,500 to 4,000 feet
Mean annual precipitation: 15 to 21 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 45 percent
Lodo family and similar soils: 25 percent
Haploxerolls, warm, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 20 inches:

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Lodo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from schist

Typical profile

H1 - 0 to 17 inches: gravelly loam
H2 - 17 to 21 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 6 to 19 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxerolls, Warm

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium derived from sandstone and/or colluvium derived from schist

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 60 inches: very gravelly loam, very gravelly sandy loam
H2 - 10 to 60 inches: weathered bedrock
H3 - 60 to 64 inches:

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 60 to 60 inches to paralithic bedrock
Natural drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Mollic haploxeralfs

Percent of map unit: 5 percent

Caperton family

Percent of map unit: 5 percent

Antelope Valley Area, California

Co—Chino loam

Map Unit Setting

National map unit symbol: hcdd
Elevation: 3,100 feet
Mean annual precipitation: 8 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 230 to 340 days
Farmland classification: Prime farmland if irrigated and drained

Map Unit Composition

Chino and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chino

Setting

Landform: Valleys
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 16 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: WET MEADOW 9-20" (R019XD067CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Hanford
Percent of map unit: 2 percent

Mocho
Percent of map unit: 1 percent

Sorrento
Percent of map unit: 1 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

HbD—Hanford coarse sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hcf3
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hanford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: coarse sandy loam
H2 - 8 to 39 inches: sandy loam, coarse sandy loam
H2 - 8 to 39 inches: gravelly loamy coarse sand, gravelly coarse sandy loam
H3 - 39 to 70 inches:
H3 - 39 to 70 inches:

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Unnamed

Percent of map unit: 5 percent

Ramona

Percent of map unit: 5 percent

Greenfield

Percent of map unit: 5 percent

HeC—Hanford sandy loam, calcareous variant, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf7
Elevation: 2,800 to 3,000 feet
Mean annual precipitation: 10 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford Variant

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 36 inches: fine sandy loam, coarse sandy loam
H2 - 16 to 36 inches: sandy loam

H3 - 36 to 56 inches: sandy loam, coarse sandy loam
H4 - 56 to 80 inches:
H4 - 56 to 80 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Unnamed

Percent of map unit: 10 percent

Hanford

Percent of map unit: 5 percent

RzF—Rough broken land

Map Unit Setting

National map unit symbol: hch4
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Rough broken land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rough Broken Land

Setting

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave

Typical profile
H1 - 0 to 60 inches: variable

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Minor Components

Gullied land
Percent of map unit: 5 percent

Badlands
Percent of map unit: 5 percent

Rock outcrop
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Flood plains

Sa—Sandy alluvial land

Map Unit Setting
National map unit symbol: hch5
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition
Sandy alluvial land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile
H1 - 0 to 10 inches: sand
H2 - 10 to 30 inches: stratified sand to loam
H3 - 30 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities
Slope: 0 to 2 percent

Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 10 inches
Frequency of flooding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B
Ecological site: SANDY 9-20" (R020XE025CA)

Minor Components

Riverwash
Percent of map unit: 10 percent
Landform: Drainageways

Unnamed
Percent of map unit: 5 percent

ScF2—Saugus loam, 30 to 50 percent slopes, eroded

Map Unit Setting
National map unit symbol: hch8
Elevation: 600 to 2,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition
Saugus and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saugus

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Weakly consoildated alluvium

Typical profile
H1 - 0 to 15 inches: loam
H2 - 15 to 42 inches: loam, sandy loam

H2 - 15 to 42 inches: weathered bedrock
H3 - 42 to 46 inches:

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Gaviota

Percent of map unit: 5 percent

Rough broken land

Percent of map unit: 5 percent

Balcom

Percent of map unit: 3 percent

Castaic

Percent of map unit: 2 percent

SsB—Sorrento loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hchh
Elevation: 80 to 1,800 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Sorrento and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sorrento

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 72 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Minor Components

Metz

Percent of map unit: 5 percent

Mocho

Percent of map unit: 5 percent

Yolo

Percent of map unit: 5 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

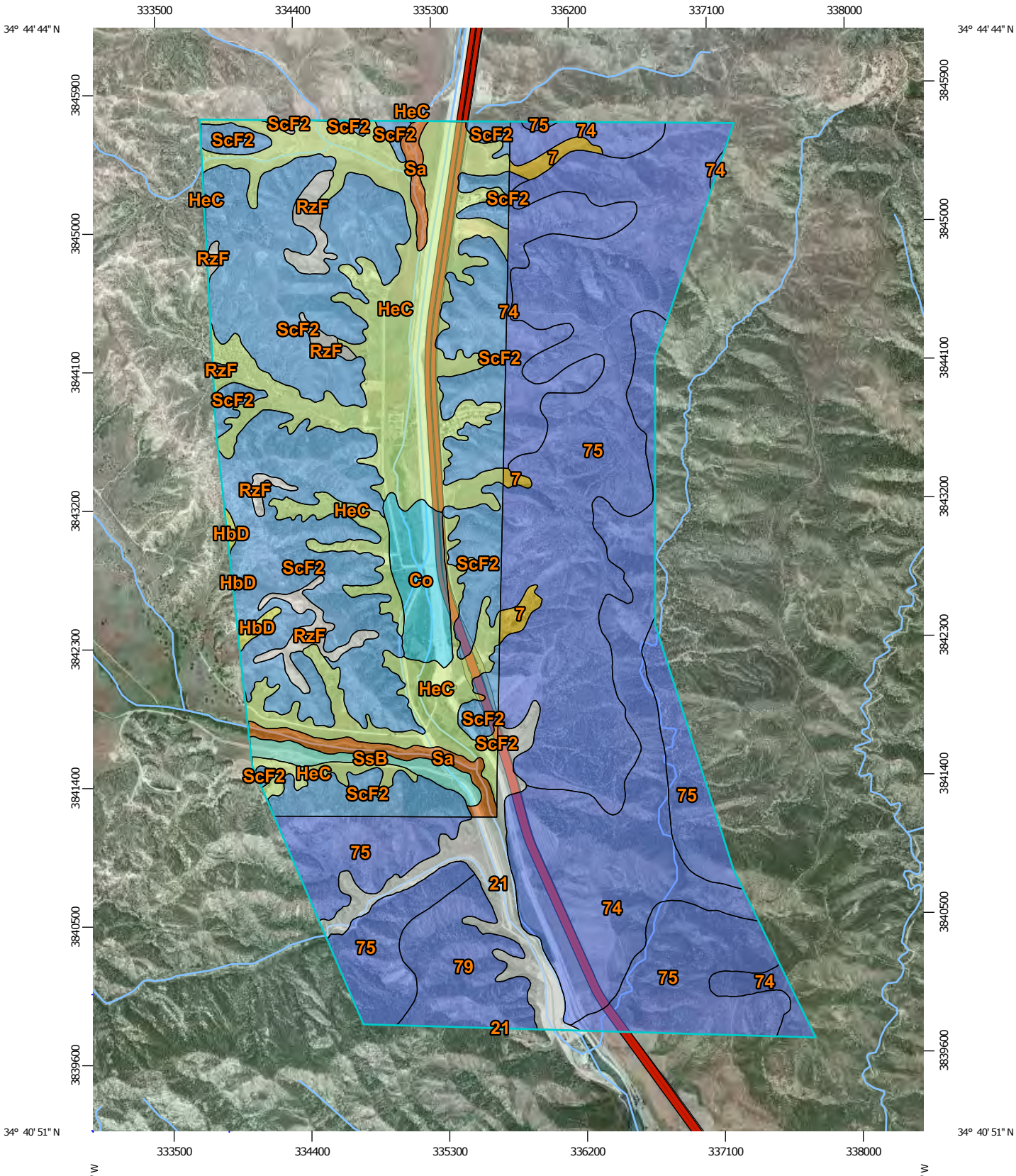
Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.


118° 49' 23" W
118° 45' 50" W
34° 44' 44" N
34° 40' 51" N
333500
334400
335300
336200
337100
338000
3845900
3845000
3844100
3843200
3842300
3841400
3840500
3839600
HeC
ScF2
RzF
Sa
75
74
7
HbD
Co
SsB
21
79
Map Scale: 1:35,000 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
500
1000
2000
3000
Feet
0
1500
3000
6000
9000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
7	Hanford family, 3 to 25 percent slopes	.15	28.7	0.7%
21	Riverwash		141.7	3.3%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	.49	670.1	15.6%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	.49	1,279.2	29.7%
79	Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes	.49	140.6	3.3%
Subtotals for Soil Survey Area			**2,260.3**	**52.6%**
Totals for Area of Interest			**4,300.3**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Co	Chino loam	.37	86.0	2.0%
HbD	Hanford coarse sandy loam, 9 to 15 percent slopes	.20	10.4	0.2%
HeC	Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	.24	709.5	16.5%
RzF	Rough broken land		81.0	1.9%
Sa	Sandy alluvial land	.05	57.5	1.3%
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	.43	1,056.9	24.6%
SsB	Sorrento loam, 2 to 5 percent slopes	.32	38.7	0.9%
Subtotals for Soil Survey Area			**2,040.0**	**47.4%**
Totals for Area of Interest			**4,300.3**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

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Appendix F

USDA-NRCS Custom Soil Resource Report of the Pyramid Dam and Lake Areas

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United States Department of Agriculture

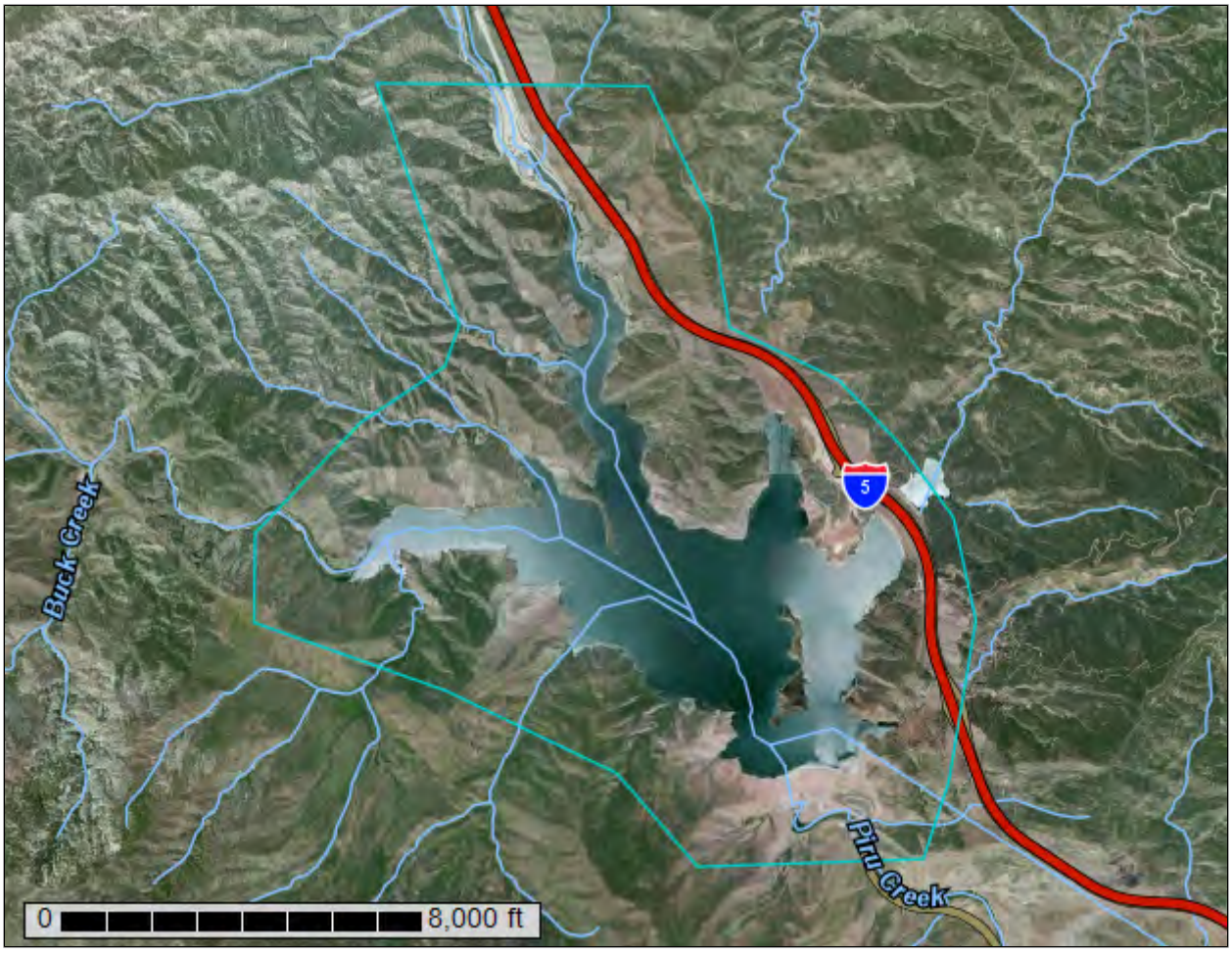
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Angeles National Forest Area, California, and Los Padres National Forest Area, California

Pyramid Dam and Lake



November 9, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

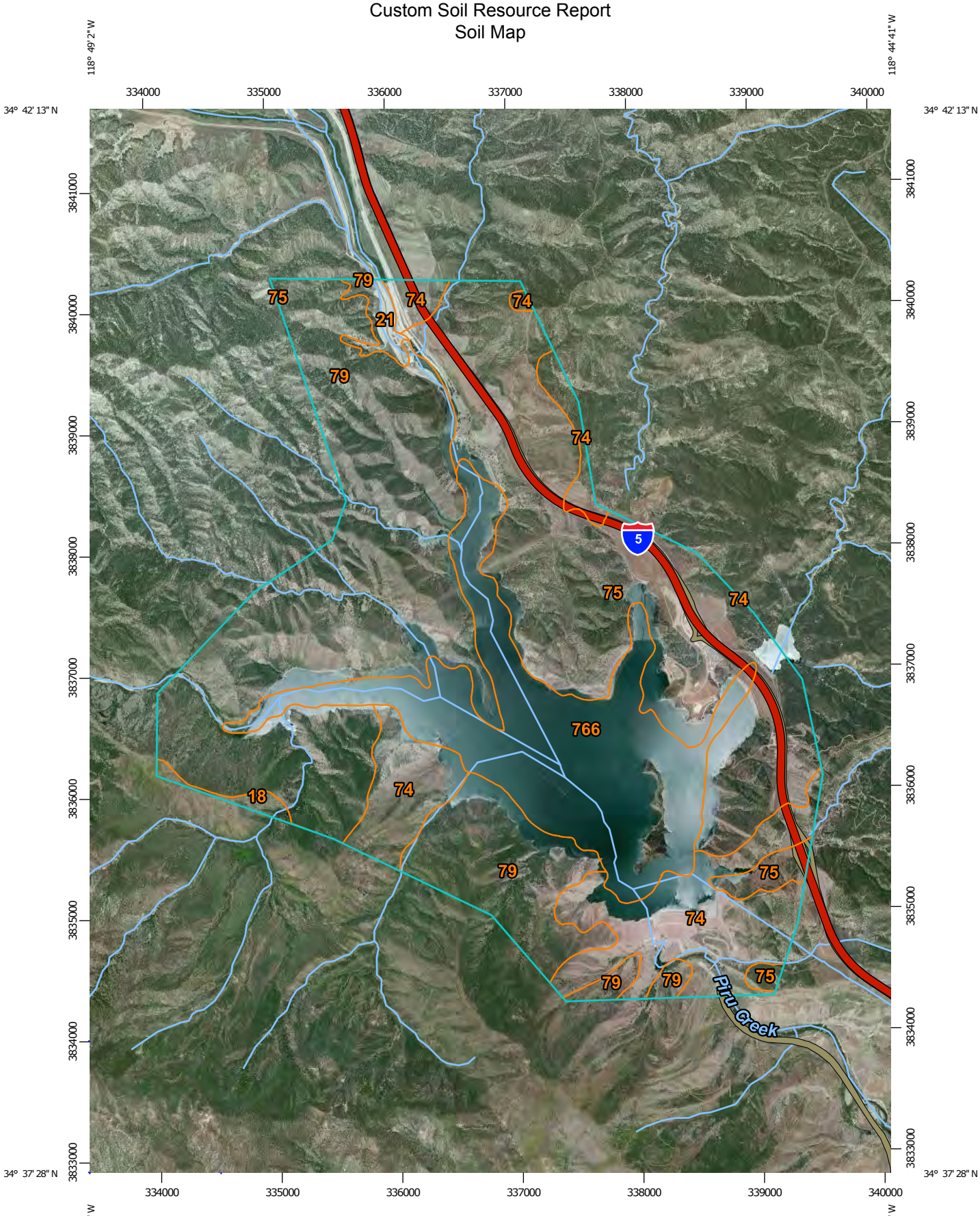
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:42,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Los Padres National Forest Area, California
Survey Area Data: Version 7, Sep 3, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Angeles National Forest Area, California (CA776)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
21	Riverwash	44.9	0.9%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	690.2	14.1%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	1,399.2	28.5%
79	Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes	1,839.1	37.5%
766	Water	910.7	18.5%
Subtotals for Soil Survey Area		**4,884.1**	**99.5%**
Totals for Area of Interest		**4,909.8**	**100.0%**

Los Padres National Forest Area, California (CA772)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
18	Lodo-Modjeska-Botella families association, 10 to 70 percent slopes	25.6	0.5%
Subtotals for Soil Survey Area		**25.6**	**0.5%**
Totals for Area of Interest		**4,909.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a

particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Angeles National Forest Area, California

21—Riverwash

Map Unit Setting

National map unit symbol: hm6p
Elevation: 1,800 to 4,800 feet
Mean annual precipitation: 14 to 30 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 60 inches: extremely stony coarse sand

Properties and qualities

Slope: 2 to 10 percent
Percent of area covered with surface fragments: 25.0 percent
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Frequency of flooding: Frequent
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Minor Components

Hanford family

Percent of map unit: 7 percent

Vista family

Percent of map unit: 6 percent

Capistrano family

Percent of map unit: 6 percent

Tujunga family

Percent of map unit: 6 percent

74—Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes

Map Unit Setting

National map unit symbol: hm87
Elevation: 2,200 to 3,730 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Scarps
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 10 inches: unweathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Minor Components

Rubble land
Percent of map unit: 4 percent

Unnamed, colluvial soils
Percent of map unit: 3 percent

Trigo family, fine textured
Percent of map unit: 3 percent

75—Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes

Map Unit Setting
National map unit symbol: hm88
Elevation: 2,400 to 4,000 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Haploxeralfs and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities
Slope: 30 to 70 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock

Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxeralfs

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 15 inches: gravelly clay loam, gravelly sandy clay loam
H2 - 6 to 15 inches: unweathered bedrock
H3 - 15 to 19 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 7 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Minor Components

Osito family

Percent of map unit: 3 percent

Unnamed, moderately deep soils

Percent of map unit: 3 percent

Modesto family

Percent of map unit: 3 percent

Rock outcrop

Percent of map unit: 2 percent

Vertic xerochrepts

Percent of map unit: 2 percent

Caperton family

Percent of map unit: 2 percent

79—Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes

Map Unit Setting

National map unit symbol: hm8c
Elevation: 2,500 to 4,000 feet
Mean annual precipitation: 15 to 21 inches

Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 45 percent
Lodo family and similar soils: 25 percent
Haploxerolls, warm, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 20 inches:

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Lodo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from schist

Typical profile

H1 - 0 to 17 inches: gravelly loam
H2 - 17 to 21 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 6 to 19 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxerolls, Warm

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium derived from sandstone and/or colluvium derived from schist

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 60 inches: very gravelly loam, very gravelly sandy loam
H2 - 10 to 60 inches: weathered bedrock
H3 - 60 to 64 inches:

Properties and qualities

Slope: 50 to 90 percent
Depth to restrictive feature: 60 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Mollic haploxeralfs

Percent of map unit: 5 percent

Caperton family
Percent of map unit: 5 percent

766—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Los Padres National Forest Area, California

18—Lodo-Modjeska-Botella families association, 10 to 70 percent slopes

Map Unit Setting

National map unit symbol: hm54
Elevation: 1,300 to 5,800 feet
Mean annual precipitation: 14 to 22 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Modjeska family and similar soils: 30 percent
Lodo family and similar soils: 30 percent
Botella family and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lodo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 7 inches: sandy loam
H2 - 7 to 16 inches: gravelly sandy loam
H3 - 16 to 26 inches: unweathered bedrock

Properties and qualities

Slope: 10 to 70 percent
Depth to restrictive feature: 15 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Modjeska Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 13 inches: sandy loam
H2 - 13 to 27 inches: extremely gravelly sandy loam, very gravelly sandy loam
H2 - 13 to 27 inches: unweathered bedrock
H3 - 27 to 31 inches:

Properties and qualities

Slope: 10 to 70 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Description of Botella Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 9 inches: sandy loam
H2 - 9 to 40 inches: gravelly sandy loam, gravelly sandy clay loam
H2 - 9 to 40 inches: unweathered bedrock
H3 - 40 to 44 inches:

Properties and qualities

Slope: 10 to 70 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Minor Components

Rock outcrop
Percent of map unit: 7 percent

Oak glen family
Percent of map unit: 7 percent

Chualar family
Percent of map unit: 6 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

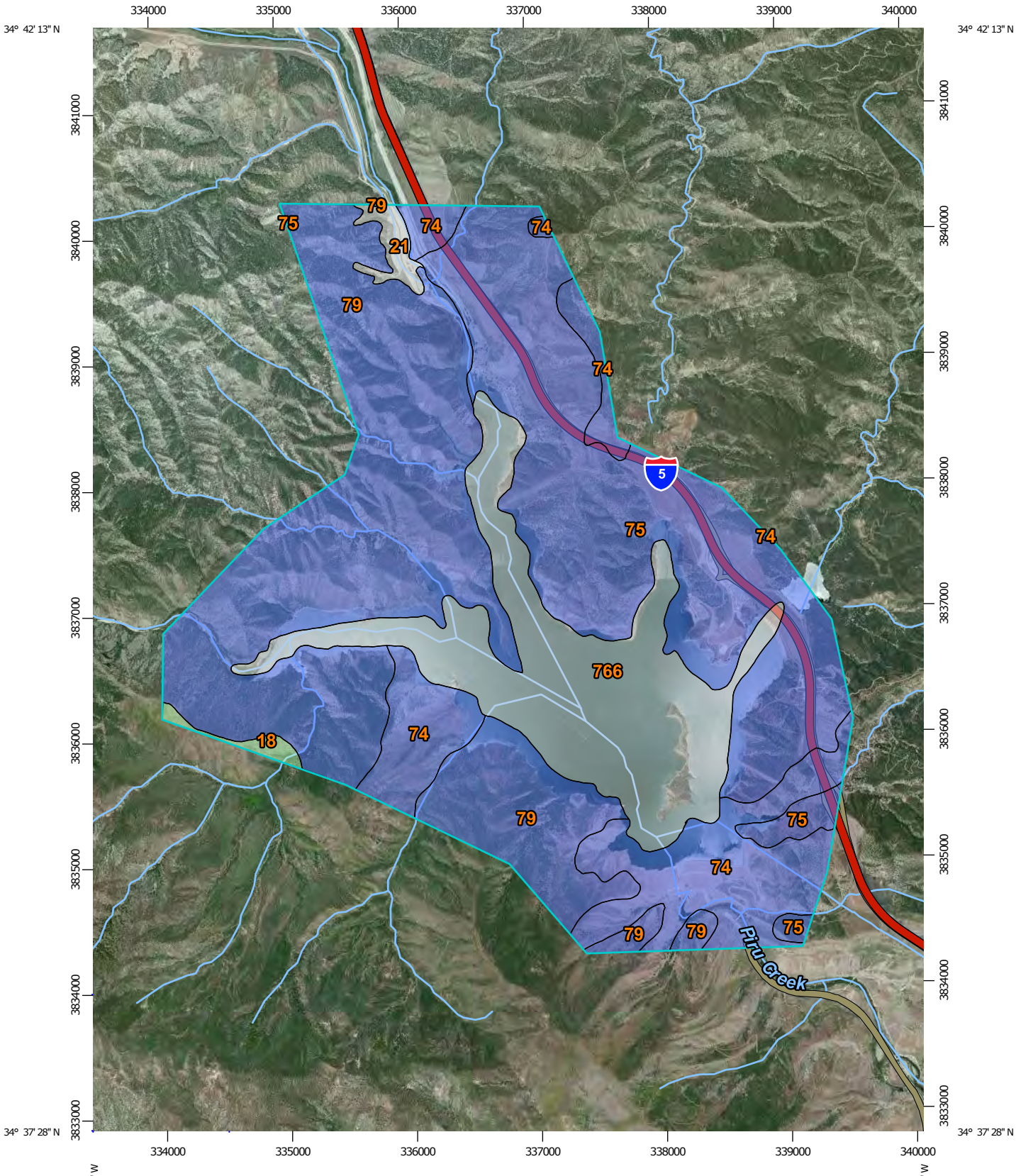
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Custom Soil Resource Report
Map—K Factor, Whole Soil



Map Scale: 1:42,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Los Padres National Forest Area, California
Survey Area Data: Version 7, Sep 3, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
21	Riverwash		44.9	0.9%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	.49	690.2	14.1%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	.49	1,399.2	28.5%
79	Trigo-Lodo families-Haploxerolls, warm complex, 50 to 90 percent slopes	.49	1,839.1	37.5%
766	Water		910.7	18.5%
Subtotals for Soil Survey Area			**4,884.1**	**99.5%**
Totals for Area of Interest			**4,909.8**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Los Padres National Forest Area, California (CA772)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
18	Lodo-Modjeska-Botella families association, 10 to 70 percent slopes	.28	25.6	0.5%
Subtotals for Soil Survey Area			**25.6**	**0.5%**
Totals for Area of Interest			**4,909.8**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

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Appendix G

USDA-NRCS Custom Soil Resource Report of the Castaic Penstocks and Powerplant Areas and Elderberry Forebay Dam and Forebay Area

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United States Department of Agriculture

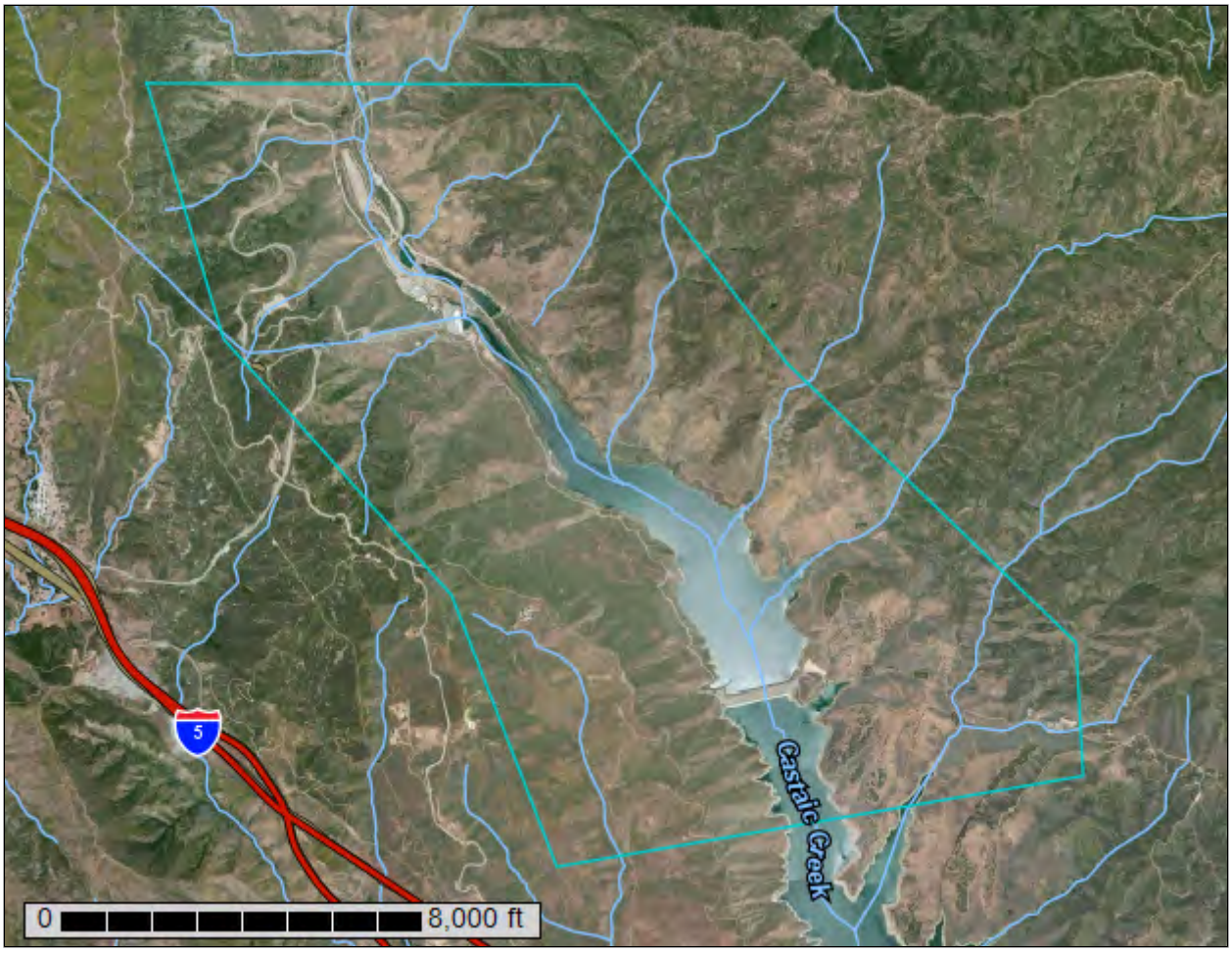
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Angeles National Forest Area, California, and Antelope Valley Area, California

Castaic-Elderberry



November 9, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

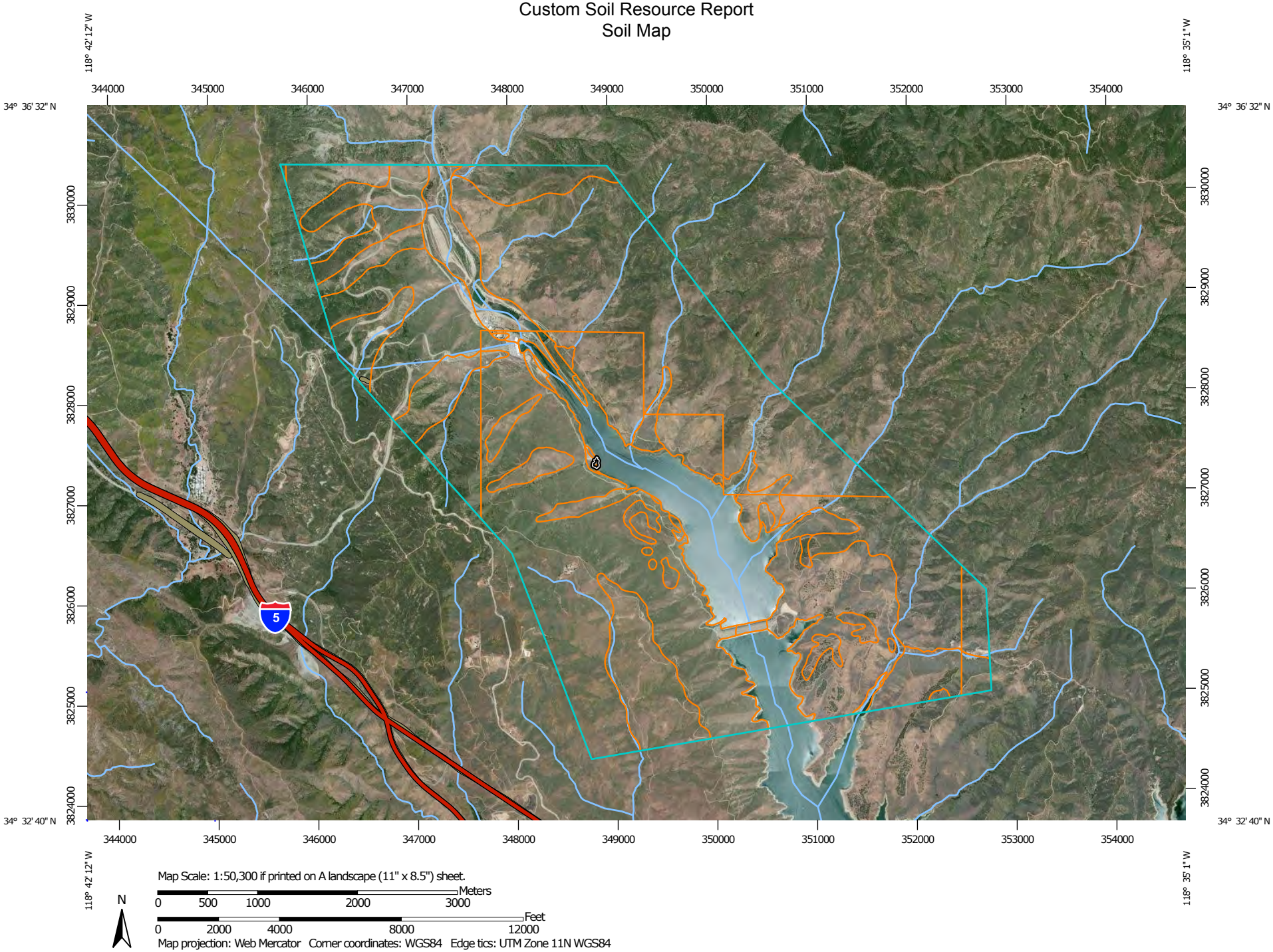
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Angeles National Forest Area, California (CA776)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
19	Trigo family-Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes	27.0	0.5%
21	Riverwash	149.7	2.6%
26	Stonyford-Millsholm families complex, 30 to 70 percent slopes	1,195.7	21.0%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	361.1	6.3%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	589.2	10.3%
82	Vertic Xerochrepts, 5 to 50 percent slopes	1.4	0.0%
316	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes	99.8	1.8%
714	Trigo-Millsholm families-Rock outcrop complex, 45 to 90 percent slopes	0.1	0.0%
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	37.7	0.7%
Subtotals for Soil Survey Area		**2,461.7**	**43.2%**
Totals for Area of Interest		**5,697.8**	**100.0%**

Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CmE	Castaic-Balcom silty clay loams, 15 to 30 percent slopes	97.5	1.7%
CmF	Castaic-Balcom silty clay loams, 30 to 50 percent slopes	846.7	14.9%
CmF2	Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded	103.9	1.8%
CnG3	Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded	99.5	1.7%
CyA	Cortina sandy loam, 0 to 2 percent slopes	15.0	0.3%
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	27.4	0.5%

Antelope Valley Area, California (CA675)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	34.5	0.6%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	1,406.6	24.7%
RcD	Ramona coarse sandy loam, 9 to 15 percent slopes	5.0	0.1%
Sa	Sandy alluvial land	37.5	0.7%
W	Water	554.5	9.7%
YoC	Yolo loam, 2 to 9 percent slopes	8.0	0.1%
Subtotals for Soil Survey Area		**3,236.1**	**56.8%**
Totals for Area of Interest		**5,697.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that

have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Angeles National Forest Area, California

19—Trigo family-Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: hm6n
Elevation: 430 to 2,200 feet
Mean annual precipitation: 12 to 22 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 35 percent
Calcixerollic xerochrepts and similar soils: 30 percent
Vista family and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone and shale

Typical profile

A - 0 to 3 inches: loam
C - 3 to 17 inches: gravelly sandy loam
Cr - 17 to 21 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calcixerollic Xerochrepts

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 5 inches: clay loam
H2 - 5 to 39 inches: clay loam, loam
H2 - 5 to 39 inches: weathered bedrock
H3 - 39 to 59 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 15 to 42 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Very high (about 12.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Description of Vista Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

A - 0 to 9 inches: sandy loam
B1 - 9 to 29 inches: sandy loam
B2 - 29 to 50 inches: sandy loam
C - 50 to 60 inches: gravelly coarse sandy loam
Cr - 60 to 79 inches: bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Minor Components

Rock outcrop

Percent of map unit: 4 percent

Modesto family

Percent of map unit: 4 percent

Millsholm family

Percent of map unit: 4 percent

Trigo family, silt loam surface

Percent of map unit: 3 percent

21—Riverwash

Map Unit Setting

National map unit symbol: hm6p
Elevation: 1,800 to 4,800 feet
Mean annual precipitation: 14 to 30 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 60 inches: extremely stony coarse sand

Properties and qualities

Slope: 2 to 10 percent

Percent of area covered with surface fragments: 25.0 percent
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Frequency of flooding: Frequent
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Minor Components

Hanford family
Percent of map unit: 7 percent

Vista family
Percent of map unit: 6 percent

Capistrano family
Percent of map unit: 6 percent

Tujunga family
Percent of map unit: 6 percent

26—Stonyford-Millsholm families complex, 30 to 70 percent slopes

Map Unit Setting
National map unit symbol: hm6r
Elevation: 1,800 to 3,700 feet
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Stonyford family and similar soils: 50 percent
Millsholm family and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stonyford Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: gravelly clay loam
H2 - 5 to 19 inches: gravelly clay loam
H3 - 19 to 29 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Millsholm Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: clay loam
H2 - 5 to 17 inches: clay loam
H3 - 17 to 27 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 12 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Minor Components

Rock outcrop
Percent of map unit: 4 percent

Modesto family
Percent of map unit: 4 percent

Typic haploxeralfs
Percent of map unit: 4 percent

Exchequer family
Percent of map unit: 4 percent

Lodo family
Percent of map unit: 4 percent

74—Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes

Map Unit Setting

National map unit symbol: hm87
Elevation: 2,200 to 3,730 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 60 to 100 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Scarps
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile
H1 - 0 to 10 inches: unweathered bedrock

Properties and qualities
Slope: 60 to 100 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Minor Components

Rubble land
Percent of map unit: 4 percent

Unnamed, colluvial soils
Percent of map unit: 3 percent

Trigo family, fine textured
Percent of map unit: 3 percent

75—Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes

Map Unit Setting
National map unit symbol: hm88
Elevation: 2,400 to 4,000 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Trigo family and similar soils: 35 percent
Calleguas family and similar soils: 30 percent
Haploxeralfs and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 59 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Calleguas Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 11 inches: silt loam
H3 - 11 to 15 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Haploxeralfs

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 15 inches: gravelly clay loam, gravelly sandy clay loam
H2 - 6 to 15 inches: unweathered bedrock
H3 - 15 to 19 inches:

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 7 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Minor Components

Osito family

Percent of map unit: 3 percent

Unnamed, moderately deep soils

Percent of map unit: 3 percent

Modesto family

Percent of map unit: 3 percent

Rock outcrop

Percent of map unit: 2 percent

Vertic xerochrepts

Percent of map unit: 2 percent

Caperton family

Percent of map unit: 2 percent

82—Vertic Xerochrepts, 5 to 50 percent slopes

Map Unit Setting

National map unit symbol: hm8f
Elevation: 2,200 to 4,000 feet
Mean annual precipitation: 19 to 22 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Vertic xerochrepts and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vertic Xerochrepts

Setting

Landform: Mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous shale

Typical profile

H1 - 0 to 8 inches: silty clay
H2 - 8 to 30 inches: channery silty clay, silty clay
H2 - 8 to 30 inches: weathered bedrock
H3 - 30 to 34 inches:

Properties and qualities

Slope: 5 to 50 percent
Depth to restrictive feature: 18 to 45 inches to paralithic bedrock
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D

Minor Components

Unnamed, deep, well developed soil
Percent of map unit: 13 percent

Osito family
Percent of map unit: 12 percent

316—Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes

Map Unit Setting
National map unit symbol: hm6z
Elevation: 430 to 5,500 feet
Mean annual precipitation: 11 to 30 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Rock outcrop: 40 percent
Chilao family and similar soils: 35 percent
Haploxerolls, warm, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile
R - 0 to 10 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 120 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Description of Chilao Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

A - 0 to 5 inches: gravelly loam
C - 5 to 18 inches: very cobbly loam, very gravelly loam, very gravelly sandy loam
C - 5 to 18 inches: weathered bedrock
C - 5 to 18 inches:
C - 18 to 28 inches:

Properties and qualities

Slope: 15 to 85 percent
Depth to restrictive feature: 6 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e
Hydrologic Soil Group: D

Description of Haploxerolls, Warm

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainbase
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium

Typical profile

A - 0 to 10 inches: gravelly loam
C - 10 to 60 inches: very gravelly loam, very gravelly sandy loam
C - 10 to 60 inches: weathered bedrock
Cr - 60 to 70 inches:

Properties and qualities

Slope: 15 to 85 percent
Depth to restrictive feature: 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e
Hydrologic Soil Group: A

Minor Components

Shortcut family

Percent of map unit: 2 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex

Exchequer family

Percent of map unit: 2 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex

Lodo family

Percent of map unit: 2 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave

Hanford family

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex

Modjeska family

Percent of map unit: 1 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex

Vista family

Percent of map unit: 1 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave

714—Trigo-Millsholm families-Rock outcrop complex, 45 to 90 percent slopes

Map Unit Setting

National map unit symbol: hm82
Elevation: 1,800 to 4,200 feet
Mean annual precipitation: 15 to 21 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Trigo family and similar soils: 45 percent
Millsholm families and similar soils: 20 percent
Rock outcrop: 15 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 16 inches: gravelly silt loam, gravelly loam
H2 - 8 to 16 inches: weathered bedrock
H3 - 16 to 20 inches:

Properties and qualities

Slope: 45 to 90 percent
Depth to restrictive feature: 3 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 3.97 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Millsholm Families

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: clay loam
H2 - 5 to 17 inches: clay loam
H3 - 17 to 21 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 90 percent
Depth to restrictive feature: 12 to 19 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 90 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Natural drainage class: Excessively drained
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8e

Minor Components

Modesto, mod deep family
Percent of map unit: 7 percent

Osito family
Percent of map unit: 7 percent

Chilao family, mod deep
Percent of map unit: 6 percent

CzC—Cortina cobbly sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: v5jh
Elevation: 30 to 2,400 feet
Mean annual precipitation: 12 to 40 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cortina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cortina

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 6 inches: cobbly sandy loam
H2 - 6 to 60 inches: stratified very cobbly sandy loam to very gravelly sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: SANDY 9-20" (R019XD065CA)

Minor Components

Metz

Percent of map unit: 10 percent

Unnamed

Percent of map unit: 4 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

Antelope Valley Area, California

CmE—Castaic-Balcom silty clay loams, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hcd7
Elevation: 50 to 2,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Castaic and similar soils: 50 percent
Balcom and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castaic

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 26 inches: silty clay loam
H3 - 26 to 30 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 22 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Description of Balcom

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 10 inches: silty clay loam
H2 - 10 to 28 inches: silty clay loam
H3 - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Minor Components

Saugus

Percent of map unit: 9 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

CmF—Castaic-Balcom silty clay loams, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hcd8
Elevation: 50 to 2,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 to 63 degrees F

Frost-free period: 280 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Castaic and similar soils: 50 percent
Balcom and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castaic

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 11 inches: silty clay loam
H2 - 11 to 28 inches: silty clay loam
H3 - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 22 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Description of Balcom

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 10 inches: silty clay loam
H2 - 10 to 28 inches: silty clay loam

H3 - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Minor Components

Gaviota

Percent of map unit: 4 percent

Saugus

Percent of map unit: 3 percent

Unnamed

Percent of map unit: 3 percent
Landform: Drainageways

CmF2—Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcd9
Elevation: 50 to 2,500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Castaic and similar soils: 50 percent
Balcom and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castaic

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 26 inches: silty clay loam
H3 - 26 to 30 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 22 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Description of Balcom

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 25 inches: silty clay loam
H3 - 25 to 29 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY 9-20" (R019XD063CA)

Minor Components

Saugus

Percent of map unit: 4 percent

Gaviota

Percent of map unit: 3 percent

Unnamed

Percent of map unit: 3 percent
Landform: Drainageways

CnG3—Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcdc
Elevation: 50 to 2,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Castaic and similar soils: 45 percent
Saugus and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castaic

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 26 inches: silty clay loam
H3 - 26 to 30 inches: weathered bedrock

Properties and qualities

Slope: 30 to 65 percent
Depth to restrictive feature: 22 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Description of Saugus

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 40 inches: loam, sandy loam
H2 - 8 to 40 inches: weathered bedrock
H3 - 40 to 44 inches:

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 35 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Minor Components

Balcom
Percent of map unit: 10 percent

Unnamed
Percent of map unit: 10 percent
Landform: Drainageways

CyA—Cortina sandy loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: hcdf
Elevation: 30 to 2,400 feet
Mean annual precipitation: 8 to 40 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Cortina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cortina

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile
H1 - 0 to 12 inches: sandy loam
H2 - 12 to 28 inches: very gravelly sandy loam
H3 - 28 to 60 inches: very cobbly sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: SANDY 9-20" (R019XD065CA)

Minor Components

Metz

Percent of map unit: 10 percent

Unnamed

Percent of map unit: 4 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

CzC—Cortina cobbly sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcdh
Elevation: 30 to 2,400 feet
Mean annual precipitation: 12 to 40 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cortina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cortina

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 6 inches: cobbly sandy loam
H2 - 6 to 60 inches: stratified very cobbly sandy loam to very gravelly sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups
Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: SANDY 9-20" (R019XD065CA)

Minor Components

Metz
Percent of map unit: 10 percent

Unnamed
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

MhE2—Millsholm rocky loam, 15 to 30 percent slopes, eroded

Map Unit Setting
National map unit symbol: hcfs
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 50 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 110 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition
Millsholm and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsholm

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile
H1 - 0 to 16 inches: loam

H2 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Gaviota

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 3 percent
Landform: Drainageways

Castaic

Percent of map unit: 2 percent

MhF2—Millsholm rocky loam, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcft
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 50 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 110 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Millsholm and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsholm

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY 9-20" (R019XD066CA)

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 5 percent

Castaic

Percent of map unit: 3 percent

Gaviota

Percent of map unit: 1 percent

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways

RcD—Ramona coarse sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hcgl
Elevation: 2,700 to 3,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 210 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ramona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: coarse sandy loam
H2 - 20 to 31 inches: fine sandy loam
H3 - 31 to 90 inches: sandy clay loam

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Greenfield
Percent of map unit: 5 percent

Hanford
Percent of map unit: 5 percent

Unnamed
Percent of map unit: 4 percent

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways

Sa—Sandy alluvial land

Map Unit Setting
National map unit symbol: hch5
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition
Sandy alluvial land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile
H1 - 0 to 10 inches: sand
H2 - 10 to 30 inches: stratified sand to loam
H3 - 30 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities
Slope: 0 to 2 percent
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 10 inches
Frequency of flooding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B
Ecological site: SANDY 9-20" (R020XE025CA)

Minor Components

Riverwash

Percent of map unit: 10 percent
Landform: Drainageways

Unnamed

Percent of map unit: 5 percent

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

YoC—Yolo loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcj9
Elevation: 30 to 400 feet
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Yolo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yolo

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 72 inches: loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: LOAMY 9-20" (R019XD064CA)

Minor Components

Metz

Percent of map unit: 5 percent

Sorrento

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 5 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

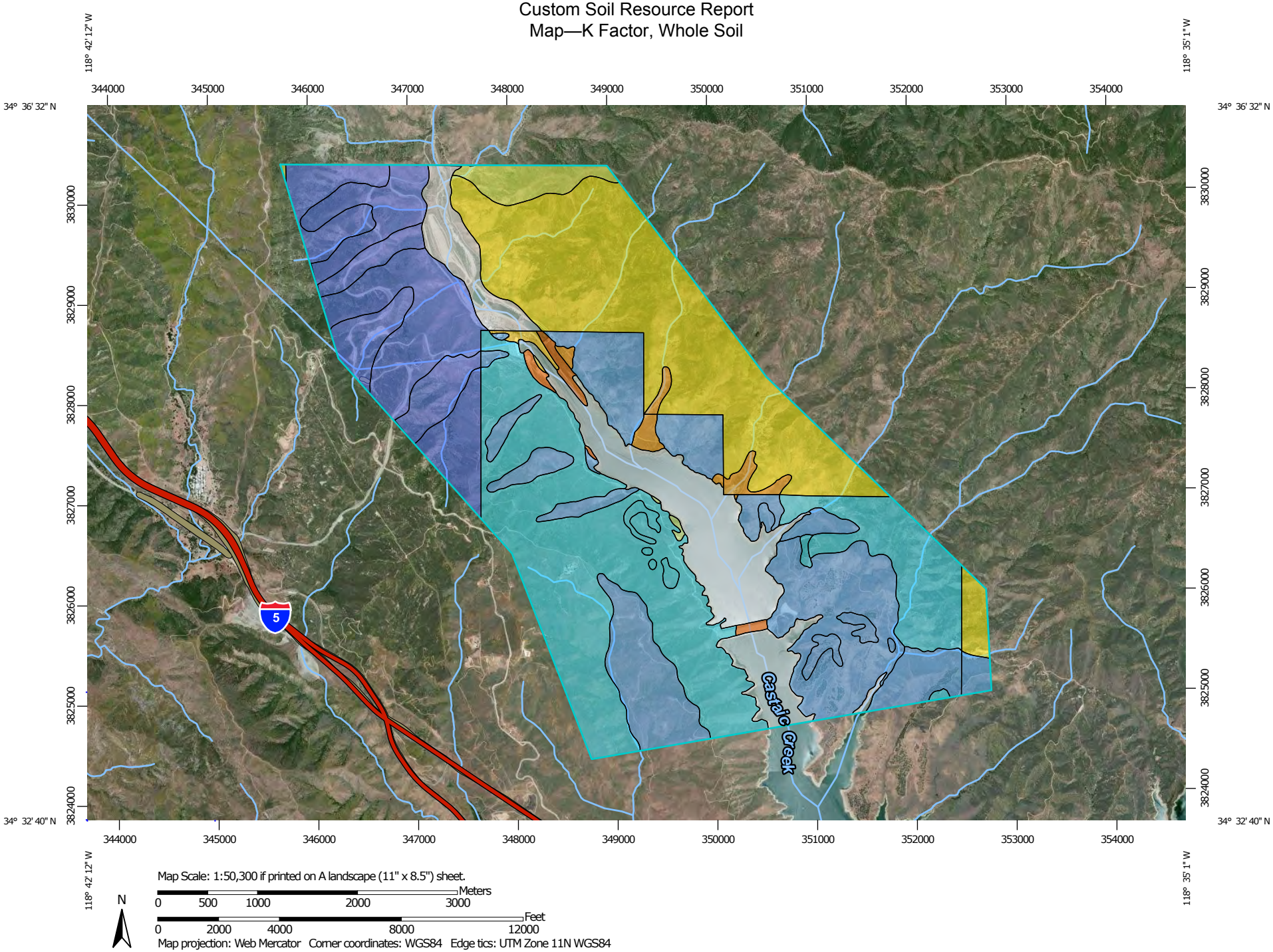
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Custom Soil Resource Report
Map—K Factor, Whole Soil



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
19	Trigo family-Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes	.43	27.0	0.5%
21	Riverwash		149.7	2.6%
26	Stonyford-Millsholm families complex, 30 to 70 percent slopes	.17	1,195.7	21.0%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	.49	361.1	6.3%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	.49	589.2	10.3%
82	Vertic Xerochrepts, 5 to 50 percent slopes	.20	1.4	0.0%
316	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes	.20	99.8	1.8%
714	Trigo-Millsholm families-Rock outcrop complex, 45 to 90 percent slopes	.49	0.1	0.0%
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	.10	37.7	0.7%
Subtotals for Soil Survey Area			**2,461.7**	**43.2%**
Totals for Area of Interest			**5,697.8**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CmE	Castaic-Balcom silty clay loams, 15 to 30 percent slopes	.43	97.5	1.7%
CmF	Castaic-Balcom silty clay loams, 30 to 50 percent slopes	.43	846.7	14.9%
CmF2	Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded	.43	103.9	1.8%
CnG3	Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded	.43	99.5	1.7%
CyA	Cortina sandy loam, 0 to 2 percent slopes	.15	15.0	0.3%

K Factor, Whole Soil— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	.10	27.4	0.5%
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	.37	34.5	0.6%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	.37	1,406.6	24.7%
RcD	Ramona coarse sandy loam, 9 to 15 percent slopes	.24	5.0	0.1%
Sa	Sandy alluvial land	.05	37.5	0.7%
W	Water		554.5	9.7%
YoC	Yolo loam, 2 to 9 percent slopes	.43	8.0	0.1%
Subtotals for Soil Survey Area			**3,236.1**	**56.8%**
Totals for Area of Interest			**5,697.8**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

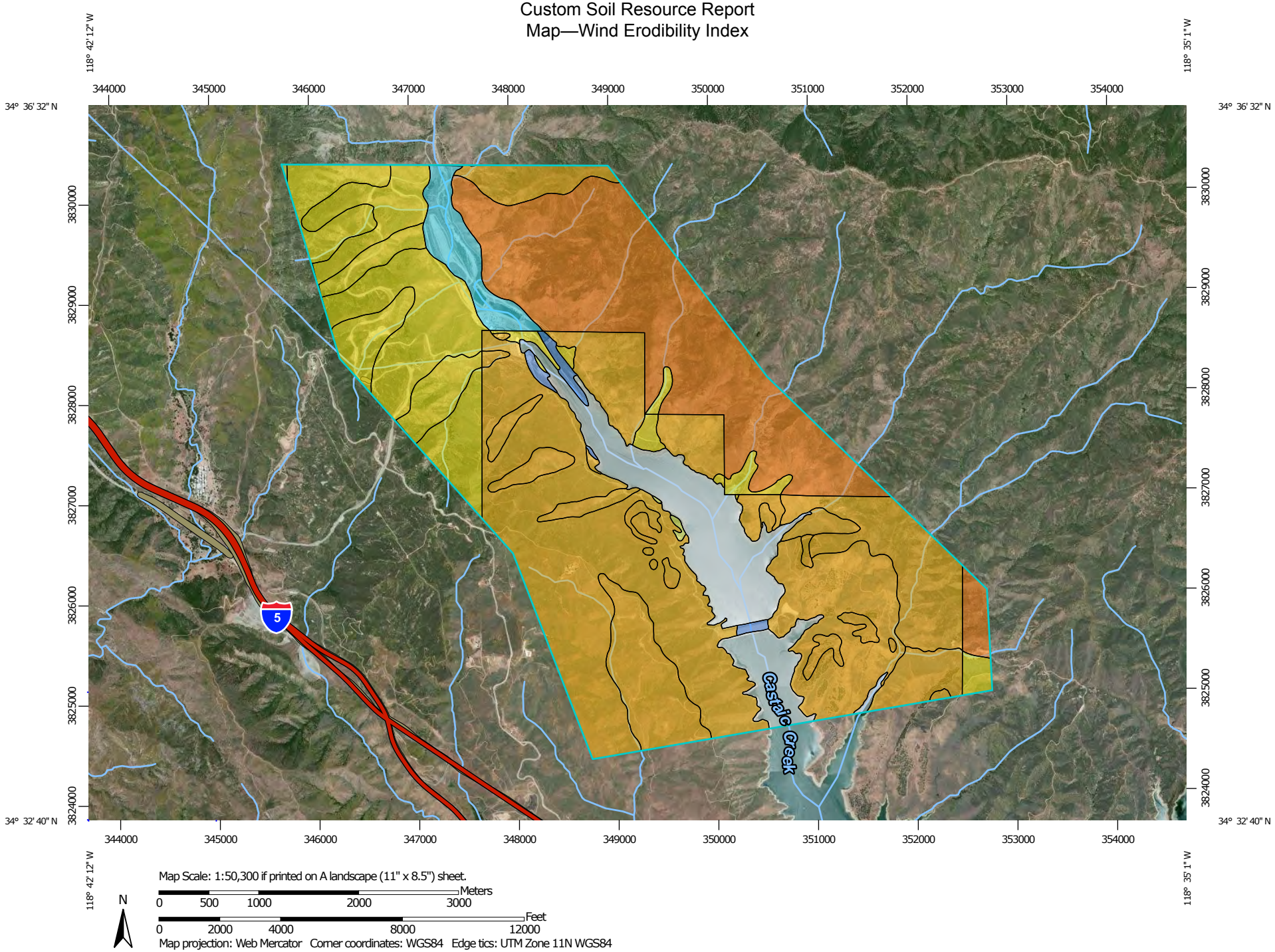
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Wind Erodibility Index

The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.


118° 42' 12" W
118° 35' 1" W
344000
345000
346000
347000
348000
349000
350000
351000
352000
353000
354000
34° 36' 32" N
34° 32' 40" N
3830000
3829000
3828000
3827000
3826000
3825000
3824000
5
Castaic Creek
Map Scale: 1:50,300 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
500
1000
2000
3000
Feet
0
2000
4000
8000
12000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Soil Rating Lines

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Soil Rating Points

0
38
48
56
86
134
160
180
220
250
310
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Angeles National Forest Area, California
Survey Area Data: Version 9, Sep 18, 2015

Soil Survey Area: Antelope Valley Area, California
Survey Area Data: Version 8, Sep 17, 2015

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Wind Erodibility Index

Wind Erodibility Index— Summary by Map Unit — Angeles National Forest Area, California (CA776)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
19	Trigo family-Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes	56	27.0	0.5%
21	Riverwash	180	149.7	2.6%
26	Stonyford-Millsholm families complex, 30 to 70 percent slopes	38	1,195.7	21.0%
74	Trigo-Calleguas families-Rock outcrop complex, 60 to 100 percent slopes	56	361.1	6.3%
75	Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes	56	589.2	10.3%
82	Vertic Xerochrepts, 5 to 50 percent slopes	86	1.4	0.0%
316	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes	48	99.8	1.8%
714	Trigo-Millsholm families-Rock outcrop complex, 45 to 90 percent slopes	56	0.1	0.0%
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	56	37.7	0.7%
Subtotals for Soil Survey Area			**2,461.7**	**43.2%**
Totals for Area of Interest			**5,697.8**	**100.0%**

Wind Erodibility Index— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
CmE	Castaic-Balcom silty clay loams, 15 to 30 percent slopes	48	97.5	1.7%
CmF	Castaic-Balcom silty clay loams, 30 to 50 percent slopes	48	846.7	14.9%
CmF2	Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded	48	103.9	1.8%
CnG3	Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded	48	99.5	1.7%

Wind Erodibility Index— Summary by Map Unit — Antelope Valley Area, California (CA675)				
Map unit symbol	**Map unit name**	**Rating (tons per acre per year)**	**Acres in AOI**	**Percent of AOI**
CyA	Cortina sandy loam, 0 to 2 percent slopes	56	15.0	0.3%
CzC	Cortina cobbly sandy loam, 2 to 9 percent slopes	56	27.4	0.5%
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	48	34.5	0.6%
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	48	1,406.6	24.7%
RcD	Ramona coarse sandy loam, 9 to 15 percent slopes	86	5.0	0.1%
Sa	Sandy alluvial land	220	37.5	0.7%
W	Water		554.5	9.7%
YoC	Yolo loam, 2 to 9 percent slopes	48	8.0	0.1%
Subtotals for Soil Survey Area			**3,236.1**	**56.8%**
Totals for Area of Interest			**5,697.8**	**100.0%**

Rating Options—Wind Erodibility Index

Units of Measure: tons per acre per year

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix H

Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan

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Table H-1. Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan

Parameter	Summary of Water Quality Objectives
Non-degradation Objective	Lahontan: Whenever the existing quality of water is better than the quality of water established in this Basin Plan as objectives (both narrative and numerical), such existing quality shall be maintained unless appropriate findings are made under the policy. Los Angeles: Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not reasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.
Unionized Ammonia	Lahontan and Los Angeles: Ammonia concentrations shall not exceed the values listed in Basin Plan Tables 3-1 to 3-4 derived from EPA ammonia criteria for freshwater and based on temperature and pH conditions. Lahontan: Separate objectives for temperature and pH values not listed in Basin Plan Tables 3-1 to 3-3; objectives are calculated from for one-hour and four-day averages are determined using equations (Page 3-3 and Page 3-4 of the Basin Plan). Los Angeles: Additional objectives for freshwater four-day objective (2.5 times the 30-day average objective) based on pH, temperature and presence/absence of early life stage fish; for inland surface waters not characteristic of freshwater (one-hour average and four-day average based on fixed concentrations of un-ionized ammonia at which four-day average concentration of un-ionized ammonia not to exceed 0.035 mg/L and one-hour average concentration not to exceed 0.233 mg/L); and inland surface waters characteristic of freshwater (not to exceed the values calculated for appropriate instream conditions of Basin Plan Tables 3-1 to 3-3).
Coliform Bacteria	Lahontan: Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes. The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml. Los Angeles: In Fresh Waters Designated for Water Contact Recreation 1. Geometric Mean Limits - *E.coli* density shall not exceed 126/100 ml. 2. Single Sample Limits - *E.coli* density shall not exceed 235/100 ml. In Fresh Waters Designated for Limited Contact Recreation Geometric Mean Limits - *E.coli* density shall not exceed 126/100 ml. Single Sample Limits - *E.coli* density shall not exceed 576 / 100 ml. In waters designated for non-water contact recreation and not designated for water contact recreation, the fecal coliform concentration shall not exceed a log mean of 2,000/100 ml (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000/100 ml.

Table H-1. Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan (continued)

Parameter	Summary of Water Quality Objectives
Biostimulatory Substances	Lahontan and Los Angeles: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.
Chemical Constituents	Lahontan and Los Angeles: Waters designated as Municipal and Domestic Supply shall not contain concentrations of chemical constituents in excess of the maximum contaminant level or secondary maximum contaminant level based upon drinking water standards specified in CCR Title 22. Waters designated as Agricultural Supply shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes). Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses. Lahontan: Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes)
Total Residual Chlorine	Lahontan: For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 mg/L or a maximum value of 0.003 mg/L. Los Angeles: Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses.
DO	Lahontan: The dissolved oxygen concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation. Waters designated as Cold Freshwater Habitat shall have a minimum 30 day mean DO of 6.5 mg/L; for Warm Freshwater Habitat, the minimum 30 day mean shall be at 5.5 mg/L (Basin Plan Table 3-6). Los Angeles: At a minimum (see specifics below), the mean annual dissolved oxygen concentration of all waters shall be greater than 7 mg/L, and no single determination shall be less than 5 mg/L, except when natural conditions cause lesser concentrations. The dissolved oxygen content of all surface waters designated as Warm Freshwater Habitat shall not be depressed below 5 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as Cold Freshwater Habitat shall not be depressed below 6 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as both Cold Freshwater Habitat and Spawning, Reproduction, and/or Early Development shall not be depressed below 7 mg/L as a result of waste discharges.
Color	Lahontan and Los Angeles: Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

Table H-1. Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan (continued)

Parameter	Summary of Water Quality Objectives
Floating Materials	Lahontan and Los Angeles: Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses. Lahontan: For natural high-quality waters, the concentrations of floating material shall not be altered to the extent that such alterations are discernable at the 10 percent significance level.
Exotic Vegetation	Los Angeles: Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects beneficial uses.
Nitrogen	Los Angeles: Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), 1 mg/L as nitrite-nitrogen (NO_2-N), or as otherwise designated in Table 3-10.
Oil and Grease	Lahontan and Los Angeles: Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water that cause nuisance or otherwise adversely affect the water for beneficial uses. Lahontan: For natural high-quality waters, the concentration of oils, greases, or other film or coat-generating substances shall not be altered.
Nondegradation of Aquatic Communities and Populations	Lahontan: All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants, or that lead to the presence of undesirable or nuisance aquatic life. All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs due to physical, chemical, and hydrologic processes.
pH	Lahontan: In fresh waters with designated beneficial uses of Cold Freshwater Habitat or Warm Freshwater Habitat, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters of the Region, the pH shall not be depressed below 6.5 nor raised above 8.5. The RWQCB recognizes that some waters of the Region may have natural pH levels outside of the 6.5 to 8.5 range. Compliance with the pH objective for these waters will be determined on a case-by-case basis. Los Angeles: The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge.
Polychlorinated Biphenyls	Los Angeles: Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 pg/L (30 day average) for protection of human health and 14 ng/L and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters respectively.

Table H-1. Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan (continued)

Parameter	Summary of Water Quality Objectives
Radioactivity	Lahontan: Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated as Municipal and Domestic Supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of CCR Title 22. Los Angeles: Waters designated for use as Municipal and Domestic Supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 64442 of Section 64442 (Gross Alpha Particle Activity, Radium-226, Radium-228, and Uranium) and Table 64443 of Section 64443 (Beta Particle and Photon Radioactivity) of CCR Title 22.
Sediment	Lahontan: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.
Settleable Materials	Lahontan: Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. For natural high-quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter. Los Angeles: Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.
Suspended Materials	Lahontan: Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affect the water for beneficial uses. For natural high-quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level. Lost Angeles: Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.
Taste and Odor	Lahontan and Los Angeles: Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. Lahontan: For natural high-quality waters, the taste and odor shall not be altered.
Temperature	Lahontan and Los Angeles: The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such an alteration in temperature does not adversely affect the water for beneficial uses. For waters designated Warm Freshwater Habitat, water temperature shall not be altered by more than 5 degrees Fahrenheit (5°F) above or below the natural temperature. Lahontan: For waters designated Cold Freshwater Habitat, the temperature shall not be altered. Los Angeles: For waters designated Cold Freshwater Habitat, water temperature shall not be altered by more than 5°F above the natural temperature.

Table H-1. Summary of Water Quality Objectives for Surface Waters in the Los Angeles and Lahontan Basin Plan (continued)

Parameter	Summary of Water Quality Objectives
Toxicity	Lahontan and Los Angeles: All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.
Turbidity	Lahontan and Los Angeles: Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Lahontan: Increases in turbidity shall not exceed natural levels by more than 10 percent. Los Angeles: Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20 percent. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10 percent.
Pesticide	Los Angeles: No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life. Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations specified in Table 64444-A of Section 64444 (Organic Chemicals) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-9.)

Sources:
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[2]California Regional Water Quality Control Board Los Angeles Region. 2015. Water Quality Control Plan Los Angeles Region. Basin Plan for the coastal watersheds of Los Angeles and Ventura counties. Adopted 1994. Amended through July 2015. Available online: http://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.html. Accessed: December 11, 2018.
[3]California Department of Water Resources.2015. Steps Taken to Reduce Concentrations of Chemical Constituents in Effluent Water at William E. Warne Powerplant (WEWPP). July 31, 2015.
Key:
CCR = California Code of Regulations
DO = dissolved oxygen
EPA = U.S. Environmental Protection Agency
MBAS = Methylene Blue Activated Substances
mg/L = milligrams per liter
mL = milliliters
NTU = Nephelometric Turbidity Unit
RWQCB = Regional Water Quality Control Board

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Appendix I

Sample Locations

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Special-Status Terrestrial Species - CWHR Study Sample Location Data

ID	Mapped Habitat	Groundtruthed Habitat	Dominant Species Observed	Associate Species Observed	Notes
SGB1	SGB	SGB	*Ericameria nauseosa*	*Cryptantha intermedia* *Brassica sp* *Bromus madritensis* *Sambucus nigra* *Artemisia dracunculus* *Juniperus californica* *Hirschfeldia incana*	
SGB2	SGB	SGB	*Ericameria nauseosa*	*Bromus madritensis* *Bromus tectorum* *Erodium cicutarium* *Poa secunda* *Brassica sp* *Cryptantha intermedia* *Stephanomeria virgata*	
SGB3	SGB	CSC	*Eriodictyon crassifolium* *Eriogonum fasciculatum* *Artemisia californica*	*Bromus madritensis* *Rhus ovata*	
SGB4	SGB	SGB	*Ericameria nauseosa*	*Bromus madritensis* *Stephanomeria virgata* *Hirschfeldia incana* *Centaurea melitensis* *Stipa cernua* *Croton setiger*	
AGS5	AGS	SGB	*Ericameria nauseosa*	*Bromus madritensis* *Croton setiger* *Eriogonum elongata* *Stephanomeria virgata* *Corethrogyne filaginifolia*	
AGS6	AGS	AGS	*Hordeum murinum ssp. leporinum*	*Brassica sp*	
AGS7	AGS	AGS	*Ambrosia acanthocarpa* *Bromus sp.*	*Hirschfeldia incana* *Croton setiger* *Lepidospartum squamatum*	No transect data. Inaccessible, over the fence assessment
BAR8	BAR	BAR	none	*Erodium cicutarium* *Salsola tragus* *Bromus madritensis* *Croton setiger* *Atriplex semibaccata*	
BAR9	BAR	AGS	*Bromus madritensis* *Salsola tragus*	*Eucalyptus sp* *Atriplex semibaccata*	
BOP10	BOP	BOW	*Quercus douglasii*	*Bromus madritensis* *Peritoma arborea* *Hesperoyucca whipplei* *Poa secunda*	Small size of accessible area (private property/fence cut off actual point and bulk of BOP polygon) allowed for only 2 plots. Moved point due to inaccessability
BOP11	BOP	MCH	*Quercus john-tuckeri*	*Pinus monophylla* *Bromus madritensis* *Ericameria pinifolia* *Juniperus californica* *Arctostaphylos glauca* *Eriogonum fasciculatum* *Cercocarpus betuloides*	
BOW12	BOW	BOP	*Pinus sabiniana* *Quercus lobata* *Quercus sp*	*Juniperus californicus* *Ericameria nauseosa* *Poa secunda*	No transect data. Inaccessible, private property. Had to use binoculars from 0.5 mile away, and observed adjacent similar area.
COW13	COW	VRI	*Platanus racemosa*	*Populus fremontii* *Baccharis salicifolia* *Stipa milacea* *Ericameria nauseosa* *Fuchsia californica* *Eriodictyon crassifolia*	

Special-Status Terrestrial Species - CWHR Study Sample Location Data

COW14	COW	COW	*Quercus agrifolia* *Platanus racemosa*	*mixed Bromus* *Eucalyptus* *Avena fatua* *Eriogonum fasciculatum* *Stipa miliaceae*	
CRC15	CRC	CRC	*Adenostoma fasciculatum*	*Eriogonum fasciculatum* *Bromus madritensis* *Eriodictyon crassifolia* *Hesperoyucca whipplei* *Opuntia sp* *Juniperus californicus*	
CRC16	CRC	CRC	*Adenostoma fasciculatum*	*Eriogonum fasciculatum* *Eriodictyon crassifolia* *Hesperoyucca whipplei*	
CRC17	CRC	CSC	*Eriogonum fasciculatum* *Salvia leucophylla*	*Bromus diandrus* *Bromus madritensis* *Artemisia californica* *Quercus berberidifolia* *Poa secunda* *Eriodictyon crassifolia* *Tamarix ramosissima* *Atriplex canescens*	Moved point due to large burned area.
CRC18	CRC	CRC	*Adenostoma fasciculatum* *Salvia mellifera*	*Artemisia californica* *Salvia leucophylla* *Ceanothus perplexans* *Bromus madritensis* *Eriogonum fasiculatum* *Quercus berberidifolia*	
CRC19	CRC	CRC	*Adenostoma faciculatum*	*Arctostaphylos glauca* *Hesperoyucca whipplei* *Cercocarpus betuloides* *Eriogonum fasciculatum* *Salvia leucophylla*	Moved plots due to inaccessability; however, accidently moved to area mapped as CSC. Despite this, area is still CRC on ground - change map
CSC20	CSC	CRC	*Adenostoma fasciculatum*	*Ericameria pinifolia* *Bromus madritensis* *Lonicera sp* *Opuntia basilaris* *Juniperus californica* *Arctostaphylos glauca* *Salvia columbariae*	
CSC21	CSC	CRC	*Adenostoma fasciculatum*	*Malacothamnus densiflorus* *Bromus madritensis* *Salvia leucophylla* *Avena fatua* *Eriogonum fasciculatum* *Quercus sp* *Hesperoyucca whipplei* *Calystegia macro*	
CSC22	CSC	CSC	*Eriogonum fasciculatum* *Eriodictyon crassifolium* *Malacothamnus fasciculatus*	*Adenostoma fasciculatum* *Bromus madritensis* *Avena fatua* *Poa secunda* *Bromus tectorum* *Epilobium canum*	
CSC23	CSC	CSC	*Adenostoma fasciculatum* *Salvia mellifera* *Eriogonum fasciculatum*	*Hesperoyucca whipplei* *Bromus madritensis* *Poa secunda* *Avena fatua*	Moved plots over 0.6 mile south due to large burned area
CSC24	CSC	CSC	*Eriogonum fasciculatum* *Salvia leucophylla*	*Avena fatua* *Bromus diandrus* *Lepidospartum squamatum* *Hesperoyucca whipplei* *Atriplex canescens* *Datura wrightii* *Croton setiger* *Artemisia californica*	Moved point due to large burned area.
CSC25	CSC	CSC	*Salvia mellifera* *Eriodictyon crassifolium* *Adenostoma fasciculatum*	*Hesperoyucca whipplei*	

Special-Status Terrestrial Species - CWHR Study Sample Location Data

DRI26	DRI	URB	*Populus fremontii* *Hesperocyparis* *Ailanthus altissima*		No transect data. Inaccessible - private residence. Conducted over the fence checklist
DSW27	DSW	DRI	*Eriodictyon crassifolium* *Eriogonum fasciculatum* *Baccharis salicifolia* *Tamarix ramosissima*	*Bromus madritensis* *Avena fatua* *Stephanomeria* *Salvia apiana* *Artemisia californica* *Populus fremontii*	
DSW28	DSW	DSW	*Salix sp*	*Eriogonum fasiculatum* *Lepidospartum squamatum* *Populus fremontii*	No transect data. Inaccessible - private area fenced off, over the fence checklist
FEW29	FEW	FEW	*Schoenoplectus californicus*	*Juncus balticus* *Populus fremontii*	Inundated, did not do transects for FEW
FEW30	FEW	FEW	*Schoenoplectus californicus* *Typha latifolia*		Inundated, did not do transects for FEW
JST31	JST	MCH	*Quercus john-tuckeri* *Eriodictyon crassifolium* *Artemisia tridentata*	*Bromus tectorum* *Bromus madritensis* *Eriophyllum sp* *Arctostaphylos sp* *Cercocarpus betuloides* *Eriogonum fasciculatum* *Lessingia grandiflorum* *Cryptantha sp*	Some plots outside of poly, due to steep slopes and comparable to upslope areas
JUN32	JUN	MCH	*Eriogonum fasciculatum* *Quercus berberidifolia* *Hesperoyucca whipplei*	*Bromus madritensis* *Encelia sp* *Arctostaphylos* *Erodium cicutarium* *Ephedra sp* *Eriodictyon crassifolium* *Ericameria nauseosa* *Adenostoma fasciculatum* *Poa secunda*	
JUN33	JUN	-	-	-	Completely inaccessible, could not bino check
MCH34	MCH	JST	*Yucca brevifolia* *Bromus madritensis*	*Eriogonum fasciculatum* *Eriodictyon* *Bromus tectorum* *Stephanomeria*	
MCH35	MCH	SGB	*Ericameria nauseosus*	*Bromus madritensis* *Bromus tectorum* *Eriogonum elongatum* *Stephanomeria sp* *Salsola tragus*	
MCH36	MCH	MCH	*Eriogonum fasciculatum*	*Bromus tectorum* *Cryptantha sp* *Elymus elymoides* *Ericameria nauseosus* *Ericamerica pinifolia* *Artemisia tridentata* *Bromus madritensis* *Juniperus californica* *Hesperoyucca whipplei*	
MCH37	MCH	MCH	*Quercus berberidifolia* *Adenostoma fasciculatum*	*Bromus madritensis* *Salvia mellifera* *Phoradendron sp*	
MCH38	MCH	CSC	*Adenostoma fasciculatum* *Salvia leucophylla* *Salvia mellifera*	*Bromus madritensis* *Bromus tectorum* *Poa secunda* *Bromus hordeaceus* *Hesperoyucca* *Allium sp* *Sisymbrium sp* *Arctostaphylos sp* *Avena sp* *Opuntia sp* *Ceanothus sp*	Moved point due to large burned area.

Special-Status Terrestrial Species - CWHR Study Sample Location Data

MCH39	MCH	CSC	*Adenostoma fasciculatum* *Eriogonum fasciculatum* *Salvia mellifera*	*Bromus madritensis* *Poa secunda* *Ceanothus sp* *Arctostaphylos sp*	
MCP40	MCP	MCH	*Eriodictyon crassifolium* *Ericameria nauseosus*	*Elymus condensatus* *Marrubium vulgare* *Artemisia tridentata*	
MHC41	MHC	MHC	*Pseudotsuga menziesii* *Arctostaphylos* *Quercus berberidifolia*	*Cercocarpus sp* *Heteromeles arbutifolia* *Yucca sp* *Lonicera sp* *Poa secunda* *Bromus diandrus*	Only 1 plot collected due to very steep slopes - safety/inaccessibility and small patch size
MHW42	MHW	VRI	*Populus fremontii* *Salix laevigata*	*Salix exigua* *Salix lasiolepis* *Tamarix sp* *Elymus condensatus* *Heliotropiumsp*	
MHW43	MHW	VOW	*Quercus lobata* *Quercus agrifolia*	*Corethrogyne filaginifolia* *Eriophyllum confertiflorum* *Avena sp* *Stipa cernua* *Eriogonum elongatum* *Anthriscus caucalis* *Rhamnus ilicifolia* *Bromus diandrus* *Bromus madritensis* *Poa secunda* *Galium aparine*	
MRI44	MRI	VRI	*Populus fremontii* *Salix goodingii*	*Juncus balticus* *Asclepias fascicularis* *Baccharis salicifolia* *Elymus triticoides* *Heliotropum curassavicum* *Urtica dioica* *Melilotus sp* *Distichlis spicata* *Bromus tectorum*	Location moved due to inundation of original point. Some plots partially inundated, thus cover/data eyeballed.
MRI45	MRI	VRI	*Salix goodingii* *Populus fremontii*	*Juncis balticus* *Quercus lobata* *Urtica dioica* *Juniperus californica* *Sambucus nigra* *Solidago sp* *Artemisia sp* *Elymus triticoides*	
PAS46	PAS	AGS	*Bromus*	*Avena fatua* *Salsola tragus* *Hirschfeldia incana*	No transect data. Inaccessible, beyond fence. Over fence checklist.
PGS47	PGS	PGS	*Elymus glaucus* *Distichlis spicata*	*Elymus triticoides* *Sisymbrium cf altosissimum*	
PGS48	PGS	AGS	*Bromus tectorum*	*Ericamerica nauseosus* *Brassica sp* *Stephanomeria*	No transect data. Inaccessible, beyond fence. Over fence checklist.
PJN49	PJN	MCH	*Quercus john tuckeri* *Arctostaphylos*	*Artemisia tridentata* *Juniperus sp*	No transect data. Inaccessible, beyond fence. Over fence checklist.
PJN50	PJN	BOP	*Quercus sp* *Juniperus californica*	*Ephedra viridis* *Ericameria nauseosus* *Bromus tectorum* *Eriogonum fasciculatum* *Artemisia tridentata* *Rhus aromatica*	
PJN51	PJN	MCH	*Quercus sp* *Juniperus californica*	*Juniperus californica* *Ericameria pinifolia* *Eriogonum fasciculatum* *Elymus condensatus* *Lonicera subspicata*	
SMC52	SMC	MHC	*Quercus chrysolepis* *Pseudotsuga menziesii* *Bromus diandrus*	*Toxicodendron diversilobum* *Prunus ilicifolia*	Only 1 plot collected due to most of veg type occurring on very steep, inaccessible slopes.

Special-Status Terrestrial Species - CWHR Study Sample Location Data

URB53	URB	URB	hardscape	*Pinus sp* *Pinus halepensis* unknown ornamentals	
URB54	URB	URB	hardscape	*Juniperus* (ornamental) *Oleo europaea* *Rosmarinus officinalis*	
VOW55	VOW	COW	*Quercus agrifolia* *Bromus diandrus*	*Salvia mellifera* *Eriogonum faciculatum* *Baccharis pilularis* *Ericameria nauseosus* *Rhus aromatica*	Small patch with steep slopes, only 1 plot fit.
VOW56	VOW	VOW	*Quercus lobata* *Bromus diandrus* *Bromus tectorum*	*Quercus sp* *Ericameria nauseosus* *Ericameria pinifolia*	
VRI57	VRI	DRI	*Populus fremontii*	*Baccharis salicifolia* *Eriodictyon* *Juglans californica* *Stephanomeria* *Bromus madritensis* *Tamarix sp* *Stipa miliacea* *Salvia leucophylla* *Nicotiana glauca* *Bromus diandrus*	
VRI58	VRI	VRI	*Populus fremontii* *Salix goodingii* *Salix exigua* *Sambucus nigra* *Elymus triticoides*	*Peritoma arborea* *Lonicera sp* *Artemisia tridentata* *Salvia mellifera* *Artemisia sp* *Bromus tectorum* *Bromus madritensis* *Ericameria nauseosus*	
WTM59	WTM	WTM	*Leptochloa* *Carex sp* *Cyperus eragrostis*	*Salix exigua* *Persicaria sp* *Xanthium strumarium* *Lepidium latifolium* *Eleocharis sp*	
WTM60	WTM	FEW	*Tamarix sp* *Typha sp*		
WTM61	WTM	CSC	*Eriogonum fasciculatum* *Cytisus scoparius*	*Bromus madritensis* *Bromus diandrus* *Eriogonum sp* *Brassica sp*	
UNK62	UNK	AGS	*Bromus madritensis* *Bromus tectorum*	*Avena sp* *Brassica sp* *Heterotheca grandiflora* *Acmispon americanus* *Lactuca serriola* *Helianthus annuus*	
UNK63	UNK	SGB	*Ericameria nauseosa* *Bromus madritensis*	*Stephanomeria tenuifolia* *Croton setiger* *Heterotheca villosa* *Erodium sp* *Avena sp* *Brassica sp.* *Eriogonum elongatum* *Bromus diandrus*	
UNK64	UNK	SGB	*Ericameria nauseosa* *Bromus madritensis* *Bromus tectorum*	*Stephanomeria tenuifolia* *Croton setiger* *Helianthus annuus*	
UNK65	UNK	SGB	*Ericameria nauseosa* *Bromus madritensis*	*Eriogonum elongatum* *Heterotheca villosa* *Ambrosia acanthicarpa* *Leptosiphon liniflorus* *Poa secunda* *Stipa cernua* *Stephanomeria tenuifolia* *Corethrogyne filaginifolia*	

Special-Status Terrestrial Species - CWHR Study Sample Location Data

UNK66	UNK	AGS	*Poa secunda* *Bromus tectorum* *Elymus triticoides*	*Amsinckia sp* *Corethrogyne filaginifolia* *Erodium sp* *Brassica sp* *Cryptantha sp* *Lactuca serriola* *Croton setiger* *Helianthus annuus* *Acmispon americanus*	