

Appendix A

DWR's Proposed PM&E Plans and Measures

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APPENDIX A

DWR’S PROPOSAL – ENVIRONMENTAL MEASURES

Provided below are the operations and management activities within California Department of Water Resources’ (DWR) Proposal that DWR proposes to undertake as conditions of the new license for the Project for the purpose of protecting or mitigating impacts that would otherwise result from DWR’s Proposal, as described in this Application for New License, or for the purpose of enhancing resources that could be affected by DWR’s Proposal.

For the purpose of this appendix, DWR has assumed that the Federal Energy Regulatory Commission’s (FERC) requirements regarding inspections of Project facilities (e.g., annual FERC inspections, Part 12 Dam Safety Inspections, and Environmental and Public Use Inspections) and other similar general FERC requirements (e.g., requirement for Emergency Action Plans) will apply to DWR’s Proposal if FERC issues a new license. DWR also has assumed that the specific requirements included in related approvals, such as dam certificates issued by the Division of Safety of Dams (DSOD) for Project dams within DSOD’s jurisdiction, and appropriated water rights issued by the State Water Resources Control Board for power generation, will not change under a new license. Therefore, DWR has not included proposed conditions related to these activities in this Application for New License. In addition, DWR has assumed that FERC will include in the new license FERC’s *Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters and Lands of the United States* (Form L-5 Standard Articles).¹ Therefore, DWR has not included proposed conditions that would otherwise be addressed by FERC’s Form L-5 Standard Articles.

Table A-1 lists the measures included in DWR’s Proposal, and for each measure specifies the Relicensing Participant that agrees with and supports the measure, and indicates if the proposed measure is a continuation of an article in the existing FERC license or other agreement that pertains to the Project.

¹ L-5: Constructed Major Project Affecting Navigable Waters and Lands of the United States, 12 Federal Power Commission (F.P.C.) 1329 (October 23, 1953), 17 F.P.C. 110 (January 13, 1957), 38 F.P.C. 203 (July 26, 1967), 54 F.P.C. 1832 (October 31, 1975)

Table A-1. Measures Proposed by DWR for Inclusion in a New License for the Devil Canyon Project

DWR’s Proposed Measure ¹	Description
Geology and Soils	
GS1	Implement the Erosion and Sediment Control Plan ²
Water Resources	
WR1	Silverwood Lake Minimum Pool and Water Surface Elevations ³
WR2	Implement the Hazardous Materials Management Plan ⁴
Aquatic Resources	
AR1	Silverwood Lake Fish Stocking ⁵
AR2	Implement the Aquatic Invasive Species Management Plan
Terrestrial Resources	
TR1	Implement the Integrated Vegetation Management Plan
Land Use	
LU1	Implement the Transportation System Management Plan ²
LU2	Implement the Fire Prevention and Response Plan ⁴
LU3	Develop and Implement a Project Safety Plan ⁶
Aesthetics	
VR1	Implement the Visual Resources Management Plan
Cultural Resources	
CR1	Implement the Historic Properties Management Plan

Notes:

¹ A Recreation Management measure will be included in DWR’s FLA and is anticipated to address continued recreation development and management, as does Article 50 in the existing license.

² As described in Section 1.3.4.4 of Exhibit E, DWR understands the U.S. Department of Agriculture, Forest Service (USFS) agrees with and supports this measure.

³ This measure is similar to the Silverwood Lake minimum pool and water surface elevation limits provided in the existing March 25, 1969, DWR/USFS Memorandum of Understanding (MOU), as amended on December 27, 1971, and the March 12, 2003, DWR/California Department of Fish and Game MOU, and is essentially a continuation of Article 58 in the existing license.

⁴ As described in Section 1.3.4.4 of Exhibit E, DWR understands USFS and San Bernardino County Fire Department agree with and support this measure.

⁵ As described in Section 1.3.4.4 of Exhibit E, DWR understands the California Department of Fish and Wildlife agrees with and supports this measure. This measure is similar to Article 51 in the existing license.

⁶ This measure addresses safety provisions, as does Articles 60 and 402 in the existing license.

Key:

DWR = California Department of Water Resources

The complete text for each measure proposed by DWR is provided below by resource area.

Geology and Soils

Measure GS1, Erosion and Sediment Control

Within six months of license issuance, implement the Erosion and Sediment Control Plan included in this Appendix as Attachment 1.

Water Resources

Measure WR1, Silverwood Lake Minimum Pool and Water Surface Elevation

- (A) DWR shall, in order to facilitate general recreation use at Silverwood Lake, operate Silverwood Lake with the objective of maintaining the water surface elevation (WSE) in Silverwood Lake as follows:
- From March 1 through September 15 of each year, maintain the WSE within a range of not more than 11 inches each day, and within a range of not more than 30 inches each 7-day period (beginning at midnight on Sunday), except that:
 - DWR may exceed the 11-inches-per-day WSE fluctuation limit by 3 inches, for a total of 15 days between March 1 and September 15.
 - DWR may raise the WSE by up to 18 inches on weekends (i.e., midnight on Friday to midnight on Sunday)
 - DWR may exceed the 30-inches-per-day WSE weekly fluctuation limit if required during certain months to allow DWR to economically meet its commitments for delivery of water under existing water supply contracts.
 - In the case of emergency conditions which cause the water surface variations or drawdown to exceed the limits specified herein, such as aqueduct shutdown, or during scheduled aqueduct shutdowns, the objective of maintaining WSEs within the specified limits shall not apply. During emergency conditions, DWR shall at the earliest opportunity notify all parties having responsibility for operating or managing any of the multipurpose facilities at Silverwood Lake, and provide an interim operational plan to cover the period of the emergency and the recovery therefrom.
- (B) DWR will use best efforts, for the protection of bass spawning in Silverwood Lake, not to lower the WSE by more than 3 feet from April 1 through June 30 of each year. In the event DWR causes the WSE to lower 3 feet or more between April 1 and June 30, DWR will notify the California Department of Fish and Wildlife (CDFW) first by telephone and email [followed, within 3 business days,

by a written notification by overnight mail with tracking capability] to the Regional Manager, Eastern Sierra Inland Deserts, CDFW. Whenever possible, such as a scheduled maintenance or repair outage, DWR will notify CDFW as far in advance as possible of the need to exceed the 3 foot lowering. In an emergency outage or other circumstance preventing advance notification, DWR will notify CDFW as soon as possible after the fact that the exceedance has occurred.

- (C) DWR will maintain a minimum storage of no less than 7,800 acre-feet in Silverwood Lake, except in an emergency.

Measure WR2, Hazardous Materials Management Plan

Within six months of license issuance, implement the Hazardous Materials Management Plan included in this Appendix as Attachment 2.

Aquatic Resources

Measure AR1, Silverwood Lake Fish Stocking

Beginning in the first full calendar year after license issuance and annually thereafter during the stocking season (October 1 to May 30), DWR will stock Silverwood Lake with a target of 20,000 pounds of catchable trout (i.e., approximately two fish per pound). This poundage is an average annual target that may fluctuate slightly from year to year. The average will be measured as a five-year running average to ensure consistent stocking over the term of the new license. DWR, after consultation with CDFW, will stock the fish at an appropriate time of the year, which is anticipated to typically be at least two events per month between October 1 and May 30 of each year. The fish stocking events will occur between the Cleghorn Boat Launch or the Sawpit Canyon Boat Launch. DWR may contract with CDFW or one or more State-registered private fish hatcheries to raise and plant the fish.

Beginning in the first full calendar year after license issuance and once every six years thereafter, DWR will conduct an angler survey at Silverwood Lake. DWR may contract with CDFW to perform the surveys. The surveys will focus on trout, the stocked species, with an option to survey for other fish. The surveys will be performed approximately eight to 10 days during each month from October 1 (or after the first stocking event, whichever is later) through May 30 (or no later than 10 days after the last seasonal stocking event), for a total of 64 to 80 survey days. The specific days to be surveyed in each month will be randomly selected by DWR, with five days in each month in two strata: (1) a high-use stratum (i.e., Saturday, Sunday, and federal holidays); and (2) a low-use stratum (i.e., Monday through Friday, excluding federal holidays). The time that the survey begins each day will be randomly selected between a morning start and an afternoon start, but all surveys will be performed in the daylight. The daily survey location will be the shoreline from Cleghorn Day Use Area to Sawpit Day Use Area, including the Sawpit boat launch. The duration of each survey day will be four hours.

The surveyor(s) will ask anglers a standard series of questions regarding trout. The surveyor(s) will ask the anglers questions to determine angling effort (i.e., hours fished per angler that day) and target fish (i.e., were the anglers fishing for trout or some other fish species). The surveyor(s) will also ask the anglers one to four standard “yes or no” questions, along with the number of trout caught, to determine their angling satisfaction for trout. The first standard question will be: “Were you satisfied with your angling experience for trout today?” The second standard question will be: “How many trout did you catch today?”

Two additional questions will be asked if the angler reports catching one or more trout: “Were you satisfied with the number of trout caught?” and “Were you satisfied with the size of trout caught?” If the anglers caught trout, the surveyor(s) will then ask questions about catch rate (i.e., the number of trout caught, including trout kept and released and why, by length of time fished), size (in inches) of trout caught, and gear used to fish. DWR may add other questions at its discretion (e.g., questions related to other fish species sought; where the anglers fished in the reservoir; number of anglers in their party; how often the anglers fish at Silverwood Lake; timing and duration of fishing trips; if the anglers are camping at Silverwood Lake or are just there for the day; and the distance the angler traveled to the lake).

By December 31, in the third full calendar year after license issuance and every other year thereafter (i.e., in license years 5, 7, 9, 11, etc.), DWR will file with FERC a report documenting Silverwood Lake trout stocking in the previous October to May stocking season, and any DWR-conducted angler surveys in those calendar years. For each of the previous two calendar years, the report will include for stocked trout: the poundage and approximate number of trout stocked; strain; size class; dates stocked; release location; method of stocking (e.g., truck); and the hatchery of origin if the fish were not obtained from CDFW. The report will also document compliance with the five-year running average stocking requirement indicated under this condition. The report will include a running summary by year of DWR’s Silverwood Lake trout stocking (i.e., poundage of trout stocked each stocking season and the five-year running average). If DWR performed an angler survey in one of the two previous calendar stocking seasons, the report will include the results of the survey, including: when and where surveys were conducted; number of anglers surveyed; total hours fished; total number of trout caught and kept; total number of trout caught and released; catch rate (i.e., number of trout caught by hours fished); length-frequency of caught trout; angler satisfaction results (i.e., response to the standard questions described above); and other information as appropriate. In addition, if an angler survey was performed in one of the two previous stocking seasons, the report will include a comparison of that season’s angler survey results to other trout angler surveys performed by DWR under this condition.

In years in which the report includes angler survey results for the previous two calendar years, prior to filing the report with FERC, DWR will provide a draft of the report to CDFW and consult with CDFW regarding the fish stocking program. CDFW will have 30 calendar days to provide written comments on the draft report, including recommending any changes to the fish stocking program. DWR will include all relevant documentation

of consultation with CDFW in the final report filed with FERC. If DWR does not adopt a particular written recommendation by CDFW, the final report will include DWR’s reasoning for the decision.

Measure AR2, Aquatic Invasive Species Management Plan

Within six months of license issuance, implement the Aquatic Invasive Species Management Plan included in this Appendix as Attachment 3.

Terrestrial Resources

Measure TR1, Integrated Vegetation Management Plan

Within six months of license issuance, implement the Integrated Vegetation Management Plan included in this Appendix as Attachment 4.

Land Use

Measure LU1, Transportation System Management Plan

Within six months of license issuance, implement the Transportation System Management Plan included in this Appendix as Attachment 5.

Measure LU2, Fire Prevention and Response Plan

Within six months of license issuance, implement the Fire Prevention and Response Plan included in this Appendix as Attachment 6.

Measure LU3, Project Safety Plan

Within one year of license issuance, DWR shall develop and implement a Project Safety Plan that provides measures for installing and maintaining signs, lights, sirens, and other devices below Cedar Springs Dam needed to protect the public. This measure is similar to Articles 60 and 402 in the existing license.

Aesthetics

Measure VR1, Visual Resources Management Plan

Within six months of license issuance, implement the Visual Resources Management Plan included in this Appendix as Attachment 7.

Cultural Resources

Measure CR1, Historic Properties Management Plan

Within six months of license issuance, implement the Historic Properties Management Plan included in this Appendix as Attachment 8.

Attachments

- Attachment 1 – Erosion and Sediment Control Plan
- Attachment 2 – Hazardous Materials Management Plan
- Attachment 3 – Aquatic Invasive Species Management Plan
- Attachment 4 – Integrated Vegetation Management Plan
- Attachment 5 – Transportation System Management Plan
- Attachment 6 – Fire Prevention and Response Plan
- Attachment 7 – Visual Resources Management Plan
- Attachment 8 – Historic Properties Management Plan (Privileged)

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Attachment 1

Erosion and Sediment Control Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



EROSION AND SEDIMENT CONTROL PLAN November 2018

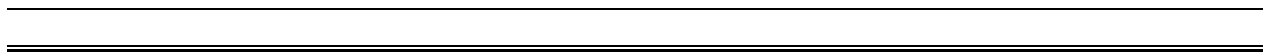


State of California
California Natural Resources Agency
DEPARTMENT OF WATER
RESOURCES
Hydropower License Planning and Compliance Office

EDMUND G. BROWN JR.
Governor
State of California

JOHN LAIRD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Brief Description of the Project.....	1-1
1.2	Purpose of the Plan	1-5
1.3	Goals and Objectives of the Plan.....	1-5
1.4	Contents of the Plan	1-5
2.0	METHODS FOR MINIMIZATION OF EROSION AND SEDIMENTATION DURING CONTINUED PROJECT OPERATION AND MAINTENANCE	2-1
2.1	Overall Erosion and Sediment Control Planning Process for the Devil Canyon Project	2-1
2.2	Measures Related to New Construction.....	2-4
2.3	Measures Related to Routine Maintenance on NFS Land.....	2-6
2.4	Measures Related to Other Emergency Erosion Control Events	2-7
2.5	Monitoring of Erosion and Sediment Control Activities	2-7
3.0	CONSULTATION, REPORTING, AND PLAN REVISIONS	3-1
3.1	Consultation and Reporting	3-1
3.2	Plan Revisions	3-1
4.0	REFERENCES CITED	4-1

LIST OF FIGURES

Figure 1.1-1.	Devil Canyon Project Vicinity	1-3
Figure 1.1-2.	Proposed Devil Canyon Project Boundary	1-4
Figure 2.1-1.	Erosion and Sediment Control Plan Process Flow Chart.....	2-3

LIST OF TABLES

Table 2.2-1.	General List of BMPs for Erosion and Sediment Control at Construction Sites.....	2-5
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COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

Application for New License	DWR's Application for a New License for Major Project – Existing Dam for the Devil Canyon Project, FERC Project Number 14797
BMP	Best Management Practice
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
LRWQCB	Lahontan Regional Water Quality Control Board
NFS	National Forest System
O&M	operation and maintenance
Plan	Erosion and Sediment Control 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	Devil Canyon Project
Project boundary	The area to which DWR requires access for normal Project operations and maintenance; the boundary is shown in Exhibit G of DWR's Application for New License
SARWQCB	Santa Ana Regional Water Quality Control Board
SBNF	San Bernardino National Forest
SRA	State Recreation Area
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers

USDA	U.S. Department of Agriculture
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

In XXXX 2018, the California Department of Water Resources (DWR), pursuant to Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act [FPA]), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project).

DWR has included this Erosion and Sediment Control Plan (Plan) in its XXXX 2018 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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities range in elevation from 3,378 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation, on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., the Pacific Crest Trail) traverse or are located in the Silverwood Lake SRA but are not Project facilities. The Project does not include any open water conduits or transmission lines. DWR operates the Project in a run-of-release mode using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities, and a slight modification to the existing Project boundary. The boundary change would result in a reduction of the area within the boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest System (NFS) lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005) , as subsequently amended (USFS 2006).

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures, which are operation and maintenance (O&M) activities to: (1) protect resources against potential impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's Proposed Project boundary.

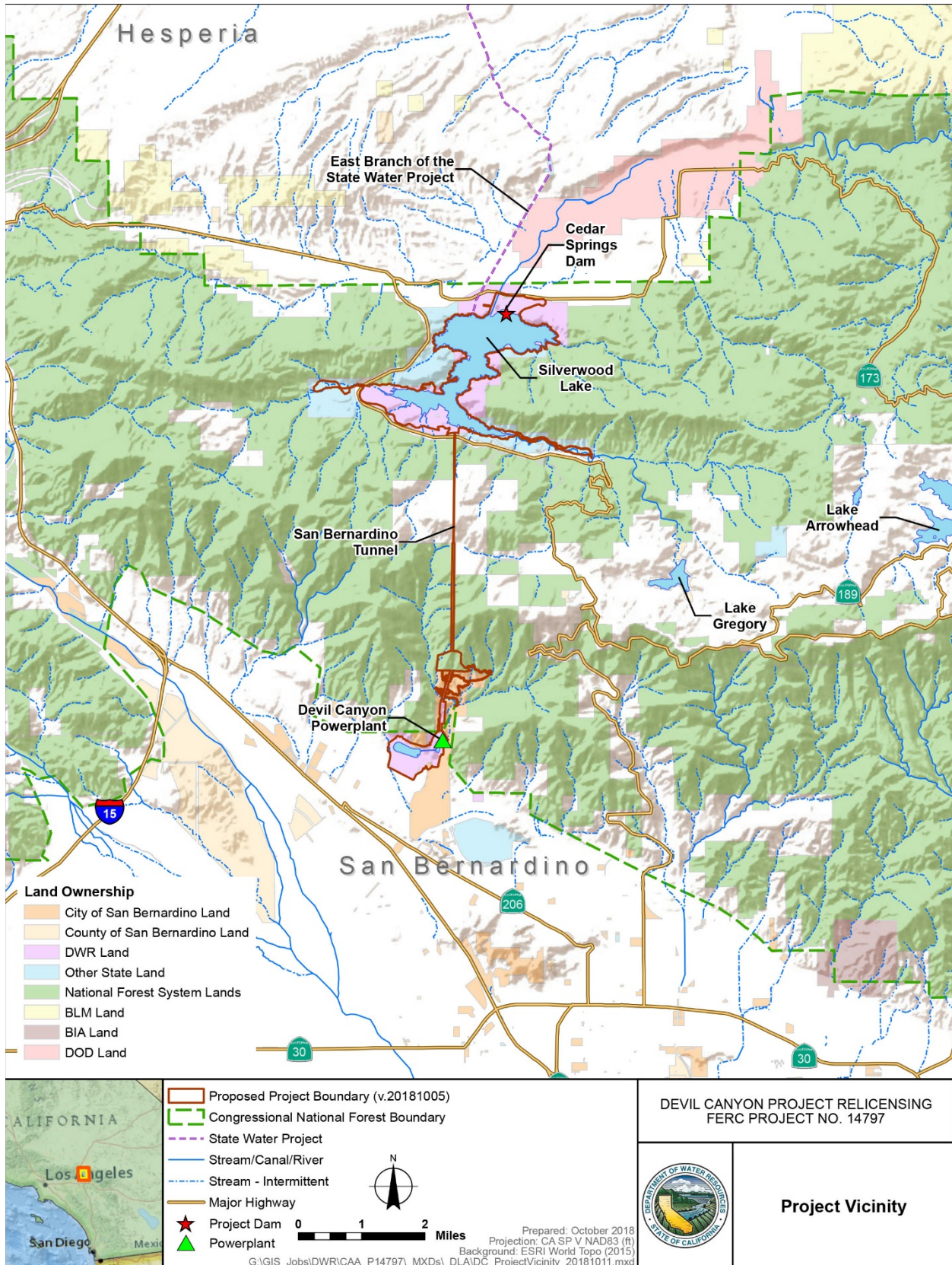


Figure 1.1-1. Devil Canyon Project Vicinity

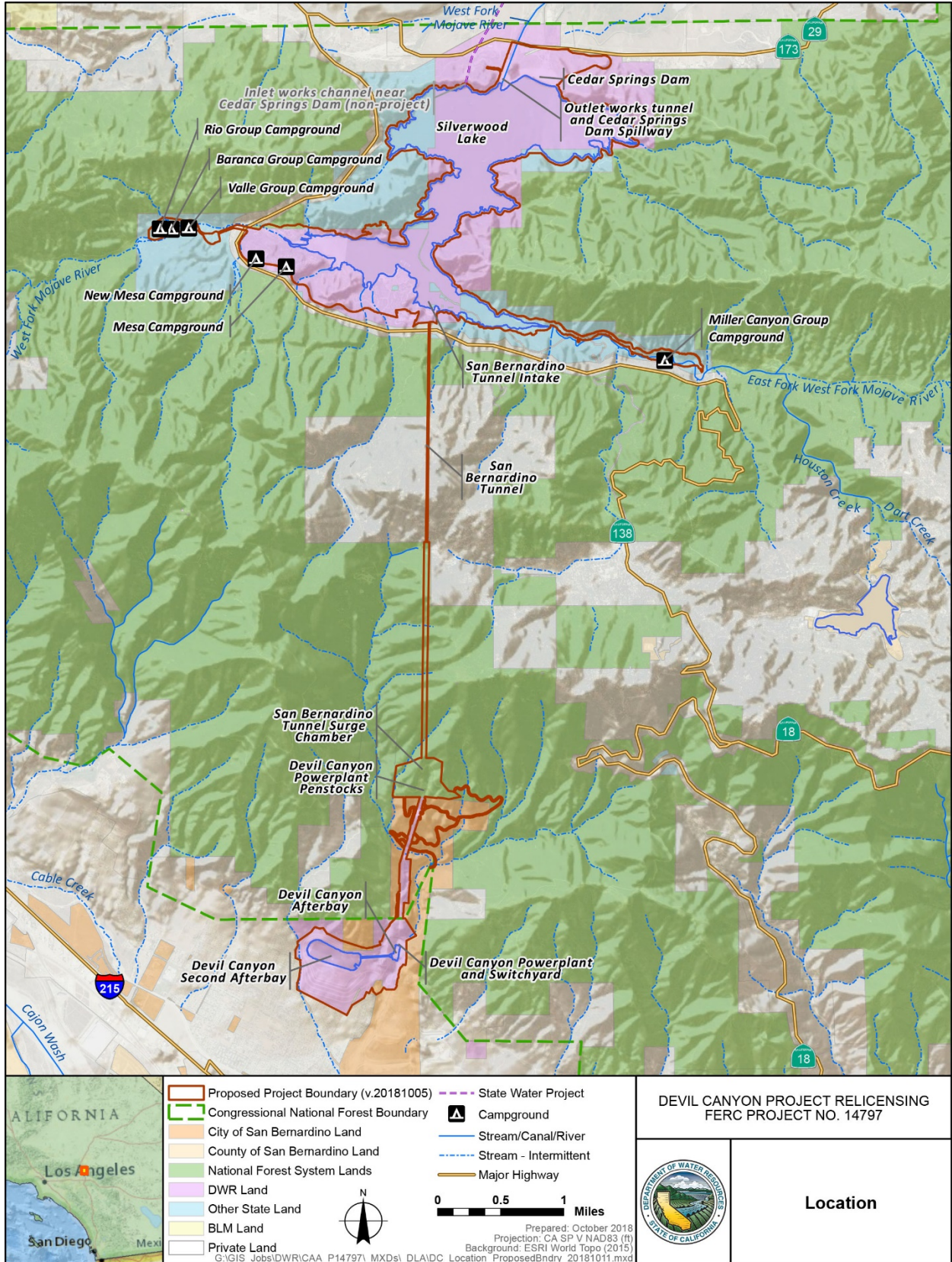


Figure 1.1-2. Proposed Devil Canyon Project Boundary

1.2 PURPOSE OF THE PLAN

The purpose of this Plan is to minimize future erosion and sedimentation related to the Project. This plan covers ground-disturbing activities from routine operations, maintenance, and new construction that could produce undesirable erosion or sedimentation conditions near, streams, reservoirs, or infrastructure.

To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

The primary goal of the Plan is to describe existing DWR and USFS Best Management Practices (BMP) (USFS 2012) on NFS lands, to control site-specific erosion and sedimentation impacts during routine operations, maintenance, and reconstruction of Project facilities, including emergency erosion control measures and protocols to control sedimentation during or after severe storm events. The objective of the Plan is to provide necessary current guidelines to meet Plan goals.

1.4 CONTENTS OF THE PLAN

This Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including the purpose, goals, and objectives of the Plan.
- Section 2.0. Methods for Minimization of Erosion and Sedimentation during Continued Project Operation and Maintenance. This section describes the methods for minimization of site-specific erosion and sedimentation impacts during continued operation and maintenance of the Project, including potential slope failures, new construction and/or reconstruction of Project facilities.
- Section 3.0. Consultation, Reporting, and Plan Revisions. This section describes consultation between DWR and the SBNF, reporting, and Plan revisions.
- Section 4.0. References Cited. This section includes the resource documents cited in this Plan.

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2.0 METHODS FOR MINIMIZATION OF EROSION AND SEDIMENTATION DURING CONTINUED PROJECT OPERATION AND MAINTENANCE

2.1 OVERALL EROSION AND SEDIMENT CONTROL PLANNING PROCESS FOR THE DEVIL CANYON PROJECT

Figure 2.1-1 is a flowchart that generally describes the overall erosion and sediment control planning, consultation, permitting, treatment, and monitoring pathways for the Project. Normally, erosion treatment projects are either planned in advance (Box 1 in Figure 2.1-1) or arise as, or are initially implemented as, emergency actions (Box 2 in Figure 2.1-1). Prior to implementation, some permanent erosion control/stabilization activities may require consultation with the Lahontan Regional Water Quality Control Board (LRWQCB) or the Santa Ana Regional Water Quality Control Board (SARWQCB). The SBNF will be consulted on NFS lands (Box 10 in Figure 2.1-1). Permanent erosion control features are defined as constructed features such as road drainage features, rip-rap, and retaining walls.

When erosion control takes place on an emergency basis, then concurrent or after-the-fact notification to the LRWQCB, SARWQCB, California Department of Fish and Wildlife (CDFW), USFS (when on or affecting NFS lands), and/or FERC may be necessary (Box 4 in Figure 2.1-1). If after the emergency erosion control actions are completed and more permanent stabilization measures are needed, then DWR will prepare a site plan with appropriate remediation and monitoring measures (Box 6 in Figure 2.1-1). If the emergency action does not require more permanent stabilization activities, then no other erosion control measures will be implemented (Box 5 in Figure 2.1-1).

Generally, planned (non-emergency) erosion control activities fall into one of two categories: (1) those associated with an erosion control element in a specific resource plan included in the new license (e.g., Historic Properties Management Plan and Transportation Management Plan, etc.) (Box 7 in Figure 2.1-1); or (2) any Project-related erosion control not addressed by specific resource plans included in the new license (Box 8 in Figure 2.1-1). Prior to implementation, planned erosion treatment plans and designs normally require consultation with USFS when on or affecting NFS lands, and potentially the LRWQCB or SARWQCB (Box 10 in Figure 2.1-1).

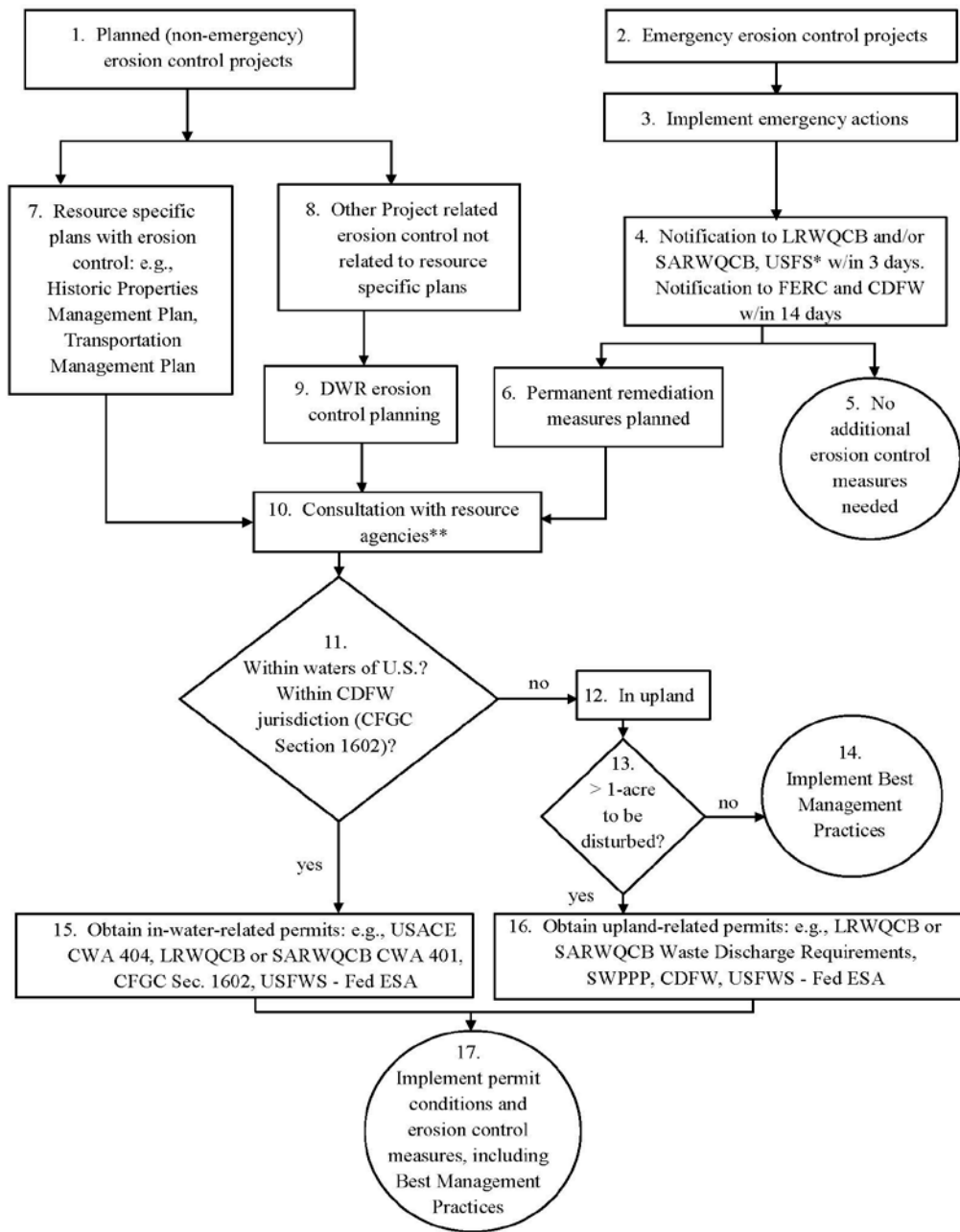
DWR will seek a Section 401 certification, as appropriate, if an erosion control activity would involve federal approval for a discharge into waters of the U.S.

Erosion treatment projects that fall within designated “waters of the U.S.” may be subject to a United States Army Corps of Engineers (USACE) permit (Box 11 in Figure 2.1-1). This may be a Nationwide or an Individual permit, depending upon the specific circumstances.

Erosion treatment projects may also fall under California Fish and Game Code (CFGC) Section 1602. DWR as a general practice will submit notification to CDFW for any non-emergency erosion control activities that may fall under CFGC Section 1602 prior to initiating said activities.

Construction work that disturbs a land area greater than one acre may be subject to a Statewide General Permit for stormwater discharge associated with construction activity, which may require a Stormwater Pollution Prevention Plan (SWPPP) (Box 16 in Figure 2.1-1). If the Project is smaller than 1 acre of land disturbance, then the Statewide General Permit is not required (Box 14 in Figure 2.1-1).

After the appropriate permits are obtained, and in compliance with the requirements of such permits, DWR would implement the erosion treatment (Box 17 in Figure 2.1-1).



Notes:

*USFS consultation applies when on or affecting NFS land.

**Resource agencies may include LRWQCB, SARWQCB, CDFW, USFWS, USACE, and others, as appropriate.

Key:

CDFW = California Department of Fish and Wildlife

CFGC = California Fish and Game Code

CWA 401 = Clean Water Act, Section 401 Certification

CWA 404 = Clean Water Act, Section 404 Permit Program

Fed ESA = Federal Endangered Species Act

LRWQCB = Lahontan Regional Water Quality Control Board

SARWQCB = Santa Ana Regional Water Quality Control Board

USACE = U.S. Army Corps of Engineers

USFS = U.S. Department of Agriculture, Forest Service

USFWS = U.S. Fish and Wildlife Service

Figure 2.1-1. Erosion and Sediment Control Plan Process Flow Chart

2.2 MEASURES RELATED TO NEW CONSTRUCTION

Temporary erosion prevention and control measures are normally implemented during construction or reconstruction of Project facilities and infrastructure. This includes, but is not limited to, reconstruction at dam sites, road reconstruction, and recreation site development, where ground disturbance and/or vegetation removal is expected. These measures are typically based on State and federal permit requirements as applicable; BMP's for NFS land; DWR BMP's, including the development of a SWPPP when required; and measures included in a Section 1602 Agreement, if obtained. Table 2.2-1 provides a general list of priority BMPs for erosion control at construction sites.

DWR, or its contractor(s), normally prepare and implement a SWPPP, if required, during development of detailed construction plans and drawings, and prior to initiating erosion control measures for each site larger than one acre. A copy of the SWPPP and Section 1602 Agreement, if one is obtained for the work, is usually maintained on site while the site is under construction, commencing with the initial mobilization and ending with the termination of coverage under a USACE permit, if applicable.

For construction and maintenance activities on NFS lands within the FERC Project boundary, DWR complies with the applicable non-stormwater BMPs adopted by the U.S. Forest Service. For construction and maintenance activities on non-NFS lands within the FERC Project boundary, DWR implements DWR's non-stormwater BMPs, depending on the specifics of a particular project. These BMP measures normally are site-specific for each planned construction project and might extend past the final construction inspection, if re-vegetation is included for more permanent site stabilization and erosion control.

Table 2.2-1. General List of BMPs for Erosion and Sediment Control at Construction Sites

BMP Topic	Key Elements
Construction Scheduling	<ul style="list-style-type: none"> • Sequence construction activities so that the soil is not exposed for long periods of time. • Schedule or limit grading to small areas. • Install key sediment control practices before site grading begins. • Schedule site stabilization as described below. • Avoid rainy periods when scheduling major grading activities. • Incorporate time for establishment of vegetation into the conclusion of the construction schedule. • Monitor rainfall and rain forecasts.
Preservation of Existing Vegetation	<ul style="list-style-type: none"> • Minimize clearing and the amount of exposed soil. • Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity. • Protect streams, stream barriers, wild woodlands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.
Site Stabilization	<ul style="list-style-type: none"> • Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed, or during temporary periods of inactivity. • Schedule temporary stabilization at inactive disturbed areas as soon as possible upon cessation of soil disturbing activities. • Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.
Silt Fencing	<ul style="list-style-type: none"> • Inspect and maintain silt fences after each storm event. • Make sure the bottom of the silt fence is buried. • Securely attach the material to the stakes. • Don't place silt fences in the middle of a waterway or use them as a check dam. • Install silt fence along topography contours with ends turned uphill in areas where sheet flow typically occurs. Stormwater should not flow around the silt fence. • Each silt fence should drain a maximum slope length of 100 ft.
Storm Drain Inlet Protection	<ul style="list-style-type: none"> • Use rock or other appropriate material to cover the storm drain inlet to prevent trash and debris from entering the storm sewer system. • Make sure the rock size is appropriate (usually 1-2 inches in diameter). • If you use inlet filters, maintain them regularly. • Storm drains should not drain an area larger than 1 acre. If they do, stormwater must be routed through additional BMPs such as sediment basins or sediment traps.

Table 2.2-1. General List of BMPs for Erosion and Sediment Control at Construction Sites (continued)

BMP Topic	Key Elements
Buffers	<ul style="list-style-type: none"> • Depending on site specifics, maintain vegetative buffers or buffers by other means along water bodies to slow and filter stormwater run-off. • Maintain buffers periodically to ensure their effectiveness.
Fugitive Dust Suppression	<ul style="list-style-type: none"> • Apply water on access roads. • Haul materials in properly tarped or sealed containers. • Restrict vehicle speeds to 15 mph. • Cover excavated areas and material after excavation activity ceases. • Reduce the excavation size and/or number of excavations. • Water-down equipment and excavation faces.
Stabilized Construction Entrances	<ul style="list-style-type: none"> • Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway. • Maintain or repair the construction entrance so that it does not become buried in soil. • Properly size entrance BMPs for all anticipated vehicles. • Crushed rock and gravel pads may be used as a stabilized construction entrance. • Replace gravel material when surface voids are visible. • Remove all sediment deposited on roadways within 24 hours.
Waste Management	<ul style="list-style-type: none"> • Collect concrete and wash water in concrete washout facilities, especially when operations are near water resources. Containers must be adequately sized to handle solids, wash water, and possible rainfall. • Choose smaller, covered containers and more frequent collection. • Do not allow waste to accumulate on site. • Separate recyclable materials from waste and keep covered. • Conduct visual inspections of dumpsters and recycling bins, removing containment and keeping containers covered. • Ensure proper storage of stockpiled materials and material storage on site. • Stockpile processed materials on-site separately. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

2.3 MEASURES RELATED TO ROUTINE MAINTENANCE ON NFS LAND

DWR normally adheres to USFS’s National Best Management Practices for Water Quality Management on National Forest System Lands (USFS 2012) for any routine maintenance activities affecting NFS lands. These BMPs are designed to minimize soil disturbance and reduce delivery of sediment to water bodies. On non-NFS lands, DWR’s erosion control BMPs include sediment control measures such as silt fences, sandbag and straw wattles; revegetation of areas after ground-disturbing activities; re-grading slopes to prevent concentrated runoff into water bodies; scheduling activities outside rainy periods (when possible); and installation of rock revetment structures; as described in the general list of BMPs in Table 2.2-1.

2.4 MEASURES RELATED TO OTHER EMERGENCY EROSION CONTROL EVENTS

DWR will be prepared to monitor for unexpected, emergency erosion control events within the Proposed Project boundary that develop in response to significant events (e.g., storms and wildfires). Erosion control measures typically include the protocols for documentation of specific erosion threats, appropriate agency notifications, and short/long-term actions that can be taken to stabilize each site and address public safety.

For emergency erosion control work, DWR will provide notification to CDFW, as appropriate, pursuant to CFGC Section 1610, which requires notification to be submitted within 14 days of beginning the emergency work. “Emergency work” as defined in CFGC Section 1610 includes: (1) immediate emergency work necessary to protect life or property, and (2) immediate emergency repairs to public service facilities necessary to maintain service as a result of a disaster in an area in which a state of emergency has been proclaimed by the governor of California.

2.5 MONITORING OF EROSION AND SEDIMENT CONTROL ACTIVITIES

Monitoring of erosion and sediment control plans generally includes both implementation monitoring (i.e., whether the BMP was installed correctly) and effectiveness monitoring (e.g., whether maintenance or adaptive management is required, whether revegetation is meeting required standards). Monitoring of erosion and sediment control activities for the Project will follow the parameters of the applicable permits (e.g., Section 1602 Agreement, 404 permit and 401 certification), and/or license implementation plan. Various implementation plans in the license (e.g., the Integrated Vegetation Management Plan and Transportation System Management Plan) include specific erosion control-related provisions.

If the work is on or affects NFS lands, the monitoring will adhere, as appropriate, to USFS 2012. The implementation plans incorporate the USFS Handbook requirements so no conflict is anticipated between the implementation plans and the USFS Handbook requirements. However, if a discrepancy does occur between the specific permits and license implementation plans, the monitoring required in the permit will take priority over the monitoring required in the implementation plan.

The USFS Land Management Plan (USFS 2005) requires the USFS to annually audit BMP implementation and effectiveness on NFS lands to meet USFS policy. The USFS audit sites are chosen at random by the USFS and may include sites related to this license. These audits would be conducted by the USFS in cooperation with DWR.

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3.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

3.1 CONSULTATION AND REPORTING

DWR will annually review with the SBNF activities related to erosion and sediment control on or affecting NFS lands in the previous calendar year, as well as any activities related to erosion and sediment control on NFS lands planned for the current calendar year. In addition, DWR will consult with the SBNF, as needed, regarding erosion and sediment control.

3.2 PLAN REVISIONS

DWR, in consultation with the SBNF, will review, update and/or revise this Plan, as it pertains to erosion and sediment control on NFS lands. Any updates to the Plan will be prepared in coordination and consultation with the SBNF. The SBNF will have 60 days after receipt of the updated plan to provide written comment and recommendations before DWR files the updated Plan with FERC for FERC's approval. DWR will include documentation of all relevant coordination and consultation associated with the updated Plan filed with FERC. If DWR does not adopt a particular recommendation by the SBNF, the filing will include DWR's reasons for not doing so. DWR 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

- United States Department of Agriculture, Forest Service (USFS). San Bernardino National Forest. 2012. FS 990a – National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide. 177 pp. Available online:
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- _____. 2006. San Bernardino National Forest Land Management Plan, Final Environmental Impact Statement, Record of Decision. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region. April. Available online:
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- _____. 2005. Land Management Plan, Part 2, San Bernardino National Forest Strategy. Department of Agriculture. Pacific Southwest Region. 117 pp. and appendices. Available online:
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_007719.pdf.
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Attachment 2

Hazardous Materials Management Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



HAZARDOUS MATERIALS MANAGEMENT PLAN

November 2018

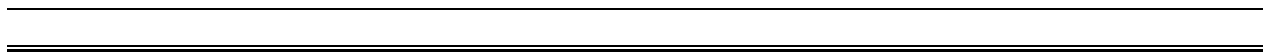


State of California
California Natural Resources Agency
DEPARTMENT OF WATER
RESOURCES
Hydropower License Planning and
Compliance Office

EDMUND G. BROWN JR.
Governor
State of California

JOHN LAIRD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Brief Description of the Project.....	1-1
1.2	Purpose of the Plan	1-5
1.3	Goals and Objectives of the Plan.....	1-5
1.4	Contents of the Plan	1-5
2.0	PROJECT-SPECIFIC HAZARDOUS MATERIALS USE, TRANSPORT, STORAGE, AND DISPOSAL.....	2-1
3.0	HAZARDOUS MATERIALS MANAGEMENT	3-1
3.1	Routine O&M	3-1
3.1.1	Training.....	3-1
3.1.2	Notification Procedures	3-1
3.2	Spill Response.....	3-3
3.2.1	Oil Spill Response – Immediate Actions	3-3
3.2.2	Oil Spill Reporting	3-5
3.2.2.1	Immediate Reporting	3-5
3.2.2.2	Follow-Up Reporting.....	3-7
3.2.3	Best Management Practices	3-7
3.3	New Construction	3-8
4.0	CONSULTATION, REPORTING, AND PLAN REVISIONS.....	4-1
4.1	Consultation and Reporting	4-1
4.2	Plan Revisions.....	4-1
5.0	REFERENCES CITED	5-1

LIST OF FIGURES

Figure 1.1-1.	Devil Canyon Project Vicinity	1-3
Figure 1.1-2.	Proposed Devil Canyon Project Boundary.....	1-4

LIST OF TABLES

Table 2.0-1.	Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance*	2-2
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APPENDICES

Appendix A	Section 304: Emergency Release Follow-Up Notice Reporting Form
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COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

§	Section
Application for New License	DWR's Application for a new license for the Devil Canyon Project, FERC Project Number 14797
Business Plan	Hazardous Materials Business Response Plan
Cal OES	Office of Emergency Services
CDFW	California Department of Fish and Wildlife
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CUPA	Certified Unified Program Agency
DPR	California Department of Parks and Recreation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
hazardous materials	A material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment, if released into the workplace or the environment.
HSC	California Health and Safety Code
LRWQCB	Lahontan Regional Water Quality Control Board
NFS	National Forest System
O&M	Operation and Maintenance
Plan	Hazardous Materials 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	Devil Canyon Project

Project boundary	The Project boundary is the area to which DWR requires access for normal Project operations and maintenance. The boundary is shown in Exhibit G of DWR's Application for New License
SBNF	San Bernardino National Forest
SDS	Safety Data Sheet
SPCC	Spill Prevention, Control, and Countermeasure Plan
SRA	State Recreation Area
SWP	State Water Project
U.S.	United States
USEPA	United States Environmental Protection Agency
U.S.C.	United States Code
USFS	U.S. Department of Agriculture, Forest Service

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1.0 INTRODUCTION

In XXXX 2018, the California Department of Water Resources (DWR), pursuant to Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act [FPA]), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project).

DWR has included this Hazardous Materials Management Plan (Plan) in its XXXX 2018 Application for New License. This Plan addresses hazardous materials, including hazardous waste, defined as “a material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment, if released into the workplace or the environment” (California Health and Safety Code [HSC], Section [§] 25501(n)(1). Hazardous wastes are further defined by the California Department of Toxic Substances Control (DTSC) as “liquids, solids, or contained gases, and can be the by-products of manufacturing processes, used oil, discarded used materials, or discarded unused commercial products, such as cleaning fluids (solvents) or pesticides” (DTSC 2016).

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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities range in elevation from 3,378 feet to 1,778 feet and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation (DPR), on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., the Pacific Crest Trail) traverse or are located in the Silverwood Lake SRA but are not Project facilities. The Project does not include any open water

conduits or transmission lines. DWR operates the Project in a run-of-release mode using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities, and a slight modification to the existing Project boundary. The boundary change would result in a reduction of the area within the boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest System (NFS) lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005), as subsequently amended (USFS 2006).

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures, which are operation and maintenance (O&M) activities to: (1) protect resources against potential impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's proposed Project boundary.

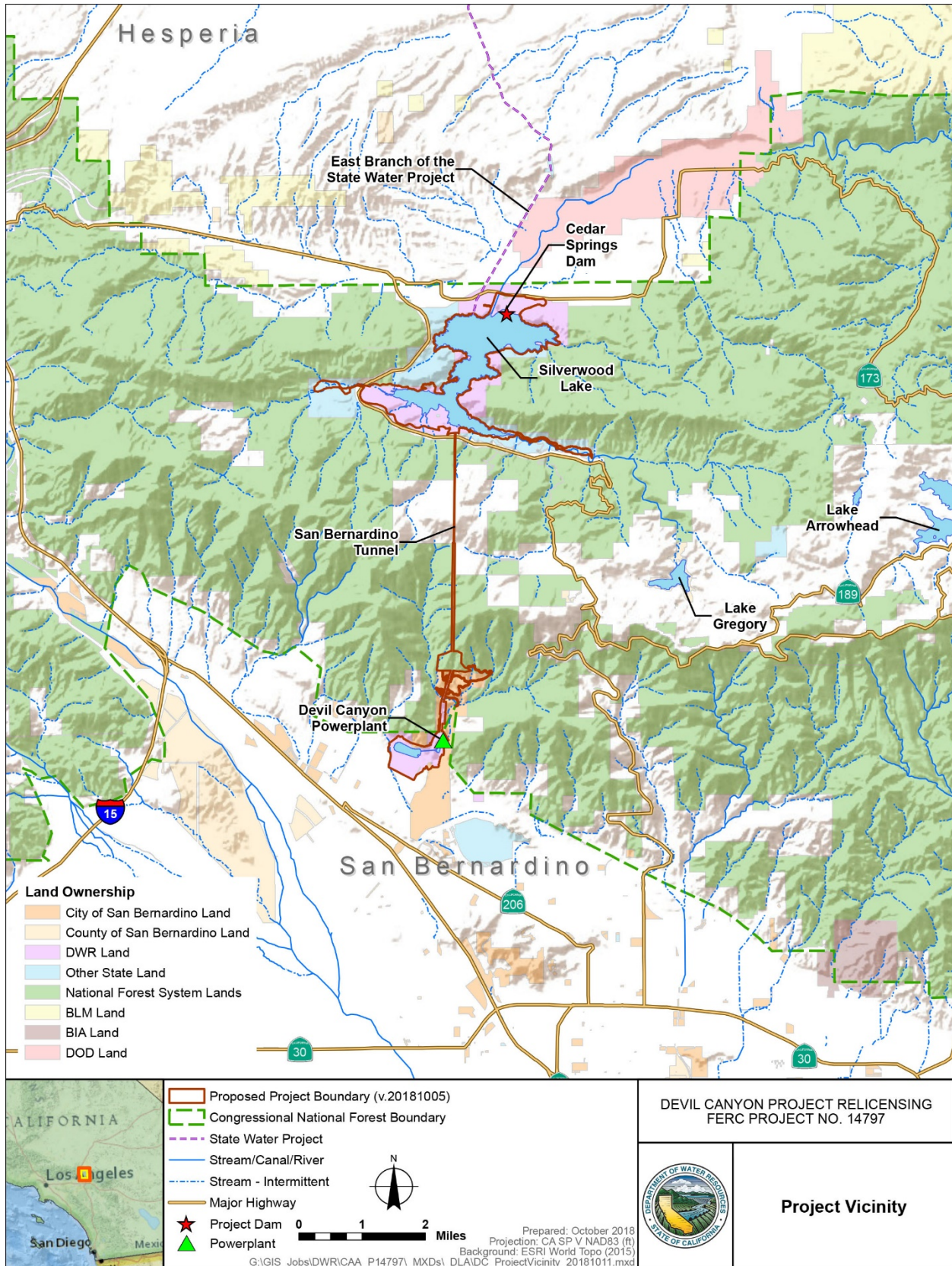


Figure 1.1-1. Devil Canyon Project Vicinity

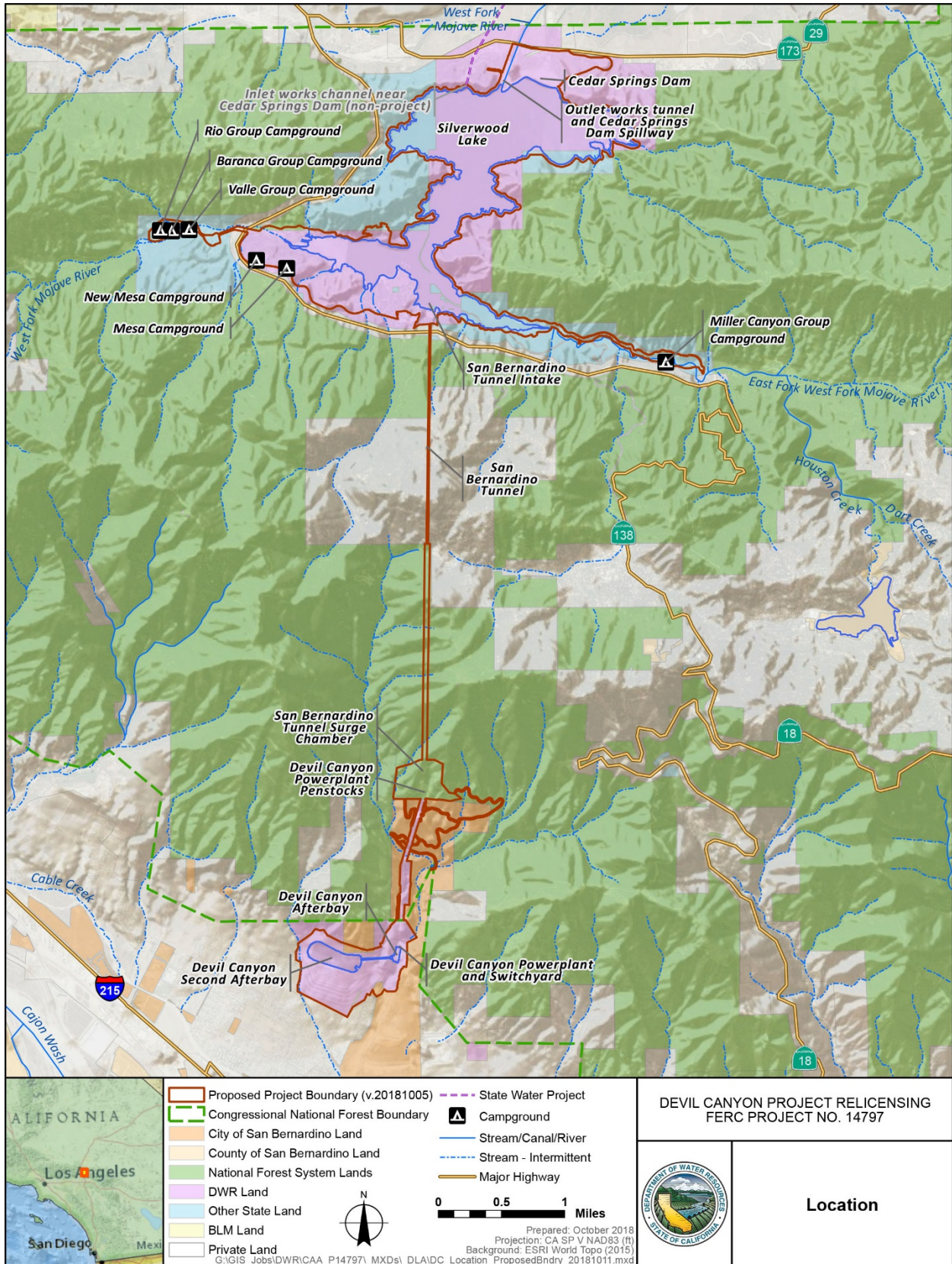


Figure 1.1-2. Proposed Devil Canyon Project Boundary

1.2 PURPOSE OF THE PLAN

This Plan is intended to provide guidance for the storage, use, and transportation of hazardous materials used or generated within the proposed Project boundary.

To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

The primary goal of the Plan is to describe the current standard practices that DWR follows when storing, using, transporting, and disposing of hazardous materials used for routine O&M of the Project. The objective of the Plan is to provide the guidance necessary to meet Plan goals.

1.4 CONTENTS OF THE PLAN

This Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including the purpose and goals of the Plan.
- Section 2.0. Hazardous Materials Stored, Used, Transported or Disposed of for the Project. This section provides a list of hazardous materials that DWR stores, uses, or transports in the routine O&M of the Project. The volume and location of the materials are described. DWR does not dispose of any hazardous substance within the proposed Project boundary.
- Section 3.0. Hazardous Materials Management. This section lists the practices that DWR employs to manage hazardous materials during O&M of the Project.
- Section 4.0. Consultation, Reporting, and Plan Revisions. This section describes consultation between DWR, CDFW, and the SBNF, reporting, and Plan review regarding hazardous materials.
- Section 5.0. References Cited. This section includes the resource documents cited in this Plan.

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2.0 PROJECT-SPECIFIC HAZARDOUS MATERIALS USE, TRANSPORT, STORAGE, AND DISPOSAL

DWR uses hazardous materials during routine O&M of the Project's facilities. DWR also transports hazardous materials to sites located in the proposed Project boundary when they are to be used for periodic maintenance work. The quantities of hazardous materials used or transported for any task at any single time are small (e.g., typically on the order of a gallon or less). Such quantities do not reach Business Plan or any other regulatory threshold values, and DWR does not store hazardous wastes on NFS lands; all waste products will be removed from NFS lands at the time it is generated. Within the proposed Project boundary, DWR stores hazardous materials, clean-up materials, and equipment. DWR does not store hazardous materials or clean-up materials on NFS lands within the proposed Project boundary, and no hazardous substance storage facilities for the Project are located on NFS lands. Spent materials (e.g., hazardous wastes) are transported at the time generated to DWR's storage facility associated with the non-Project Mojave Power/Pumping Plant for proper disposal; the Mojave Power/Pumping Plant is outside of the proposed Project boundary. Hazardous materials are not disposed of within the proposed Project boundary or on NFS lands. Table 2.0-1 provides a general description, by location, of hazardous materials that may be used, stored, or transported for routine Project O&M. Refer to Section 3.2 of this Plan regarding procedures for clean-up of hazardous material spills, including during transport.

DWR and DPR have Business Plans as appropriate for the hazardous materials stored at Devil Canyon Powerplant and Silverwood Lake SRA, as shown in Table 2.0-1. Devil Canyon Powerplant is the only Project facility where DWR stores hazardous materials. DPR hazardous materials are stored at the DPR maintenance facility at Silverwood Lake SWRA. In addition, limited quantities of gasoline and other materials, as listed in Table 2.0-1, are kept by DPR at the marina.

Table 2.0-1. Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance*

Hazardous Materials	Location	O&M Activity	Quantity
DEVIL CANYON FACILITIES¹			
Transformer oil	Exterior Transformer Yard, North of Powerplant	Plant maintenance, Electrical Plant Transformers	30,000 gallons
Diesel fuel No. 2	Exterior, North of Transformer Yard	Plant SEG Fuel Tank	1,800 gallons
Welding gas (75% argon, 25% CO ₂)	Exterior, South of Powerplant	Plant Maintenance Activity	> 100 cubic feet
Chevron hydraulic oil AW 32	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, Plant Hydraulic Equipment	> 220 gallons
Chevron gear lubricant – Meropa 150	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, DC 225Ton Crane	> 110 gallons
Chevron hydraulic fluid - Rando HD 150	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, EBX Unit Oil	> 165 gallons
Chevron motor oil SAE 15W-40	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, Plant and Ck Site SEG Oil	> 110 gallons
K-1 Kerosene	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, Used in Steam Cleaner	> 110 gallons
Mobil EAL 224H – hydraulic fluid	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, EBX Hydraulic Power Unit Oil	> 165 gallons
Used oil/waste	Hazmat/Waste & Storage area NW of Powerplant	Transported offsite for recycling @ 55gal	> 55 gallons
Oily rags	Hazmat/Waste & Storage area NW of Powerplant	Transported offsite for recycling @ 55gal	> 150 pounds
Used oil	Hazmat/Waste & Storage area NW of Powerplant	Transported offsite for recycling @ 55gal	> 165 gallons
Shell Diala oil AX	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, EBX Transformer Oil	>110 gallons
SIGMA M-460 compressor fluid	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, EBX Compressor Oil	>110 gallons

Table 2.0-1. Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance* (continued)

Hazardous Materials	Location	O&M Activity	Quantity
Texaco Starplex Moly MPGM2 - grease	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, EBX Pump Grease	>120 pounds
Chevron turbine oil GST 68	Hazmat/Waste & Storage area NW of Powerplant	Plant maintenance, DC Unit Plant Oil	>110 gallons
Used oil/waste	Plant Elev. 1938, U2 Oil Coalescer	Needle Oil/Water Separator	>50 gallons
Nitrogen	Plant elev. 1938, Cylinder Storage Cage	Plant maintenance, Plant Nitrogen for TSV System	3,800 cubic feet
Chevron turbine oil GST 68	Plant elev. 1938, Day Tanks near Units 1-4	Plant maintenance, Needle Day Tanks	>100 gallons
Nitrogen	Plant elev. 1938, E. end nitrogen bank	Plant maintenance, TSV System Nitrogen	22,500 cubic feet
Chevron turbine oil GST 68	Plant elev. 1938, TSV accumulation tanks	Plant maintenance, U1 & 2 TSV HPU	>350 gallons
Chevron turbine oil GST 68	Plant elev. 1938, TSV HPU control cabinet	Plant maintenance, U1 & 2 TSV HPU	>400 gallons
Chevron Dura-Lith grease EPNRG12	Plant elev. 1938, Hazmat/Storage Area	Plant Maintenance, PM grease	>400 pounds
Used oil/waste	Plant elev. 1938, Hazmat/Storage Area	Transported offsite for recycling @ 55gal	>30 gallons
Used antifreeze	Plant elev. 1938, Hazmat/Storage Area	Transported offsite for recycling @ 55gal	>35 gallons
Used/crushed oil filters	Plant elev. 1938, Hazmat/Storage Area	Transported offsite for recycling @ 55gal	>75 pounds
Acetylene	Plant elev. 1938, Portable	Plant Maintenance Welding	>150 cubic feet
Oxygen	Plant elev. 1938, Portable	Plant Maintenance Welding	>105 cubic feet
Chesterton 801 Industrial & Marine Solvent	Plant elev. 1938, Oil Centrifuge Room	Plant maintenance part cleaning (Pink Soap)	>30 gallons

Table 2.0-1. Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance* (continued)

Hazardous Materials	Location	O&M Activity	Quantity
K-1 kerosene	Plant elev. 1938, Oil Centrifuge Room	Plant maintenance, Used in Steam Cleaners	>30 gallons
Oily rags	Plant elev. 1938, Oil Centrifuge Room	Transported offsite for recycling @ 55gal	>75 pounds
Texaco Ursa Super Plus 15W-40 oil	Plant elev. 1938, Oil Centrifuge Room	Plant maintenance, Plant & Check Site SEG	>30 gallons
Chevron turbine oil GST 68	Plant elev. 1938, Oil Centrifuge Room	Lubricates generator and turbine bearings	>30 gallons
Motor oil 15w-40	Plant elev. 1938, Oil Room	Plant maintenance, Plant & Check Site SEG	>190 gallons
Chevron turbine oil GST 68	Plant elev. 1938, Oil Room	Plant maintenance, Dirt/Clean Tanks Oil System	>1,970 gallons
Used oil/waste	Plant elev. 1938, Oil Room sump pit	Centrifuge Overflow, Transported offsite for recycling @ 55gal	>50 gallons
Dowtherm heat transfer fluid	Plant elev. 1938, HVAC Room	HAVAC Maintenance PM	>30 gallons
Carbon dioxide	Plant elev. 1938, Storage Room	Fire Suppression System	9,170 cubic feet
Nitrogen	Plant elev. 1938, West Nitrogen Bank	Plant maintenance, TSV System Nitrogen	22,500 cubic feet
Chevron turbine oil GST 68	Plant elev. 1938, West Nitrogen Bank	U3, 4 & Bypass Vlv HPU	>350 gallons
Lead acid batteries	Plant elev. 1954, East Battery Room	Essential Buss Emergency Plant Power	315 gallons
Carbon dioxide	Plant elev. 1954, East CO ₂ Bank	Fire Suppression System	39,300 cubic feet
Acetylene	Plant elev. 1954, portable	Plant Maintenance Welding	>150 cubic feet
Oxygen	Plant elev. 1954, portable	Plant Maintenance Welding	>100 cubic feet
Lead acid batteries	Plant elev. 1954, West Battery Room	Essential Buss Emergency Plant Power	>45 gallons
Carbon dioxide	Plant elev. 1954, West CO ₂ Bank	Fire Suppression System	30,130 cubic feet

Table 2.0-1. Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance* (continued)

Hazardous Materials	Location	O&M Activity	Quantity
Chevron turbine oil GST 68	Plant elev. 1954, Turbine/LGB Reservoir	Lubricates generator and turbine bearings	>840 gallons
Waxie City Seal	Plant elev. 1970, North wall stairwell	Floor wax building maintenance	>40 gallons
Waxie W-400 Sealer	Plant elev. 1970, North wall stairwell	Floor wax building maintenance	>75 gallons
Oxygen	Plant elev. 1970, Exterior Cylinder Gas Storage Case	Plant Maintenance Welding	>200 cubic feet
Acetylene	Plant elev. 1970, SW Cylinder Gas Storage Closet	Plant Maintenance Welding	>500 cubic feet
Argon compressed	Plant elev. 1970, SW Cylinder Gas Storage Closet	Plant Maintenance Welding	1,600 cubic feet
Chevron turbine oil GST 68	Plant elev. 1970, Motor UGB/Governor Reservoir	Lubricates generator and turbine bearings	>2,320 gallons
A-1025 shielding gas	Plant elev. 1970, West Welding Shop	Plant Maintenance Welding	>1,800 cubic feet
Acetylene	Plant elev. 1970, West Welding Shop	Plant Maintenance Welding	>100 cubic feet
Argon compressed	Plant elev. 1970, West Welding Shop	Plant Maintenance Welding	>500 cubic feet
Oxygen	Plant elev. 1970, West Welding Shop	Plant Maintenance Welding	>200 cubic feet
SILVERWOOD LAKE STATE RECREATION AREA (DPR) ²			
Diesel fuel	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Refuel heavy equipment	1,000 gallons
Latex paint	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance	220 gallons
Port o pot blue (toilet deodorizer)	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance	220 gallons
Disinfectant	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance	200 gallons

Table 2.0-1. Devil Canyon Project Facilities and Hazardous Materials Stored, Used, or Transported for Routine Operation and Maintenance* (continued)

Hazardous Materials	Location	O&M Activity	Quantity
Liqified petroleum gas (LPG)	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	HVAC	5,000 gallons
Gasoline	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Refuel equipment	4,000 gallons
Oxygen	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance - welding	1,000 cubic feet
Used lubricating oils	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Heavy equipment maintenance	35 gallons
Acetylene	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance - welding	750 cubic feet
Roundup Pro Concentrate	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance	100 gallons
Sodium Hypochlorite – Clorox Bleach	DPR maintenance facility: 14651 Cedar Cir, Hestperia, Ca.	Facility maintenance	100 gallons

Note:

¹DWR maintains a Business Plan for this facility.

²DPR maintains a Business Plan for this facility.

*This list represents the products used or onsite during the writing of this plan. It is not intended to limit the type, volume, or storage location of products used or held during the term of the license.

3.0 HAZARDOUS MATERIALS MANAGEMENT

3.1 ROUTINE O&M

Prior to conducting any O&M task, DWR staff normally develops solutions that will eliminate, nullify, or prevent hazards that may be encountered during task implementation, including hazards associated with hazardous substance handling.

3.1.1 Training

Using best practices and good judgment, and as required by regulations, DWR staff who handle hazardous materials during routine O&M are trained in the following:

- Safe handling of hazardous materials, including appropriate protocols with respect to hazardous substance storage, labeling, and SDSs
- Location and use of appropriate equipment and materials for cleaning up any hazardous materials spill
- Procedures for cleaning up spills
- Use of spill control and personal protective equipment (PPE)

DWR formally documents all trainings.

3.1.2 Notification Procedures

DWR staff who handle hazardous materials are familiar with notification and reporting procedures in case of a hazardous materials spill or incident during routine O&M activities. These notification and reporting procedures may include:

- As soon as possible, but no later than 24 hours after the event of a reportable-quantity hazardous substance spill or accident, DWR informs the appropriate federal, State and county agencies and DPR; DWR initially notifies the California Governor's Office of Emergency Services (Cal OES) at 800-852-7550 or 916-262-1621.
- If the spill occurs on or affects resources on NFS lands, DWR will contact the SBNF to report the spill and discuss corrective actions. The contact information for SBNF Emergency Command Center dispatch, to initiate the SBNF's Emergency Response Plan is 909-383-5651 (24-hour emergency); or 909-382-2619 or 909-382-2633 (for office, general questions).
- Depending on the type of release, DWR may contact the California Department of Fish and Wildlife (CDFW) Office of Spill Prevention and Response at 800-852-7550 or 916-845-0045, and/or the U.S. Department of the Interior, Fish and Wildlife Service (USFWS) for Natural Resource Damage Assessment: 760-431-9440 (extension 271) or 760-431-9440 (extension 291).

- Reporting includes the following details regarding the spill: product, magnitude, nature, time, date, location and actions taken. Reports can be made by any employee involved in release, the Site Manager, or DWR's Incident Commander.
- DWR will notify FERC of the event, including the agencies notified by DWR, pertinent details regarding the event, and any corrective actions or requirements of the responsible agencies.

In the rare event during which spill prevention activities fail, clean-up material inventories at the Devil Canyon Powerplant supply Project tasks managed by DWR. From this inventory, trucks used for O&M are normally equipped with a fire extinguisher, shovel and bucket, as a matter of routine.

At DWR-maintained facilities within the proposed Project boundary, the clean-up material inventory is specific to the products in use. Those clean-up materials may include, but are not limited to:

- Emergency Spill Kit
 - Absorbent socks
 - Disposal bags and ties
 - Safety glasses
 - Rubber gloves
 - Absorbent drip pillow
 - Absorbent skimmers
 - Emergency response guide book
 - Absorbent spill pillows, 24" x 18"
 - Hazardous Waste labels
 - Lite-dri absorbent (or equal)
 - Flat-bladed shovel and broom
 - Waste material containment drums for collection of spilled materials, including disposable spill kit items used in the spill response (e.g, absorbent socks and pillows, rubber gloves, etc.) for disposal in accordance with federal, state and local regulations.

- Absorbent Pads – Each pad (18 inches x 18 inches) is polypropylene fabric that absorbs 11 times its weight in liquids. Pads absorb 10 gallons of liquid per bale of 100 pads. Each clean-up crew normally has 100 absorbent pads.
- Absorbent Skimmers Booms – Skimmers float indefinitely before or after saturation with oils. Skimmers are made of meltdown polypropylene fill that repels water. They absorb 10 times their weight in oil and can be used in lakes, streams, or on the ground. Each skimmer normally has a harness kit attached that is made of yellow polypropylene rope with grommets that are used to connect skimmers. Each boom is usually 8 feet x 10 feet. Absorbent skimmer booms are useful when work is performed near water.
- Clean Drum – One 55-gallon clean drum, lined with polypropylene material (overpack), can be used to store spill response materials until needed. When a spill occurs, soiled pads, pillows, skimmers and contaminated soil will be placed in the drum for disposal after the cleanup is accomplished.

3.2 SPILL RESPONSE

In the remote event that DWR's prevention practices are not successful, DWR generally follows the procedures outlined below that facility personnel carry out when responding to, and reporting on, a spill/release.

3.2.1 Oil Spill Response – Immediate Actions

- Evaluate the Area. What is the most immediate hazard? Are you in immediate danger? Is the spill headed for a drain, dry goods, or co-workers? Can you act safely to stop the leak at an upstream valve? If you cannot turn off a valve, can you dike or block-off the leak with absorbent materials. Remember – do everything only from a safe distance and avoid contact with the spilled product.
- Notify Your Supervisor. Warn your supervisor and affected personnel in accordance with internal emergency response system procedures. If you can, do not leave the spill unattended when reporting to your supervisor; instead find someone nearby to monitor the spill and to enforce safety/security measures and keep others away. Use the information you have gathered to inform your supervisor of the situation. The supervisor assures that the Incident Commander for the facility assumes incident command for directing a coordinated response and ensuring the required external reporting notifications.
- Secure the Work Area. Clear the immediate area. Block off the spill site and areas where exposure may be a problem. Keep all sources of ignition away from the area. Have coworkers stand at points around the scene to keep people and vehicles from passing through the spill area. Shut down machinery that could ignite the spill. If machinery cannot be removed from the path of the spill, surround equipment with absorbent materials. Be aware of the potential for electric shock.

- **Personal Protective Equipment.** Put on appropriate PPE before beginning any cleanup or containment operation. The type of PPE needed will vary according to the type and degree of hazard. Check the SDS for the type of PPE needed for the spilled material.
- **Control the Spill.** Before you begin, be ready to react for your own safety. Recognize signs of over-exposure. Have a fire extinguisher ready for appropriate use. Locate first-aid supplies. Plan your emergency escape route. Follow the path of the spill back to its origin and stop the flow: a ruptured pipeline can be turned off by shutting down the closest valve upstream; an overturned container can be placed upright and secured; and a damaged container can be rolled on its side so the damaged area is on top. Try to keep the spill from entering a floor drain.
- **Contain the Spill.** Try to contain the spill to a small area. If you are dealing with a liquid, it is best to dike or block the spill by using absorbent materials. If these are not immediately available at your workplace, use sandbags or even chemical hoses to dike the spill. If the spill is outdoors, you may dig a trench around the spill to help contain it. Remember that for an outdoor spill, the main concern is to avoid runoff into storm sewers and nearby bodies of water. Deploy floating absorbent booms to contain water already contaminated or threatened by contamination. Chemical dispersants will not be applied without specific authorization from the U.S. Environmental Protection Agency (USEPA).
- **Clean-up the Spill.** After immediate threats are stabilized, you can clean up a spill by absorbing it, neutralizing the chemical, or by recovering it. It is important to have adequate information to perform your work safely (consult the SDS). Clean-up methods should be appropriate for the chemical.
 - **Recover.** Recover using equipment compatible with the spilled material (e.g., rubber squeegee, flat-bladed shovel, etc.). An industrial wet-vac may be used for certain, non-volatile oils if there is no risk of fire or explosion. Place recovered material in a new container, properly sealed and labeled for disposal.
 - **Absorb.** Absorb the spill with a commercial spill absorbent, or a non-reactive absorbent such as vermiculite. Clean up absorbent and place it in sealed and labeled containers. If the spill contained a hazardous substance, a hazardous waste label is required.
 - **Neutralize.** Neutralize where appropriate. Check the SDS to determine if the spilled material needs to be neutralized. Neutralization is the process of applying either acids or bases to the spill to form a neutral salt. Neutralization reduces the toxicity of the spill and allows for additional means of disposal. Do not neutralize a spilled liquid unless you are sure that the resulting reaction will not release a hazardous gas or cause an explosion.

- Decontaminate. Decontaminate hazardous materials from employees and their equipment. Set up a “Decon” area away from the spill. Make sure all equipment, material, and personnel used to respond to the spill are properly decontaminated. Decontaminate PPE before it is removed. Remove the PPE so that outside surfaces do not touch the wearer.
- Dispose. Immediately after a petroleum or oil spill/release, the Incident Commander must provide for storing and/or disposing of all recovered oil, contaminated soil, contaminated water, and/or contaminated spill response media. Bring in the Environmental and Safety Manager to oversee the disposal process with contracted waste handlers. No matter how you dispose of a material, labeling is required on all containers. For everyone’s safety, it is important to know exactly what material is being handled during the disposal process.

3.2.2 Oil Spill Reporting

3.2.2.1 *Immediate Reporting*

- Upon discovery of a spill, the Incident Commander of a DWR facility will contact San Bernardino County OES at 909-386-8425 or Cal OES at 800-852-7550 or 916-262-1621 for any of the following conditions:
 - Any significant spill/release of petroleum
 - Discharges of any hazardous materials, oil, or petroleum products into State waters
 - Discharges that may threaten or impact water quality
- If San Bernardino County OES determines that emergency response assistance is required, the DWR Incident Commander notifies the following agencies:
 - Local Emergency Response Agency (9-1-1, or Local Fire Department)
 - San Bernardino County Fire – Hazardous Materials Division at 909-386-8425
 - Lahontan Regional Water Quality Control Board (LRWQCB) at 760-241-6583 or 530-542-5400
 - CDFW at 916-445-0045; press 5 for Spill Prevention and Response.
- The Incident Commander contacts the U.S. Coast Guard National Response Center at 800-424-8802 if any of the following conditions are met:
 - The oil spill/release will reach a navigable body of water or an adjoining shoreline

- Water quality standards could be violated
- The spill/release could cause a film, sheen, or discoloration
- The spill/release could cause a sludge or emulsion
- The spill/release exceeds Federal Reportable Quantities (Comprehensive Environmental Response, Compensation, and Liability Act, also known as CERCLA).
- For serious injuries or harmful exposures to workers, the Incident Commander will contact the California Department of Industrial Relations/Division of Occupational Safety and Health District Office in San Bernardino at 909-383-4321 within eight hours.
- For hazardous waste tank system releases or secondary containment releases, the Incident Commander will contact the California Environmental Protection Agency, Department of Toxic Substances Control at 916-255-3545.

To the maximum extent known, the Incident Commander provides the following information to the federal, State, and local reporting agencies during the initial telephone notifications:

- Identity of caller and telephone number at which he/she can be reached
- Location, date, and time of the spill/release incident, or threatened spill/release incident
- Substance and quantity involved
- A description of what happened
- Medium or media impacted by the spill/release (water or land)
- Time and duration of the spill/release
- Proper precautions to take
- Danger or threat posed by the spill/release
- Number and types of injuries (if any)
- Weather conditions at the incident location
- Any other information that may help emergency personnel responding to the incident

3.2.2.2 Follow-Up Reporting

- As soon as practical, but no later than 30 days of the spill/release, the Incident Commander normally files a Section 304: Emergency Release Follow-Up Notice Reporting Form with Cal OES. (A blank Section 304: Emergency Release Follow-Up Notice Reporting Form is provided in Appendix A).
- If the spill/release is greater than 1,000 gallons, or is the second spill/release event of more than 42 gallons of oil within 12 months, the Incident Commander will prepare a written report of the incident. The report will be submitted to the USEPA Regional Administrator and LRWQCB within 60 days of the triggering incident. The written report must include the following.
 - Name of the facility
 - Incident Commander's name
 - Location of the facility
 - Maximum storage or handling capacity of the facility and normal daily throughput
 - Corrective action and countermeasures taken, including a description of the equipment repairs and replacements
 - An adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
 - The cause of the discharge, including failure analysis of the system or subsystem in which the failure occurred
 - Additional preventative measures taken or contemplated to minimize the possibility of recurrence
 - Other information the Regional Administrator may reasonably require pertinent to the Spill Prevention, Control, and Countermeasure (SPCC) Plan or discharge incident(s)

3.2.3 Best Management Practices

On National Forest Service lands, BMP FAC-6 Hazardous Materials (USFS 2012) will be used. The following Best Management Practices (BMP) will be adhered to on non-National Forest Service lands:

- Vehicles and equipment will not be maintained or refueled in areas where hazardous materials may enter a stream or lake.

- No debris, soil, silt, sand, rubbish, construction waste, cement or concrete or washings thereof, asphalt, paint, oil or other petroleum products, or any other materials which could be hazardous to aquatic life, will be stored or otherwise placed in an area where they may enter a stream or lake.

3.3 NEW CONSTRUCTION

In addition to its own standard practices, should DWR hire a contractor to perform any maintenance work or new construction for the Project within the proposed Project Boundary, prior to the work, each contractor will have a work-specific SPCC plan in place, if one is required for the work. DWR will notify the SBNF of any new construction for the Project if the new construction is on NFS lands. The project-specific SPCC plan will normally include:

- Designate a supervisor to oversee and enforce proper spill prevention measures
- Provide spill response and prevention education for employees and subcontractors
- Stock appropriate clean-up materials onsite near material storage, unloading, and use areas
- Designate hazardous waste storage areas away from storm drains or watercourses
- Minimize production or generation of hazardous materials onsite or substitute materials used onsite with less hazardous materials

4.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

4.1 CONSULTATION AND REPORTING

DWR will annually review with the SBNF activities related to hazardous materials on NFS lands in the previous calendar year, as well as any activities related to hazardous materials on NFS lands planned for the current calendar year. In addition, DWR will consult with the SBNF, as needed, regarding hazardous materials.

DWR will follow SBNF reporting requirements for hazardous substance events.

4.2 PLAN REVISIONS

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

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5.0 REFERENCES CITED

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- _____. 2005. San Bernardino National Forest Land Management Plan, Part 2, San Bernardino National Forest Strategy. Department of Agriculture. Pacific Southwest Region. 117 pp. and appendices. Available online:
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Appendix A

Section 304: Emergency Release Follow-Up Notice Reporting Form

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Written Reporting of Emergency Releases

The requirements for written reports can be found in the California Code of Regulations - Title 19, Division 2, Chapter 4, Article 2, Section 2705, which states:

- (a) If required to submit a written emergency release follow-up notice pursuant to 42 U.S.C. section 11004(c) (1989), or as that section may be subsequently amended, a business shall prepare the written emergency release follow-up notice using the form specified in subsection (c) of this section.
- (b) A written emergency release follow-up notice prepared pursuant to subsection (a) shall be sent to the Chemical Emergency Planning and Response Commission (CEPRC) at 3650 Schriever Avenue, Mather, CA 95655. This written report shall be sent as soon as practicable following a release, but no later than 7 days from the date of the release.
- (c) The following reporting form (with instructions), the 'Emergency Release Follow-up Notice Reporting Form,' shall be used for filing the written emergency release follow-up notice required by subsection (a) of this section.

EMERGENCY RELEASE FOLLOW - UP NOTICE REPORTING FORM

A	BUSINESS NAME	FACILITY EMERGENCY CONTACT & PHONE NUMBER () -	
B	INCIDENT MO DAY YR DATE	TIME OES NOTIFIED (use 24 hr time)	OES CONTROL NO.
C	INCIDENT ADDRESS LOCATION	CITY / COMMUNITY	COUNTY ZIP
D	CHEMICAL OR TRADE NAME (print or type)		CAS Number
	CHECK IF CHEMICAL IS LISTED IN 40 CFR 355, APPENDIX A <input type="checkbox"/>	CHECK IF RELEASE REQUIRES NOTIFICATION UNDER 42 U.S.C. Section 9603 (a) <input type="checkbox"/>	
	PHYSICAL STATE CONTAINED <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	PHYSICAL STATE RELEASED <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	QUANTITY RELEASED
	ENVIRONMENTAL CONTAMINATION <input type="checkbox"/> AIR <input type="checkbox"/> WATER <input type="checkbox"/> GROUND <input type="checkbox"/> OTHER	TIME OF RELEASE	DURATION OF RELEASE ___DAYS ___HOURS ___MINUTES
E	ACTIONS TAKEN		
F	KNOWN OR ANTICIPATED HEALTH EFFECTS (Use the comments section for addition information)		
	<input type="checkbox"/> ACUTE OR IMMEDIATE (explain) _____		
	<input type="checkbox"/> CHRONIC OR DELAYED (explain) _____		
	<input type="checkbox"/> NOTKNOWN (explain) _____		
G	ADVICE REGARDING MEDICAL ATTENTION NECESSARY FOR EXPOSED INDIVIDUALS		
H	COMMENTS (INDICATE SECTION (A - G) AND ITEM WITH COMMENTS OR ADDITIONAL INFORMATION)		
I	CERTIFICATION: I certify under penalty of law that I have personally examined and I am familiar with the information submitted and believe the submitted information is true, accurate, and complete.		
	REPORTING FACILITY REPRESENTATIVE (print or type) _____		
	SIGNATURE OF REPORTING FACILITY REPRESENTATIVE _____ DATE: _____		

EMERGENCY RELEASE FOLLOW-UP NOTICE
REPORTING FORM INSTRUCTIONS

(This form may be reproduced, as needed)

GENERAL INFORMATION:

Chapter 6.95 of Division 20 of the California Health and Safety Code requires that written emergency release follow-up notices prepared pursuant to 42 U.S.C. § 11004, be submitted using this reporting form. Non-permitted releases of reportable quantities of Extremely Hazardous Substances (listed in 40 CFR 355, appendix A) or of chemicals that require release reporting under section 103(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [42 U.S.C. § 9603(a)] must be reported on the form, as soon as practicable, but no later than 7 days, following a release. The written follow-up report is required in addition to the verbal notification.

BASIC INSTRUCTIONS:

- The form, when filled out, reports follow-up information required by 42 U.S.C § 11004. Ensure that all information requested by the form is provided as completely as possible.
- If the incident involves reportable releases of more than one chemical, prepare one report form for each chemical released.
- If the incident involves a series of separate releases of chemical(s) at different times, the releases should be reported on separate reporting forms.

SPECIFIC INSTRUCTIONS:

Block A: Enter the name of the business and the name and phone number of a contact person who can provide detailed facility information concerning the release.

Block B: Enter the date of the incident and the time that verbal notification was made to OES. The OES control number is provided to the caller by OES at the time verbal notification is made. Enter this control number in the space provided.

Block C: Provide information pertaining to the location where the release occurred. Include the street address, the city or community, the county and the zip code.

Block D: Provide information concerning the specific chemical that was released. Include the chemical or trade name and the Chemical Abstract Service (CAS) number. Check all categories that apply. Provide best available information on quantity, time and duration of the release.

Block E: Indicate all actions taken to respond to and contain the release as specified in 42 U.S.C. § 11004(c).

Block F: Check the categories that apply to the health effects that occurred or could result from the release. Provide an explanation or description of the effects in the space provided. Use Block H for additional comments/information if necessary to meet requirements specified in 42 U.S.C. § 11004(c).

Block G: Include information on the type of medical attention required for exposure to the chemical released. Indicate when and how this information was made available to individuals exposed and to medical personnel, if appropriate for the incident, as specified in 42 U.S.C. § 11004(c).

Block H: List any additional pertinent information.

Block I: Print or type the name of the facility representative submitting the report. Include the official signature and the date that the form was prepared.

MAIL THE COMPLETED REPORT TO:

**Chemical Emergency Planning and Response Commission (CEPRC) /
Local Emergency Planning Committee (LEPC)
Attn: Section 304 Reports
3650 Schriever Avenue,
Mather, CA 95655**

Attachment 3

Aquatic Invasive Species Management Plan

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**DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797**



AQUATIC INVASIVE SPECIES MANAGEMENT PLAN
February 2018



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

EDMUND G. BROWN JR.
Governor
State of California

JOHN LAIRD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources

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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-3
1.1.1	Brief Project Description	1-3
1.2	Purpose of the Plan	1-6
1.3	Goals and Objectives of the Plan.....	1-6
1.4	Management of AIS Species	1-6
1.4.1	Management Activities Performed by DWR.....	1-6
1.4.2	Management Activities Not Performed by DWR	1-6
1.5	Contents of the Plan	1-7
2.0	AQUATIC INVASIVE SPECIES MANAGEMENT AND MONITORING	2-1
2.1	Standards and Best Practices.....	2-1
2.1.1	Best Management Practices for Project Activities.....	2-1
2.1.2	Quagga and Zebra Mussel Prevention Activities	2-1
2.2	Monitoring.....	2-1
2.2.1	Species-specific Monitoring	2-1
2.2.1.1	Quagga and Zebra Mussels.....	2-1
2.2.1.2	Cyanobacteria Blooms.....	2-4
2.2.1.3	Taste and Odor Algal Blooms	2-4
2.2.2	Incidental Observations Monitoring.....	2-5
3.0	CONSULTATION, REPORTING, AND PLAN REVISIONS.....	3-1
3.1	Consultation and Reporting	3-1
3.2	Plan Revisions.....	3-1
4.0	REFERENCES CITED	4-1

LIST OF FIGURES

Figure 1.1-1.	Devil Canyon Project Vicinity	1-4
Figure 1.1-2.	DWR's Proposed Devil Canyon Project Boundary.....	1-5
Figure 2.2-1.	Veliger and Adult Quagga and Zebra Mussel Monitoring Sites in Silverwood Lake	2-2
Figure 2.2-2.	Veliger Quagga and Zebra Mussel Monitoring Sites at the Devil Canyon Second Afterbay	2-3

LIST OF APPENDICES

Appendix A Forest Service Manual 2900, Invasive Species Management

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

AIS	aquatic invasive species
APAP	Aquatic Pesticide Application Plan
Application for New License	DWR's Application for a New License for Major Project – Existing Dam for the Devil Canyon Project, FERC Project Number 14797
BMP	Best Management Practice
C.C.R.	California Code of Regulations
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
MWD	Metropolitan Water District
O&M	operations and maintenance
Plan	Aquatic Invasive Species Management Plan
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operations and maintenance (O&M) activities to: (1) protect resources against impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M
Project	Devil Canyon Project
Project boundary	The area to which DWR requires access for normal Project operations and maintenance; the boundary is shown in Exhibit G of DWR's Application for New License
Project vicinity	The area within and surrounding the FERC Project boundary on the order of a USGS 1:24,000 quadrangle
SBNF	San Bernardino National Forest
SRA	State Recreation Area
State	State of California
SWP	State Water Project
SWRCB	State Water Resources Control Board

U.S.
USFS

United States
U.S. Department of Agriculture, Forest Service

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1.0 INTRODUCTION

In XXXX 2018, the California Department of Water Resources (DWR), 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) (Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project).

DWR has included this Aquatic Invasive Species Management Plan (Plan) in its XXXX 2018 Application for New License.

For the purpose of this Plan, aquatic invasive species (AIS) include aquatic organisms that invade ecosystems beyond their natural, historic range and may harm native ecosystems or commercial, agricultural, or recreational activities; algal blooms that generate undesirable taste and odor compounds; and algal blooms that can create unhealthy conditions through the production of cyanotoxins. The list of AIS of concern for this Plan includes species known or with the potential to occur on the Project, as follows:

- Cyanobacteria
- Aquatic Plants
 - curly leaf pondweed (*Potamogeton crispus*)
 - Eurasian watermilfoil (*Myriophyllum spicatum*)
 - coontail (*Ceratophyllum demersum*)
 - sago pondweed (*Potamogeton pectinatus*)
 - hydrilla (*Hydrilla verticillata*)
 - water hyacinth (*Eichhornia crassipes*)
 - parrot’s feather milfoil (*Myriophyllum aquaticum*)
- Mollusks
 - quagga mussel (*Dreissena rostriformis bugensis*)
 - zebra mussel (*Dreissena polymorpha*)
 - New Zealand mudsnail (*Potamopyrgus antipodarum*)
 - Asian clam (*Corbicula fluminea*)

- channeled apple snail (*Pomacea canaliculata*)
- European ear snail (*Radix auricularia*)
- Crustaceans
 - Red swamp crayfish (*Procambarus clarkii*)
- Amphibians
 - American bullfrog (*Lithobates catesbeianus*)
 - African clawed frog (*Xenopus laevis*)
- Reptiles
 - red-eared slider (*Trachemys scripta elegans*)
- Fish
 - Shimofuri goby (*Tridentiger bifasciatus*)
 - Inland silverside (*Menidia beryllina*)

Of the above AIS, at this time cyanobacteria, curly leaf pondweed, Eurasian watermilfoil, coontail, sago pondweed, Asian clam, channeled applesnail, red-eared slider, Shimofuri goby, and inland silverside are reported to occur in Silverwood Lake. The other AIS in the preceding list have a known risk of being introduced to Project impoundments. Additional AIS may be added to the above list in this Plan if they are reported to occur or if there is good reason to suspect that they occur or will occur in Project impoundments.

In addition to the above AIS, the following 11 species of non-native fish are reported to occur in Silverwood Lake: (1) largemouth bass (*Micropterus salmoides*); (2) bluegill (*Lepomis macrochirus*); (3) black crappie (*Pomoxis nigromaculatus*); (4) striped bass (*Morone saxatilis*); (5) channel catfish (*Ictalurus punctatus*); (6) white catfish (*Ameiurus catus*); (7) American shad (*Alosa sapidissima*); (8) threadfin shad (*Dorosoma petenense*); (9) Sacramento blackfish (*Orthodon microlepidotus*); (10) hitch (*Lavinia exilicauda*); and (11) tule perch (*Hysterocarpus traskii*). In addition, the California Department of Fish and Wildlife (CDFW) has stocked non-native rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) in the reservoir.

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 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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities range in elevation from 3,378 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Devil Canyon Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation (DPR), on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., the Pacific Crest Trail) traverse or are located in the Silverwood Lake SRA but are not Project facilities. The Project does not include any open water conduits or transmission lines. DWR operates the Project in a run-of-release mode using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities and a slight modification to the existing Project boundary. The boundary change would result in a reduction of the area within the boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest System (NFS) lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005), as subsequently amended.

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures, which are operations and maintenance (O&M) activities to: (1) protect resources against potential impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's proposed Project boundary.

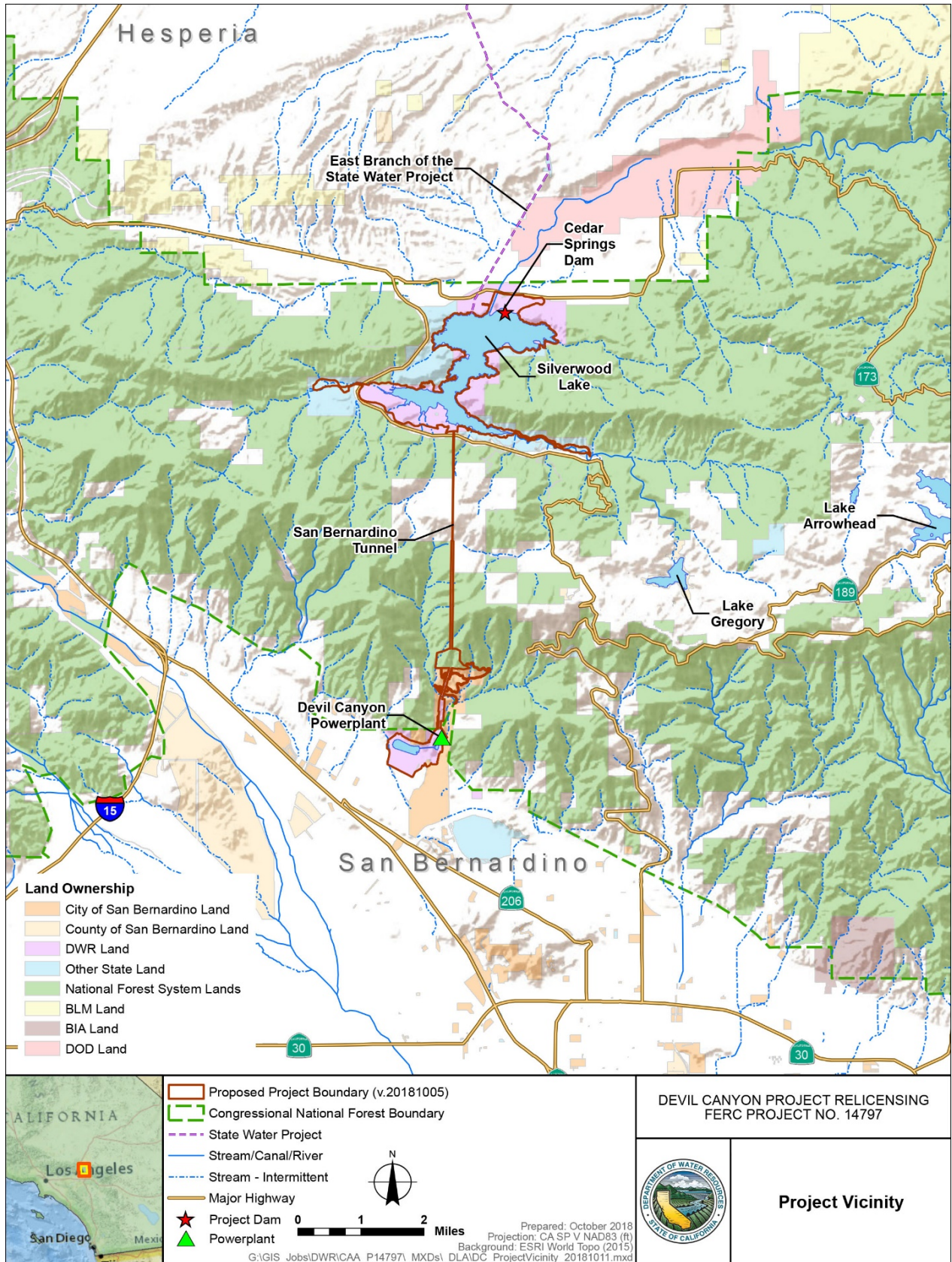


Figure 1.1-1. Devil Canyon Project Vicinity

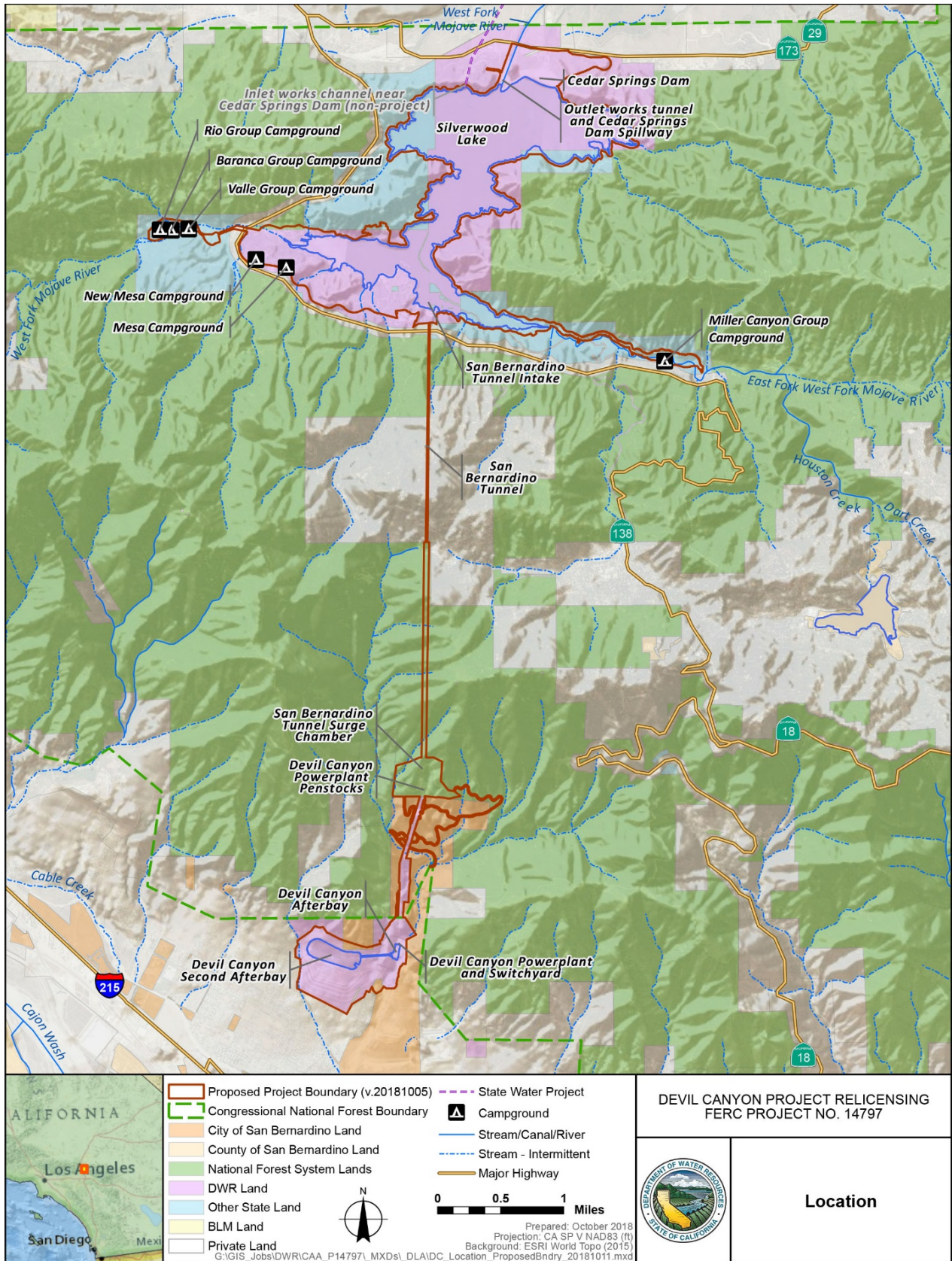


Figure 1.1-2. DWR's Proposed Devil Canyon Project Boundary

1.2 PURPOSE OF THE PLAN

The purpose of this Plan is to minimize the risk of introduction and spread of AIS due to Project O&M.

To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

The goal of this Plan is to provide guidance for managing AIS. The objectives of the Plan are to describe activities related to minimizing the risk of introduction and spread of AIS into and throughout Project-affected waters.

1.4 MANAGEMENT OF AIS SPECIES

1.4.1 Management Activities Performed by DWR

DWR actively monitors and manages for quagga and zebra mussels, algal blooms that generate undesirable taste and odor compounds, and algal blooms that can create unhealthy conditions through the production of cyanotoxins.

DWR monitors for the presence of quagga and zebra mussels. DWR supports DPR's vessel inspection program to prevent the introduction of mussels into the Project.

DWR monitors and manages for the reduction of algae that produce taste and odor compounds and cyanobacteria that produce cyanotoxins through the application of aquatic algaecides, which is the most effective direct treatment.

1.4.2 Management Activities Not Performed by DWR

DWR does not manage for aquatic plants, American bullfrogs, African clawed frogs, or red-eared slider.

Management techniques for aquatic plants include mechanical removal, bottom barriers, dredging, water drawdown and some biological controls. Each of these techniques has drawbacks and are differentially successful, depending on species.

Trapping, pesticide application, water drawdown and hunting/hand removal control methods have been moderately successful on small populations of American bullfrogs and African clawed frogs. However, no treatment methods for large populations or those in larger bodies of water have been developed.

Red-eared slider management is also time-consuming and difficult. Methods include trapping, water drawdown and seine-netting (IUCN 2010).

1.5 CONTENTS OF THE PLAN

This Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including the purpose, goals, and objectives of the Plan.
- Section 2.0. Aquatic Invasive Species Management and Monitoring. This section includes a description of preventative and monitoring guidelines for AIS.
- Section 3.0. Consultation, Reporting, and Plan Revisions. This section describes consultation between DWR, CDFW and SBNF, reporting, and Plan revisions.
- Section 4.0. References Cited. This section includes the resource documents cited in this Plan.

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2.0 AQUATIC INVASIVE SPECIES MANAGEMENT AND MONITORING

2.1 STANDARDS AND BEST PRACTICES

This Plan identifies feasible and relevant actions to reduce or prevent introduction, infestation, or spread of AIS into or within Silverwood Lake, the Project afterbays, and Project-affected stream reaches caused by Project activities. Some of these actions are currently performed by DWR or DPR.

2.1.1 Best Management Practices for Project Activities

DWR will develop and implement specific Best Management Practices (BMPs) for future Project O&M and construction activities that have the potential to introduce AIS into Silverwood Lake, the Project afterbays, and Project-affected stream reaches. BMPs for such activities may include the following, as applicable:

- A list of AIS with the potential to be introduced or spread
- Measures to reduce the potential for introduction or spread of AIS
- Identification of critical control points for prevention of AIS
- Actions that will be taken if an introduction of AIS is found during the O&M activity

2.1.2 Quagga and Zebra Mussel Prevention Activities

DPR currently funds and operates a program where watercraft entering Silverwood Lake via the Silverwood Lake SRA are inspected for quagga and zebra mussels. The watercraft must be clean, drained of water, and dry. If a watercraft fails inspection, DPR does not permit the vessel to enter the reservoir for at least seven days, after which it will be inspected again. In addition, DPR requires watercraft that have been in waters that are known to be infested by quagga or zebra mussels to wait seven days before the vessel can be inspected for entry into Silverwood Lake (California State Parks 2018), and DPR posts signs regarding mussels. DPR expects to continue this program into the future.

2.2 MONITORING

2.2.1 Species-specific Monitoring

2.2.1.1 Quagga and Zebra Mussels

DWR conducts an Early Detection Monitoring Program throughout the SWP for planktonic veligers (larval life stage of mussels) and adult quagga and zebra mussels. DWR's Early Detection Mussel Monitoring Program is described in the Quagga and Zebra Mussel Rapid Response Plan for the SWP (DWR 2010). The specific details of

the plan are confidential, privileged, and contain critical energy infrastructure information.

Briefly, the Early Detection Monitoring Program involves ongoing monitoring through routine sampling at set intervals and at predetermined sites that are selected based on specified criteria. The Early Detection Monitoring Program allows adaptability in the selection of monitoring sites such that the monitoring sites can be relocated based on current information. Refer to Figures 1.1-3 and 1.1-4 for current monitoring sites.

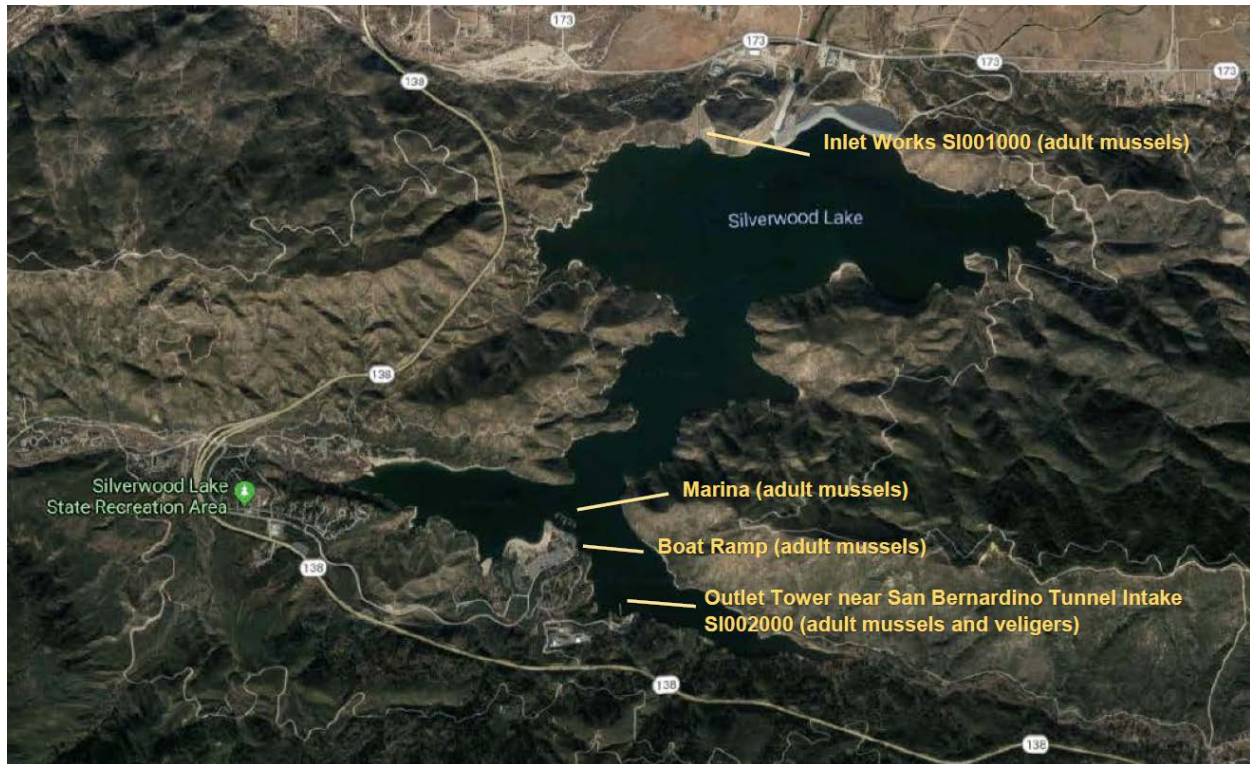


Figure 2.2-1. Veliger and Adult Quagga and Zebra Mussel Monitoring Sites in Silverwood Lake

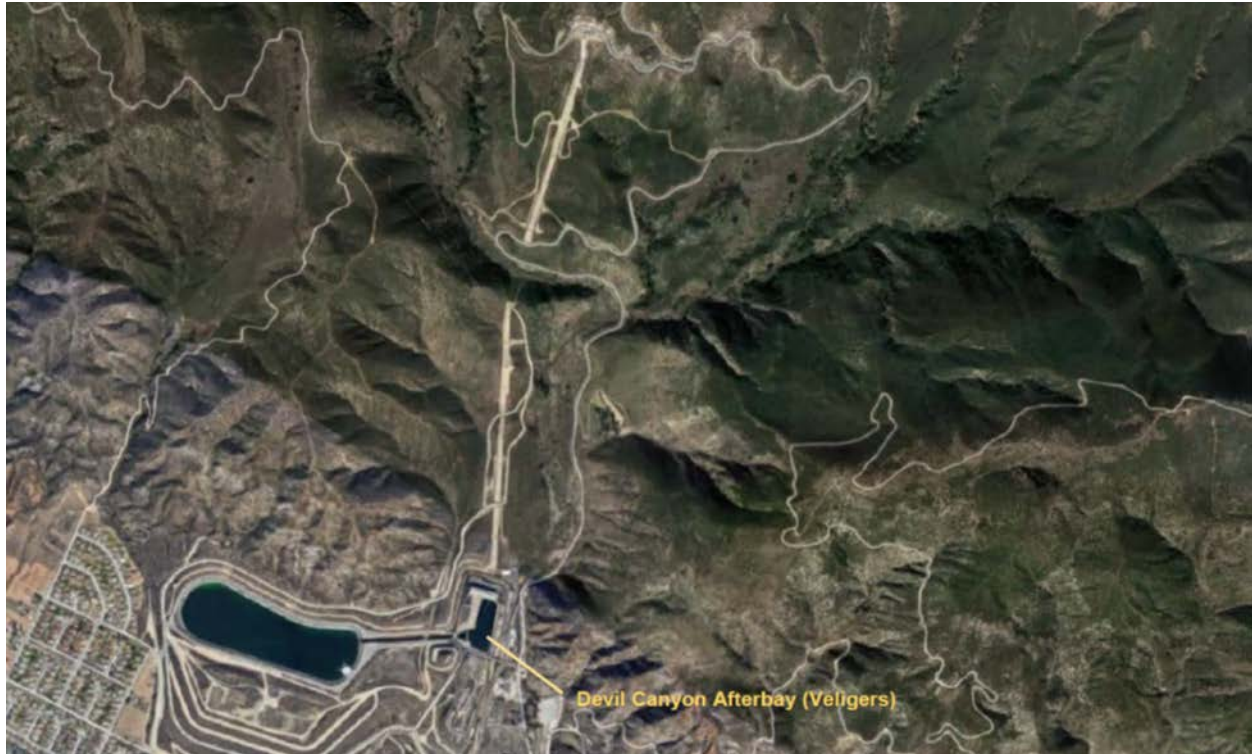


Figure 2.2-2. Veliger Quagga and Zebra Mussel Monitoring Sites at the Devil Canyon Second Afterbay

For detecting planktonic veligers, a vertical plankton net tow is run through the water column from 1 meter (m) above the bottom and up to the surface, at a target depth of 40m and a target distance of 40m (DWR 2010). The sampling occurs year-round on a monthly basis at the outlet works in Silverwood Lake near the San Bernardino Tunnel Intake (SBIT), and as needed at the inlet works and marina boat ramp (DWR 2018, in draft). Larval vertical tow surveys also are conducted year-round on a monthly basis at the Devil Canyon Afterbay (DWR 2018, in draft). The filtrate is stored in a sample bottle on ice in the field and is sent overnight to the laboratory for analysis. Samples are analyzed either by amplifying the deoxyribonucleic acid (DNA) in the filtrate through polymerase chain reaction (PCR) methodology to detect the presence or absence of mussel DNA or viewing the sample under cross-polarized light microscopy to confirm the presence or absence of veligers and to quantify the veliger density (DWR 2010).

DWR uses artificial substrates (i.e., settlement plates) to detect adult mussels. Settlement plate samplers are situated at different depths near the SBIT intake tower in Silverwood Lake. The settlement plate samplers consist of polyvinylchloride plates that are stacked and spaced two inches apart with a plastic-coated cable running through the center of each plate. If present, adult mussels will settle, attach, and grow on the settlement plates. DWR staff who are experienced in identifying adult mussels conduct seasonal visual inspections of the settlement plate samplers. If present, specimens are photographed, collected and stored in a labeled jar containing 70 percent ethanol or in a sealed bag, and submitted to the laboratory for DNA analysis to confirm the species identification (DWR 2010).

If a positive result from a sample occurs as part of the Early Detection Mussel Monitoring Program, it is initially considered a preliminary positive result and must undergo further investigation to validate and reclassify as a confirmed positive result. DWR will increase the frequency and coverage of early detection monitoring efforts, as well as implement additional surveying methods and other procedures and management actions, following any positively confirmed results (DWR 2010).

Field equipment is decontaminated following each sampling event. The same equipment is never used or transported to another monitoring site to prevent cross-contamination in the samples and the spread of mussels (DWR 2010, DWR 2018, in draft). In addition to these formal monitoring procedures, all DWR field staff are trained in quagga and zebra mussel identification and are instructed to look for mussels during their regular field work and during routine maintenance activities.

2.2.1.2 Cyanobacteria Blooms

Cyanobacteria are distributed worldwide and are prevalent throughout California in many types of freshwater waterbodies (lakes, rivers, streams, wetlands, estuaries). Certain species of cyanobacteria can produce toxins that are potentially harmful to human health if present in high concentrations. While cyanobacteria are not introduced species, cyanobacteria can become nuisance species when present in high abundance and form harmful algal blooms.

DWR routinely monitors for cyanotoxins produced by cyanobacteria through microscopic examination and chemical analysis of water samples. Samples are collected in the lake on a monthly basis from spring through fall. When sampling results indicate that concentrations of cyanotoxins are at or reaching a level of concern, DWR water quality staff determine the location of the source (in-lake production versus upstream production) and feasibility of control. If the location of the algal source is identified and cyanotoxin levels threaten water supply safety, DWR staff develop a plan for applying aquatic herbicides to control the harmful algal bloom. The control plan would be in compliance with the Aquatic Pesticide Application Plan (APAP) for the SWP, as approved by the Lahontan RWQCB and the SWRCB.

2.2.1.3 Taste and Odor Algal Blooms

Algae can produce compounds that cause unpleasant taste and odors in finished drinking water. In cooperation with DWR, Metropolitan Water District of Southern California (MWD) routinely monitors taste and odor compounds (i.e., geosmin and 2-Methylisoborneol [MIB]) produced by algae through chemical analysis of water samples. When sampling results indicate that concentrations of taste and odor compounds exceed a pre-determined level, MWD determines the source and requests DWR to manage the algal bloom and prevent further production of geosmin and MIB compounds. If an algal source is identified, DWR staff develop a plan for applying aquatic herbicides to control the specific algae associated with elevated taste and odor compound concentrations. Control measures include the application of aquatic

herbicides as approved by the Lahontan RWQCB and the SWRCB and as outlined in the APAP for the SWP.

2.2.2 Incidental Observations Monitoring

During aquatic monitoring specified by this Plan and other implementation plans that are required as part of the new license, DWR will record incidental observations of AIS on field data sheets. The purpose of this effort is to opportunistically gather additional data for AIS, not to expand the specific AIS monitoring required by the Plan or conduct a focused survey (i.e., no survey effort in addition to the specific field tasks identified for the specific monitoring). Field personnel performing the implementation plan monitoring will be trained in the identification of AIS, but they are not expected to be experts on those species.

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3.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

3.1 CONSULTATION AND REPORTING

DWR will annually review AIS management activities on NFS lands that were completed in the previous calendar year, as well as any activities to be located on SBNF lands planned for the upcoming calendar year.

DWR is in the process of preparing and submitting a quagga and zebra mussel prevention plan to CDFW for review and approval. Following CDFW's approval, DWR will provide an annual report to CDFW, copying SBNF and the California Department of Parks and Recreation (DPR), during the first full calendar year following issuance of the new license (or upon CDFW's approval of the prevention plan, whichever occurs later), and by March 31 of each year thereafter. The annual report will summarize DWR's activities and observations pursuant to the approved quagga and zebra mussel prevention program at the Project reservoir and will describe monitoring results, mussel management activities that occurred in the previous calendar year, and any changes in the reservoir's vulnerability to infestation.

If DWR plans to apply aquatic herbicides in Silverwood Lake to control algae associated with elevated taste and odor compound concentrations or elevated cyanotoxin concentrations, DWR will notify DPR prior to application of the herbicide.

If any AIS that are not already known in the Project are detected by DWR anywhere within the proposed FERC Project boundary, DWR will notify SBNF, CDFW, State Water Resources Control Board (SWRCB) and DPR.

If DWR identifies hydrilla within any waterbody in the Proposed FERC Project boundary, DWR will notify California Department of Food and Agriculture by calling its Pest Hotline at 1-800-491-1899.

3.2 PLAN REVISIONS

DWR, in consultation with the SBNF (to the extent the Plan applies to NFS lands), CDFW, and SWRCB, will review, update, and/or revise this Plan, as needed. Any updates to the Plan will be prepared in coordination and consultation with the SBNF (as updates apply to NFS lands), CDFW, and the SWRCB. DWR will allow 60 days for the SBNF, CDFW and SWRCB to provide written comments and recommendations before filing the updated Plan with FERC for approval. DWR will include documentation of all relevant coordination and consultation associated with the updated Plan filed with FERC. If DWR does not adopt a particular recommendation from SBNF, CDFW, or SWRCB, the filing will include DWR's reasons for not doing so. DWR 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

***Forest Service Manual 2900,
Invasive Species Management***

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**FOREST SERVICE MANUAL
NATIONAL HEADQUARTERS (WO)
WASHINGTON, DC**

FSM 2900 - INVASIVE SPECIES MANAGEMENT

CHAPTER - ZERO CODE

Amendment No.: 2900-2011-1

Effective Date: December 5, 2011

Duration: This amendment is effective until superseded or removed.

Approved: JAMES M. PEÑA
Associate Deputy Chief, NFS

Date Approved: 11/21/2011

Posting Instructions: Amendments are numbered consecutively by title and calendar year. Post by document; remove the entire document and replace it with this amendment. Retain this transmittal as the first page(s) of this document.

New Document	2900_zero_code	28 Pages
Superseded Document(s) by Issuance Number and Effective Date		

Digest:

2900 zero code - Establishes code and a new manual, FSM 2900, Invasive Species Management, which sets forth National Forest System policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens). This new chapter replaces FSM 2080 (noxious weed management).

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

Table of Contents

2901 - AUTHORITY	3
2901.01 - Laws.....	3
2901.02 - Regulations	7
2901.03 - Executive Orders	9
2902 - OBJECTIVES	9
2903 - POLICY.....	10
2904 - RESPONSIBILITY	13
2904.01 - Chief	14
2904.02 - Deputy Chief, National Forest System	14
2904.03 - Deputy Chief, State and Private Forestry	15
2904.04 - Washington Office, Director of Rangeland Management	15
2904.05 - Washington Office, Director of Forest Health Protection	17
2904.06 - Regional Foresters	18
2904.07 - Forest and Grassland Supervisors.....	20
2904.08 - District Rangers	21
2905 - DEFINITIONS	23

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2901 - AUTHORITY

The Forest Service authority to manage aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens) on all areas of the National Forest System is derived from laws enacted by Congress that authorize the Secretary of Agriculture (Secretary) to administer the National Forest System and other resources and to issue necessary regulations. Many of these authorities have subsequently been delegated from the Secretary to the Chief of the Forest Service.

2901.01 - Laws

The principal statutes governing or supporting the management of aquatic and terrestrial invasive species on the National Forest System include but are not limited to, the following statutes. Except where specifically stated, these statutes apply to the entire National Forest System.

1. Organic Administration Act of 1897 (16 U.S.C. §§473 *et seq.*). Authorizes the Secretary to establish regulations governing the occupancy and use of national forests and to protect national forests from destruction.
2. Knutson-Vandenberg Act of June 9, 1930 (16 U.S.C. 576, 576a-576b). Section 3 of the Act, codified at 16 U.S.C. 576b. Provides that the Secretary may require any purchaser of national forest timber to make deposits of money in addition to the payments for the timber, to cover the cost to the United States of planting, sowing with tree seeds, and cutting, destroying or otherwise removing undesirable trees or other growth, on the national forest land cut over by the purchaser, in order to improve the future stand of timber, or protecting and improving the future productivity of the renewable resources of the forest land on such sale area.
3. Bankhead-Jones Farm Tenant Act of 1937 (7 U.S.C. §§1010 *et seq.*) Title III of the Act. Authorizes the Secretary to develop a program of land conservation and land utilization in order to correct maladjustments in land use. This statute applies only to national grasslands and land utilization projects.
4. Anderson-Mansfield Reforestation and Revegetation Act of October 11, 1949 (16 U.S.C. 581j (note), 581j, 581k). Requires the agency to accelerate and provide a continuing basis for the needed reforestation and re-vegetation of National Forest System lands and other lands under Forest Service administration or control.
5. Granger-Thye Act of 1950 (16 U.S.C. §§580h). Authorizes the Secretary to use a portion of grazing fees for range improvement projects on National Forest System lands. Specific projects mentioned are artificial re-vegetation, including the collection or purchase of necessary seed and eradication of poisonous plants and noxious weeds, in

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

order to protect or improve the future productivity of the range. Section 11 of the Act authorizes the use of funds for rangeland improvement projects outside of National Forest System lands under certain circumstances.

6. Sikes Act (Fish and Wildlife Conservation) of September 15, 1960 (16 U.S.C. 670g-670l, 670o, P.L. 86-797), as amended. Section 201. Directs the Secretary of Agriculture to plan, develop, maintain, coordinate, and implement programs for the conservation and rehabilitation of wildlife, fish and game species, including specific habitat improvement or species management [including invasive species management] projects, on lands and waters under the Secretary's jurisdiction. The Act also provides for carrying out wildlife and fish conservation programs on Federal lands and waters including authority for cooperative State-Federal plans and authority to enter into agreements with States to collect fees to fund the programs identified in those plans.

7. Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. §§528 et seq.). Authorizes the Secretary to: administer National Forest System lands for outdoor recreation, range, timber, watershed, and wildlife and fish purposes; to develop the surface renewable resources for multiple use and sustained yield of several products and services to be obtained from these lands, without impairment of the productivity of the land; and, to cooperate with interested State and local governmental agencies and others in the development and management of the national forests. The Act also recognizes and clarifies Forest Service authority and responsibility to manage wildlife and fish on national forests.

8. The Endangered Species Act (ESA) of 1973 (16 U.S.C. §§1531 et seq.). Provides for the conservation of threatened and endangered species of plants and animals. Section 7 of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of the species' critical habitat. This section also requires Federal agencies to consult with the U.S. Fish and Wildlife Service (for non-marine species) or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service whenever an agency action is likely to affect a threatened or endangered species or result in the destruction or adverse modification of its critical habitat.

9. Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 as amended by the National Forest Management Act (NFMA) of 1976. Section 6 of the Act codified at 16 U.S.C. §§1600 et seq. Provides for the Secretary to promulgate regulations, under the principles of the Multiple-Use Sustained-Yield Act of 1960, specifying guidelines for land management plans developed to achieve the goals of the Program. The guidelines should provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

Further, within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan.

10. Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201, 1201 (note), 1236, 1272, 1305). Section 515. Directs the establishment on the mined areas, and all other lands affected, of a diverse, effective and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation on the area; except that introduced species may be used in the re-vegetation process where desirable and necessary to achieve the approved post mining land use plan.

11. Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2101 (note), 2101-2103, 2103a, 2103b, 2104-2105). Section 3 (16 U.S.C. 2102). Details the assistance that may be given to State foresters or equivalent State officials and State extension directors, in the form of financial, technical, educational, and related assistance. Section 8 (16 U. S. C. 2104) details actions that may be taken directly on the National Forest System, in cooperation with other Federal departments on other Federal lands, and in cooperation with State foresters, or equivalent State officials, subdivisions of States, agencies, institutions, organizations, or individuals on non-federal lands to: enhance the growth and maintenance of trees and forests; promote the stability of forest related industries and employment associated therewith through the protection of forest resources; aid in forest fire prevention and control; conserve forest cover on watersheds, shelterbelts, and windbreaks; protect outdoor recreation opportunities and other forest resources; and extend timber supplies by protecting wood products, stored wood, and wood in use.

12. The North American Wetland Conservation Act 1989 (16 U.S.C. 4401 (note), 4401-4413, 16 U.S.C. 669b (note)). Section 9 (U.S.C. 4408). directs Federal agencies to cooperate with the Director of the U.S. Fish and Wildlife Service to restore, protect, and enhance the wetland ecosystems and other habitats for migratory birds, fish and wildlife within the lands and waters of each agency to the extent consistent with the mission of such agency and existing statutory authorities.

13. Consolidated Appropriations Resolution, 2003. Section 323 of the Act, codified at 16 U.S.C. 2104. Provides authority to the Forest Service to enter into stewardship contracts with public or private entities or persons to perform services to achieve land management goals for the National Forest System lands that meet local and rural community needs. Stewardship agreements may be entered into for other land management goals such as the following: removal of vegetation or other activities to

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

promote healthy forest stands, reduction of fire hazards; watershed restoration and maintenance; restoration and maintenance of wildlife and fish habitat; prevention and control of invasive species; and reestablishing native plant species.

14. Healthy Forests Restoration Act of 2003 (H.R. 1904), (16 U.S.C. 6501-6502, 6511-18, 6541-42, 6571-78). Provides improved statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands and also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships.

15. The National Historic Preservation Act of 1966 (16 U.S.C. §§470 et seq.). Requires agency heads to assume responsibility for the preservation of historic properties owned or controlled by the agency and to develop a preservation program for the identification, evaluation, and nomination of historic properties to the National Register. Management activities to protect and preserve historic properties and cultural sites may include actions to prevent and control invasive species threatening or impacting those areas. The Act requires agency heads to evaluate the effects of an undertaking on property that is included or eligible for inclusion in the National Register and to afford the Advisory Council a reasonable opportunity to comment on the undertaking. Defines undertaking to include permitting activities or Federal financial assistance under the jurisdiction of an agency.

16. The Plant Protection Act of 2000 (7 U.S.C. 7701 et seq) as amended by the Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412). Among other provisions, the Plant Protection Act authorizes the Secretary of Agriculture to prohibit or restrict the importation, entry, exportation, or movement in interstate commerce of any plant, plant product, biological control organism, noxious weed, article, or means of conveyance, if the Secretary determines that the prohibition or restriction is necessary to prevent the introduction into the United States or the dissemination of a plant pest or noxious weed within the United States. The Act defines the term “Noxious Weed”.

17. Wyden Amendment (P.L. 109-54, Section 434). Authorizes the Forest Service to enter into cooperative agreements to benefit resources within watersheds on National Forest System lands. Agreements may be with willing Federal, Tribal, State, and local governments, private and non-government entities, and landowners to conduct activities on public or private lands. Under this authority, the Forest Service may enter into agreements to support or conduct invasive species management activities on aquatic and terrestrial areas owned by local and State governments, Tribes, other Federal agencies, and private individuals or organizations, to benefit and protect the National Forest System and other resources within a watershed at risk from invasive species.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

18. Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344; 91 Stat. 1566). This act amends the Federal Water Pollution Control Act of 1972. Section 313 is strengthened to stress Federal agency compliance with Federal, State and local substantive and procedural requirements related to the control and abatement of pollution to the same extent as required of nongovernmental entities. Invasive species management to improve watershed condition supports the Act's charge to maintain the ecological integrity of our nation's waters, including the physical, chemical and biological components.

19. National Environmental Policy Act of 1969 (16 U.S.C. 4321). Requires agencies to analyze the physical, social, and economic effects associated with proposed plans and decisions, to consider alternatives to the action proposed, and to document the results of the analysis. The provisions of NEPA and the Council on Environmental Quality implementing regulations apply to invasive species management (FSM 1950; FSH 1909.15).

20. Wilderness Act of 1964 (16 U.S.C. §§1131 et seq.). Authorizes the Secretary to administer certain congressionally designated National Forest System lands as wilderness. Directs the protection and preservation of these wilderness areas in their natural state, primarily affected by nature and not man's actions. Integrated pest management actions [including aquatic and terrestrial invasive species] in Wilderness are authorized to meet provisions of the Act and consistent with Forest Service policy and guidance for Wilderness management.

21. Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), (7 U.S.C. s/s 136 et seq.). Describes pesticide regulations and requirements related to hazardous material use and worker protection standards for employees in the planning and application of pesticides.

2901.02 - Regulations

The authority to manage for invasive species on National Forest System lands and other lands under Forest Service control is delegated from the Secretary of Agriculture to the Under Secretary for Natural Resources and Environment at Title 7, Code of Federal Regulations (CFR), section 2.20 (7 CFR 2.20). This authority has been delegated in turn from the Under Secretary for Natural Resources and Environment to the Chief of the Forest Service at Title 7, Code of Federal Regulations, section 2.60 (7 CFR 2.60). Title 36, Code of Federal Regulations (including Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297) provides additional authorities to manage and regulate invasive species across the National Forest System, including establishing requirements and prohibitions to prevent and control aquatic and terrestrial invasive

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

species. In addition, Forest Service regulations at 36 CFR 222.8 acknowledge the Agency's obligation to work cooperatively in identifying invasive species (including noxious weeds) problems and initiating control programs in aquatic and terrestrial areas of the National Forest System.

1. Policy on Noxious Weed Management. Departmental Regulation 9500-10 (DR 9500-10) (January 18, 1990)). Establishes U.S. Department of Agriculture (USDA) policy to manage and coordinate noxious weed activities among USDA agencies in order to improve the quality and ecological conditions of crop and rangeland in the United States.
2. Policy on the Management of Wildlife, Fish, and Plant Habitat. Departmental Regulation 9500-4 (DR 9500-4). Guides the management of Wildlife, Fish, and Plant Habitat on public lands.
3. Gypsy Moth Policy (USDA) of 1990. Departmental Regulation 5600-001 (DR 5600-001). This regulation establishes the Departmental Gypsy Moth Policy. It assigns responsibilities to USDA agencies and defines agency roles to avoid unnecessary duplication and to provide maximum coordination of USDA activities dealing with the gypsy moth. The Forest Service plays a significant role in the management of Gypsy Moths in the United States.
4. Departmental Regulation 9500-4. USDA policy on wildlife, fish, and plant habitat management on National Forest System lands and waters. This regulation provides that the Department will promote the concept and use of integrated pest management practices in carrying out its responsibilities for pest control, and will seek to alleviate damage by plant and animal pests to farm crops, livestock, poultry, forage, forest and urban trees, wildlife, and their habitats. Departmental agencies, through management and research programs, will develop or assist in developing new techniques and methodologies for the prevention of damage to agricultural or forestry production. The agencies also will strive to reduce potential depredation through improved management of USDA programs. Pest control techniques and considerations will be incorporated into appropriate management and education programs.
5. Native Plant Materials Policy (FSM 2070). Forest Service manual direction on the use of native plant materials in re-vegetation, rehabilitation, and restoration of both aquatic and terrestrial ecosystems across the National Forest System.
6. Pesticide Use Management and Coordination Policy (FSM 2150). Provides agency policy and guidance on the use of pesticides as part of an integrated pest management approach. Additional guidance provided in the Pesticide Use Management Handbook (FSH 2109).

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2901.03 - Executive Orders

1. Executive Order 13112 issued February 3, 1999 (E.O. 13112). Directs Federal agencies to: (1) identify actions that may affect status of an invasive species; (2)(a) prevent introduction of such species; (b) detect and control such species; (c) monitor population of such species; (d) provide for restoration of native species; (e) conduct research on invasive species and develop technologies to prevent introduction of such species; (f) promote public education of such species; and (3) not authorize, fund, or carry out actions likely to cause the introduction or spread of invasive species in the United States or elsewhere unless the benefits of the action clearly outweigh the harm and the agencies take steps to minimize the harm.
2. Executive Order 10046 issued March 24, 1949 (E.O. 10046). Permanently withdrew all public domain lands within Land Utilization Projects (many in the West are now national grasslands) boundaries from all forms of appropriation under the public land laws, except the mining and mineral leasing laws, and reserved them for use, administration, and disposition by the U.S. Department of Agriculture in accordance with provisions of Title III of the Bankhead-Jones Farm Tenant Act.
3. Executive Order 11246 issued September 24, 1965 (E.O. 11246). Requires entities doing business on behalf of the Forest Service to comply with Title VI of the Civil Rights Act and applicable USDA regulations.

2902 - OBJECTIVES

Management activities for aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens) will be based upon an integrated pest management approach on all areas within the National Forest System, and on areas managed outside of the National Forest System under the authority of the Wyden Amendment (P.L. 109-54, Section 434), prioritizing prevention and early detection and rapid response actions as necessary. All National Forest System invasive species management activities will be conducted within the following strategic objectives:

1. Prevention. Take proactive approaches to manage all aquatic and terrestrial areas of the National Forest System in a manner to protect native species and ecosystems from the introduction, establishment, and spread of invasive species. Prevention can also include actions to design public-use facilities to reduce accidental spread of invasive species, and actions to educate and raise awareness with internal and external audiences about the invasive species threat and respective management solutions.
2. Early Detection and Rapid Response (EDRR). Inventory and survey susceptible aquatic and terrestrial areas of the National Forest System so as to quickly detect invasive species infestations, and subsequently implement immediate and specific actions to eradicate those infestations before they become established and/or spread. Coordinate

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

detection and response activities with internal and external partners to achieve an effective EDRR approach across all aquatic and terrestrial areas of the National Forest System. EDRR actions are grouped into three main categories: early detection, rapid assessment, and rapid response. EDRR systems will be consistent with guidance from the National Invasive Species Council, such as the ‘Guidelines for Early Detection and Rapid Response’.

3. Control and Management. Conducting integrated invasive species management activities on priority aquatic and terrestrial areas of the National Forest System will be consistent with guidance from the National Invasive Species Council, such as the ‘Control and Management Guidelines’, to contain, reduce, and remove established infestations of aquatic and terrestrial invasive species, and to limit the adverse effects of those infestations on native species, human health, and other National Forest System resources.

4. Restoration. Pro-actively manage aquatic and terrestrial areas of the National Forest System to increase the ability of those areas to be self-sustaining and resistant (resilience) to the establishment of invasive species. Where necessary, implement restoration, rehabilitation, and/or revegetation activities following invasive species treatments to prevent or reduce the likelihood of the reoccurrence or spread of aquatic or terrestrial invasive species.

5. Organizational Collaboration. Cooperate with other Federal agencies, State agencies, local governments, tribes, academic institutions, and the private sector to increase public awareness of the invasive species threat, and promote a better understanding of integrated activities necessary to effectively manage aquatic and terrestrial invasive species throughout the National Forest System. Coordinate National Forest System invasive species management activities with other Forest Service programs and external partners to reduce, minimize, or eliminate the potential for introduction, establishment, spread, and impact of aquatic and terrestrial invasive species. Coordinate and integrate invasive species research and technical assistance activities conducted by Forest Service Research and Development, and State and Private Forestry programs with National Forest System programs to increase the management effectiveness against aquatic and terrestrial invasive species infestations impacting or threatening the National Forest System.

2903 - POLICY

The following describes Forest Service’s policy for the management of aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens), based on an integrated pest management approach, throughout the National Forest System:

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

1. Initiate, coordinate, and sustain actions to prevent, control, and eliminate priority infestations of invasive species in aquatic and terrestrial areas of the National Forest System using an integrated pest management approach, and collaborate with stakeholders to implement cooperative invasive species management activities in accordance with law and policy.
2. When applicable, invasive species management actions and standards should be incorporated into resource management plans at the forest level, and in programmatic environmental planning and assessment documents at the regional or national levels.
3. Determine the vectors, environmental factors, and pathways that favor the establishment and spread of invasive species in aquatic and terrestrial areas the National Forest System, and design management practices to reduce or mitigate the risk for introduction or spread of invasive species in those areas.
4. Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
5. Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas. Integrate visitor use strategies with invasive species management activities on aquatic and terrestrial areas of the National Forest System. At no time are invasive species to be promoted or used in site restoration or re-vegetation work, watershed rehabilitation projects, planted for bio-fuels production, or other management activities on national forests and grasslands.
6. Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service-approved vehicle and equipment cleaning requirements/standards prior to using the vehicle or equipment in the National Forest System.
7. Make every effort to prevent the accidental spread of invasive species carried by contaminated vehicles, equipment, personnel, or materials (including plants, wood, plant/wood products, water, soil, rock, sand, gravel, mulch, seeds, grain, hay, straw, or other materials).
 - a. Establish and implement standards and requirements for vehicle and equipment cleaning to prevent the accidental spread of aquatic and terrestrial invasive species on the National Forest System or to adjacent areas.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

- b. Make every effort to ensure that all materials used on the National Forest System are free of invasive species and/or noxious weeds (including free of reproductive/propagative material such as seeds, roots, stems, flowers, leaves, larva, eggs, veligers, and so forth).
8. Where States have legislative authority to certify materials as weed-free (or invasive-free) and have an active State program to make those State-certified materials available to the public, forest officers shall develop rules restricting the possession, use, and transport of those materials unless proof exists that they have been State-certified as weed-free (or invasive-free), as provided in 36 CFR 261 and Departmental Regulation 1512-1.
9. Monitor all management activities for potential spread or establishment of invasive species in aquatic and terrestrial areas of the National Forest System.
10. Manage invasive species in aquatic and terrestrial areas of the National Forest System using an integrated pest management approach to achieve the goals and objectives identified in Forest Land and Resource Management plans, and other Forest Service planning documents, and other plans developed in cooperation with external partners for the management of natural or cultural resources.
11. Integrate invasive species management funding broadly across a variety of National Forest System programs, while associating the funding with the specific aquatic or terrestrial invasive species that is being prioritized for management, as well as the purpose and need of the project or program objective.
12. Develop and utilize site-based and species-based risk assessments to prioritize the management of invasive species infestations in aquatic and terrestrial areas of the National Forest System. Where appropriate, use a structured decisionmaking process and adaptive management or similar strategies to help identify and prioritize invasive species management approaches and actions.
13. Comply with the Forest Service performance accountability system requirements for invasive species management to ensure efficient use of limited resources at all levels of the Agency and to provide information for adapting management actions to meet changing program needs and priorities. When appropriate, utilize a structured decisionmaking process to address invasive species management problems in changing conditions, uncertainty, or when information is limited.
14. Establish and maintain a national record keeping database system for the collection and reporting of information related to invasive species infestations and management activities, including invasive species management performance, associated with the

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

National Forest System. Require all information associated with the National Forest System invasive species management (including inventories, surveys, and treatments) to be collected, recorded, and reported consistent with national program protocols, rules, and standards.

15. Where appropriate, integrate invasive species management activities, such as inventory, survey, treatment, prevention, monitoring, and so forth, into the National Forest System management programs. Use inventory and treatment information to help set priorities and select integrated management actions to address new or expanding invasive species infestations in aquatic and terrestrial areas of the National Forest System.

16. Assist and promote cooperative efforts with internal and external partners, including private, State, tribal, and local entities, research organizations, and international groups to collaboratively address priority invasive species issues affecting the National Forest System.

17. Coordinate as needed with Forest Service Research and Development and State and Private Forestry programs, other agencies included under the National Invasive Species Council, and external partners to identify priority/high-risk invasive species that threaten aquatic and terrestrial areas of the National Forest System. Encourage applied research to develop techniques and technology to reduce invasive species impacts to the National Forest System.

18. As appropriate, collaborate and coordinate with adjacent landowners and other stakeholders to improve invasive species management effectiveness across the landscape. Encourage cooperative partnerships to address invasive species threats within a broad geographical area.

2904 - RESPONSIBILITY

The Chief delegates the authority and responsibility for the overall administration of the National Forest System invasive species management program in conformance with applicable Federal law, regulation, and policy, to the Deputy Chief, National Forest System (NFS). This delegated authority is reserved to the Deputy Chief, NFS, except for the delegations to the Director of Rangeland Management, regional foresters, forest/grassland supervisors, and/or district rangers. National Forest System invasive species management responsibilities and activities are integrated and coordinated with parallel and overlapping invasive species program activities conducted under the policies of the Deputy Chief, State and Private Forestry (FSM 3000-3900) and the Deputy Chief, Research and Development (FSM 4000-4900).

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2904.01 - Chief

The responsibility of the Chief is to:

1. Retain overall authority over and responsibility for establishing national policy for the management of invasive species threatening aquatic and terrestrial areas of the National Forest System.
2. Promote cooperation and coordination between other Federal agencies, State agencies, Tribes, and local governments, and other public and private sector partners for the management of terrestrial and aquatic invasive species.
3. Provide coordination across all Forest Service program areas to ensure program activities are integrated and overall management effectiveness against aquatic and terrestrial invasive species is maximized.

2904.02 - Deputy Chief, National Forest System

The responsibility of the Deputy Chief for the National Forest System is to:

1. Ensure overall coordination and oversight of National Forest System invasive species management activities and associated program budget and performance integration, and coordination with the Deputy Chief, State and Private Forestry, and the Deputy Chief, Research and Development.
2. Issue national policy, direction, guidelines, protocols, and standards for the integrated management of invasive species on all aquatic and terrestrial areas of the National Forest System. Integrate invasive species management direction across programs within the National Forest System.
3. Promote coordination across all National Forest System program areas within the Deputy area to ensure program activities are integrated and overall management effectiveness against aquatic and terrestrial invasive species is maximized. Facilitate multi-disciplinary, cross-programmatic teams to coordinate National Forest System invasive species management activities with other Forest Service programs.
4. Represent the Chief on national committees, coalitions, teams, and ad hoc groups concerned with invasive species management and research relevant to, or affecting, the National Forest System, when necessary. Coordinate NFS participation and representation as needed with Deputy Chief, State and Private Forestry and the Deputy Chief, Research and Development.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

5. Ensure that invasive species management activities and funding are integrated broadly across all National Forest System programs to meet requirements in law, policy, strategic plan objectives, and to increase overall management effectiveness against terrestrial and aquatic invasive species threatening the National Forest System.
6. Promote the development and use of a national recordkeeping database system for the collection and reporting of National Forest System information related to invasive species infestations and management activities, and associated program performance and accountability. Ensure national standards, protocols, and program requirements for record keeping and reporting are met across the National Forest System.
7. Promote cooperation and coordination between the National Forest System invasive species management program and other Federal agencies, State agencies, tribes, local governments, and other public and private sector partners for the management of aquatic and terrestrial invasive species across the landscape.

2904.03 - Deputy Chief, State and Private Forestry

The responsibility of the Deputy Chief for State and Private Forestry is to:

1. Approve funding requests recommended by the Director of Forest Health Protection for eradication, prevention, suppression, and restoration projects related to invasive forest insects and pathogens on the National Forest System, in coordination with the Deputy Chief, National Forest System.
2. Promote coordination between programs within State and Private Forestry and other Forest Service programs to ensure program activities are integrated and overall effectiveness against aquatic and terrestrial invasive species is maximized across the National Forest System.
3. Facilitate participation by State and Private Forestry programs on multi-disciplinary, cross-programmatic teams at the local, regional, and national levels to improve invasive species research and management activities across the agency.

2904.04 - Washington Office, Director of Rangeland Management

The responsibility of the Washington Office, Director of Rangeland Management is to:

1. Establish and support a National Invasive Species Program Coordinator to oversee all National Forest System invasive species management activities, including: invasive species program budget and performance integration; oversight and development of policies and regulations; development and oversight of invasive species management program requirements and standards; interagency and interdepartmental coordination; development and expansion of partnerships; promoting collaboration with other Forest

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

Service programs; reviewing invasive species management programs at the regional and field levels, providing technical and scientific support on invasive species issues; promoting and supporting technology development and research accomplished in the Forest Service State and Private Forestry and Research and Development programs, and sources outside the agency; and the development and review of plans, strategies, policies, and proposals relevant to the management of aquatic and terrestrial invasive species.

2. Coordinate national invasive species management activities across all programs and offices within the National Forest System, including but not limited to coordination with Washington Office staff directors, regional office staff directors, and other programs and offices across the National Forest System.
3. Collaborate with Forest Service State and Private Forestry programs, International programs, Research and Development, and other Forest Service programs conducting invasive species management activities and associated projects and partnerships.
4. Coordinate with other Federal agencies, the National Invasive Species Council, and national and international invasive species organizations, State government organizations, tribal government organizations, and other stakeholders in the establishment, application, and use of collaborative, proactive and integrated approaches for the management of invasive species affecting, or potentially affecting, the National Forest System.
5. Provide for National Forest System representation on internal interdisciplinary Forest Service teams, such as the Washington Office, National Invasive Species Issue Team (WO-ISIT), to facilitate cross-deputy area, cross-programmatic, and multi-disciplinary collaboration on invasive species management issues relevant to, or affecting the National Forest System.
6. Represent the Forest Service Chief or National Forest System Deputy Chief on external national committees, coalitions, teams, and ad hoc groups concerned with invasive species management and research relevant to, or affecting, the National Forest System, when necessary.
7. Coordinate with other Forest Service invasive species programs managed under the Deputy Chief, State and Private Forestry, International Programs, and the Deputy Chief, Research and Development to ensure the full spectrum of Forest Service invasive species management and research issues are represented on national or regional committees, coalitions, teams, and ad hoc groups.
8. Develop, review, establish, and implement national-level agreements or memorandums of understanding with other Federal agencies, national-level State organizations, national non-government organizations, tribal governments, and other partners concerning invasive species issues affecting the National Forest System.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

9. Ensure that invasive species management activities, funding, and performance are integrated across all National Forest System programs to meet requirements in law, policy, the objectives in strategic plans, and to increase overall management effectiveness against terrestrial and aquatic invasive species threatening the National Forest System.
10. Provide oversight and guidance on the development and use of a national record keeping database system for the collection and reporting of National Forest System information related to invasive species infestations and management activities, and associated program performance and accountability.
11. Develop and issue national standards, protocols, business rules, and related invasive species program record keeping and reporting requirements associated with National Forest System invasive species management.
12. Monitor compliance with applicable law, policy, and other program requirements and guidance associated with the management of aquatic and terrestrial invasive species across the National Forest System. When requested, compile, summarize, and report National Forest System invasive species management performance results, financial information, and other National Forest System invasive species program records.
13. Maintain contact with the Forest Service research organizations, and other external research and development organizations to review invasive species research programs, identify additional research needs, set priorities, and help coordinate research efforts for management of invasive species affecting national forests and grasslands.
14. Coordinate with Forest Service regions, forests, and other program areas to establish and issue nationwide standards and requirements for invasive species management training for Agency personnel, including but not limited to training associated with pesticide use, integrated pest management planning, record keeping, invasive species identification and ecology, and inventory and monitoring activities. Ensure that training is developed and implemented consistent with national program objectives, policy, and law.

2904.05 - Washington Office, Director of Forest Health Protection

The responsibility of the Director, Forest Health Protection for State and Private Forestry is to:

1. Administer the functions of section 8 of the Cooperative Forestry Assistance Act as amended, codified at 16 U.S.C. 2104, in support of the management of invasive forest insects and forest pathogens conducted on the National Forest System.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2. Provide leadership, technical advice, and guidance to national forests and grasslands on the management of invasive forest insects and forest pathogens, including activities to survey and detect, evaluate, prevent, and suppress forest invasive insects and pathogens, and the restoration of lands damaged by those invasive species.
3. Provide leadership, technical advice, and guidance on the use of chemical and biological pesticides to prevent or control aquatic and terrestrial invasive species on national forests and grasslands.
4. Review and recommend to the Deputy Chief for State and Private Forestry all funding requests submitted by National Forests and Grasslands for eradication, prevention, suppression, and restoration projects related to invasive forest insects and forest pathogens, in accordance with FSM 3400 and other relevant guidance.

2904.06 - Regional Foresters

The responsibility of regional foresters is to:

1. Appoint at least one coordinator for all National Forest System invasive species management activities within the region and formally establish a multi-disciplinary regional Invasive Species Issue Team to collaborate on invasive species issues across Forest Service program areas within the region.
2. Provide National Forest System representation on the Regional Invasive Species Issue Team, and other agency or interagency committees, task forces, coalitions, teams, and ad hoc groups concerned with invasive species management relevant to, or affecting, the national forests or national grasslands within that region.
3. Ensure Forest Land and Resource Management plans, Regional Environmental Management System plans, and other regional resource and programmatic plans include objectives, desired conditions, guidelines, and specific elements and activities to address the management of aquatic and terrestrial invasive species, including but not limited to inventory, monitoring, prevention, and control of invasive vertebrates, invertebrates, plants, and pathogens.
4. Collect, maintain, and report regional information related to National Forest System invasive species management activities (including inventory, prevention, treatment, cost, needs assessments, and treatment efficacy information), and associated program performance and accountability information, in compliance with national protocols, rules, and requirements.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

5. Develop, establish, and implement regional-level agreements or memorandums of understanding with other Federal and State agencies, non-government organizations, tribal governments, and other partner organizations to address invasive species issues at a forest or regional level. Foster collaborative efforts such as “cooperative weed management areas”, “cooperative invasive species management zones”, and similar collaborative partnerships.
6. Collaborate with internal and external partners to develop and implement National Forest System invasive species management training, consistent with national requirements, including training programs associated with record keeping, integrated pest management techniques, restoration, and other invasive species program training.
7. Collaborate with internal and external partners to develop public information and education programs to improve awareness and understanding of invasive species, their biology, impacts, and management. Projects should utilize expertise from the broad array of Forest Service program areas as appropriate.
8. Cooperate with State governments and Tribes to implement and enforce applicable regulations, plans, and guidance on invasive species management on national forests and grasslands across the region, including but not limited to:
 - a. State regulations related to prevention and control of aquatic and terrestrial invasive species (and noxious weeds);
 - b. State regulations associated with utilizing, storing, transporting, or certifying invasive species-free (and/or noxious weed-free) straw, hay, mulch, gravel, forage, seed, or other materials; or
 - c. Statewide aquatic nuisance species management plans, fish and wildlife management plans, early detection and rapid response plans, or other statewide or regionwide invasive species management plans within the respective Forest Service region.
9. Issue orders, rules, or other regulations under the authority of 36 CFR (Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297), Departmental Regulation 1512-1, and consistent with national or regional Forest Service policy, to prevent and control the introduction and spread of aquatic and terrestrial invasive species (including noxious weeds) on the National Forest System, when necessary.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2904.07 - Forest and Grassland Supervisors

The responsibility of forest and grassland supervisors is to:

1. Appoint forest staff to coordinate the forest or grassland invasive species management program in accordance with law and policy, and other national and regional requirements.
2. Develop and implement a forest or grassland invasive species management program that is consistent with this chapter, annual program requirements, and the objectives, desired conditions, and guidelines identified in Forest Land and Resource Management plans, Environmental Management System plans, and the Forest Service and Departmental strategic plans.
3. Ensure all Forest Land and Resource Management plans, Forest Environmental Management System plans, and other resource and project-level plans are updated to include objectives, desired conditions, guidelines, specific elements and activities to manage aquatic and terrestrial invasive species, including but not limited to prevention, control, inventory and monitoring of invasive vertebrates, invertebrates, plants, and pathogens.
4. Establish agreements and memorandums of understanding with other Federal and State agencies, non-government organizations, tribal governments, and other partner organizations to address invasive species issues as appropriate. Foster collaborative efforts such as “cooperative weed management areas”, “cooperative invasive species management zones”, and similar collaborative partnerships to address invasive species.
5. Collect, maintain, and report information related to invasive species infestations, impacts, and management activities (including inventories, surveys, assessments, treatments, and treatment efficacy) occurring on the national forest or grassland and associated program performance and accountability information, in compliance with national invasive species program protocols, criteria, rules, and requirements.
6. Identify and record the spatial extent of site-specific invasive species treatment activities, and monitoring invasive species treatments to determine efficacy and evaluate impacts to effected resources. Collect and maintain treatment records and associated spatial information in the national database of record in compliance with national invasive species program protocols, rules, and requirements.
7. Provide opportunities for staff training for invasive species identification and management, consistent with national and regional requirements, including training associated with invasive species record keeping, integrated pest management techniques, invasive species inventory and treatment monitoring, and other invasive species program training.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

8. Collaborate with internal and external partners to develop public information and educational materials/ programs to increase the awareness and understanding of aquatic and terrestrial invasive species, their biology, impacts, and management.
9. Cooperate with State governments and Tribes to implement and enforce applicable regulations, plans, and guidance on invasive species management across the national forest or grassland, including but not limited to:
 - a. State regulations related to prevention and control of aquatic and terrestrial invasive species (and noxious weeds);
 - b. State regulations associated with utilizing, storing, transporting, or certifying invasive species-free (and/or noxious weed-free) straw, hay, mulch, gravel, forage, seed, or other materials;
 - c. Statewide aquatic nuisance species management plans, fish and wildlife management plans, early detection and rapid response plans, or other statewide or regionwide invasive species management plans affecting the respective Forest or Grassland.
10. Issue orders, rules, or other regulations under the authority of 36 CFR (Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297), Departmental Regulation 1512-1, and consistent with national and regional policy, to prevent and control the introduction and spread of aquatic and terrestrial invasive species (including noxious weeds) on the forest or grassland, when necessary.
11. Coordinate and cooperate with State and county agencies, Tribes, non-government organizations, and adjacent landowners in invasive species prevention, early detection and rapid response, control and containment, restoration and rehabilitation, and inventory and monitoring activities.
12. Ensure that contracts and permits contain clauses and specifications requiring the implementation of measures to prevent, control, and/or contain aquatic or terrestrial invasive species (including noxious weeds). Oversee contract and permit administration to ensure compliance with the provisions.

2904.08 - District Rangers

The responsibility of district rangers is to:

1. Appoint staff to coordinate invasive species management activities in accordance with law and policy.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

2. Maintain working relationships with the State or local invasive species or noxious weed management committees, districts or boards, and other invasive species stakeholder organizations.
3. Establish, as appropriate, agreements and memorandums of understanding with other Federal and State agencies, non-government organizations, Tribes, and other partner organizations to address invasive species issues. Foster collaborative efforts such as “cooperative weed management areas”, “cooperative invasive species management areas”, and similar collaborative partnerships to address invasive species across the landscape.
4. Prevent the introduction and establishment, as well as providing for the containment and suppression, of aquatic and terrestrial invasive species, and coordinating with State and local agencies, Tribes, and landowners in the prevention, control, and restoration efforts associated with the management of invasive species. Outbreaks and newly detected infestations should be reported promptly.
5. Collect, maintain, and report information related to invasive species infestations, impacts, and management activities (including inventories, surveys, assessments, treatments, and treatment efficacy) occurring on the national forest or grassland and associated program performance and accountability information, in compliance with national invasive species program protocols, criteria, rules, and requirements.
6. Identify and record the spatial extent of site-specific invasive species treatment activities, and monitoring invasive species treatments to determine efficacy and evaluate impacts to effected resources. Collect and maintain treatment records and associated spatial information in the national database of record in compliance with national invasive species program protocols, rules, and requirements.
7. Implement the elements, activities, and measures associated with invasive species management in Forest Land and Resource Management plans, Forest Environmental Management System plans, and other resource management and project-level plans.
8. Determine the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities.
9. Ensure that staff are properly trained on invasive species management consistent with national and regional, and State requirements, including training programs associated with invasive species record keeping, integrated pest management techniques, invasive species inventory and treatment monitoring, and other invasive species related training.

**FSM 2900 – INVASIVE SPECIES MANAGEMENT
CHAPTER – ZERO CODE**

10. Collaborate with internal and external partners to develop public information and educational materials/ programs to increase the awareness and understanding of aquatic and terrestrial invasive species, their biology, impacts, and management.
11. Cooperate with State governments and Tribes to implement and enforce applicable regulations, plans, and guidance on invasive species management across the forest or grassland, including but not limited to:
 - a. State regulations related to prevention and control of aquatic and terrestrial invasive species (and noxious weeds);
 - b. State regulations associated with utilizing, storing, transporting, or certifying invasive species-free (and/or noxious weed-free) straw, hay, mulch, gravel, forage, seed, or other materials;
 - c. Statewide aquatic nuisance species management plans, fish and wildlife management plans, early detection and rapid response plans, or other statewide or regionwide invasive species management plans affecting the respective forest or grassland.
12. Issue orders, rules, or other regulations under the authority of 36 CFR (Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297), Departmental Regulation 1512-1, and consistent with national or regional policy, to prevent and control the introduction and spread of aquatic and terrestrial invasive species (including noxious weeds), when necessary.
13. Coordinate and cooperate with State and county agencies, Tribes, non-government organizations, and adjacent landowners in invasive species prevention, early detection and rapid response, control and containment, restoration and rehabilitation, and inventory and monitoring activities.
14. Ensure that contracts and permits contain clauses and specifications requiring the implementation of measures to prevent, control, and/or contain aquatic or terrestrial invasive species (including noxious weeds) and restoration measures to offset associated impacts. Oversee contract and permit administration to ensure compliance with the invasive species provisions.

2905 - DEFINITIONS

Adaptive Management. A system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or reevaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain.

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Control. With respect to invasive species (plant, pathogen, vertebrate, or invertebrate species), control is defined as any activity or action taken to reduce the population, contain, limit the spread, or reduce the effects of an invasive species. Control activities are generally directed at established free-living infestations, and may not necessarily be intended to eradicate the targeted infestation in all cases.

Early Detection. The process of finding, identifying, and quantifying new, small, or previously unknown infestations of aquatic or terrestrial invasive species prior to (or in the initial stages of) its establishment as free-living expanding population. Early detection of an invasive species is typically coupled with integrated activities to rapidly assess and respond with quick and immediate actions to eradicate, control, or contain it.

Eradication. With respect to invasive species (plant, pathogen, vertebrate, or invertebrate species), eradication is defined as the removal or elimination of the last remaining individual invasive species in the target infestation on a given site. It is determined to be complete when the target species is absent from the site for a continuous time period (that is, several years after the last individual was observed). Eradication of an infestation of invasive species is relative to the time-frame provided for the treatment procedures. Considering the need for multiple treatments over time, certain populations can be eradicated using proper integrated management techniques.

Integrated Pest Management (IPM). A pest (in this context an invasive species) control strategy based on the determination of an economic, human health, or environmental threshold that indicates when a pest population is approaching the level at which control measures are necessary to prevent a decline in the desired conditions (economic or environmental factors). In principle, IPM is an ecologically-based holistic strategy that relies on natural mortality factors, such as natural enemies, weather, and environmental management, and seeks control tactics that disrupt these factors as little as possible. Integrated pest management techniques are defined within four broad categories: 1) Biological, 2) Cultural, 3) Mechanical/Physical, and 4) Chemical techniques.

Invasive Species. Executive Order 13112 defines an invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The Forest Service relies on Executive Order 13112 to provide the basis for labeling certain organisms as invasive. Based on this definition, the labeling of a species as “invasive” requires closely examining both the origin and effects of the species. The key is that the species must cause, or be likely to cause, harm and be exotic to the ecosystem it has infested before we can consider labeling it as “invasive”. Thus, native pests are not considered “invasive”, even though they may cause harm. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: Plants, Vertebrates, Invertebrates, and Pathogens. Additional information on this definition can be found in Executive Order 13112.

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Invasive Species Management. Activities to prevent, control, contain, eradicate, survey, detect, identify, inventory, and monitor invasive species; includes rehabilitation and restoration of affected sites and educational activities related to invasive species. Management actions are based upon species-specific or site-specific plans (including forest plans, IPM plans, watershed restoration plans, and so forth), and support the accomplishment of plan goals and objectives and achieve successful restoration or protection of priority areas identified in the respective plan(s).

Inventory. Invasive species inventories are generally defined as the observance and collection of information related to the occurrence, population or infestation of the detected species across the landscape or with respect to a more narrowly-defined area or site. Inventory attributes and purposes will vary, but are typically designed to meet specific management objectives which need information about the extent of an invasive species infestation. Inventories are typically conducted to quantify the extent of, and other attributes related to, infestations identified during survey activities.

Memorandum of Understanding. A written agreement between the Forest Service and local, State, or Federal entities, or private organizations, entered into when there is no exchange of funds from one organization to another.

Monitoring. For the purposes of invasive species program performance and accountability, the term “monitoring” refers to the observance and recording of information related to the responses to treating an invasive species infestation, and reported as treatment efficacy. By monitoring the treatment results over time, a measure of overall programmatic treatment efficacy can be determined and an adaptive management process can be used in subsequent treatment activities.

Noxious Weed. The term “Noxious Weed” is defined for the Federal Government in the Plant Protection Act of 2000 and in some individual State statutes. For purposes of this chapter, the term has the same meaning as found in the Plant Protection Act of 2000 as follows: The term “noxious weed” means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. The term typically describes species of plants that have been determined to be undesirable or injurious in some capacity. Federal noxious weeds are regulated by USDA-Animal and Plant Health Inspection Service under the Plant Protection Act of 2000, which superseded the Federal Noxious Weed Act of 1974. State statutes for noxious weeds vary widely, with some States lacking any laws defining or regulating noxious weeds. Depending on the individual State law, some plants listed by a State statute as “noxious” may be native plants which that State has determined to be undesirable. When the species are native, they are not considered invasive species by the Federal Government. However, in most cases, State noxious weed lists include only exotic (non-native) species.

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Prevention. Prevention measures for invasive species management programs include a wide range of actions and activities to reduce or eliminate the chance of an invasive species entering or becoming established in a particular area. Preventative activities can include projects for education and awareness as well as more traditional prevention activities such as vehicle/equipment cleaning, boat inspections, or native plant restoration plantings. Restoration activities typically prevent invasive species infestations by improving site resilience, and reducing or eliminating the conditions on a site that may facilitate or promote invasive species establishment.

Priority Area Treated. Program or project plans (primarily at the district or forest level) will identify priority areas on which to focus integrated management actions to directly prevent, control, or eradicate a priority/high-risk aquatic or terrestrial invasive species. Priority areas identified for invasive species treatments may include any specifically-delineated project area. Examples include, but are not limited to: a fuels treatment area, a developed recreation area, a transportation corridor, a facility, a sensitive habitat for rare species, a wetland, a river, a lake, a stream, an irrigation ditch, a grazing allotment, a stock pond, a fire camp, wildlife winter range, a burned area, a fire-break, a timber sale area, a wilderness area, a Research Natural Area, an energy transmission right of way, and so forth). The size of the priority area treated will typically be measured in acres. For linear features (such as a stream/river, trail, roadway, power-line, ditch, and so forth) the area size can be calculated from the length and average width. In some cases, a smaller portion of a delineated project area infested by invasive species may be prioritized for treatment over the larger infestation. Guidance on determining and establishing priorities for invasive species management is provided in the Forest Service Invasive Species Management Handbook (FSH 2900).

Rapid Response. With respect to invasive species (plant, pathogen, vertebrate, or invertebrate species), rapid responses are defined as the quick and immediate actions taken to eradicate, control, or contain infestations that must be completed within a relatively short time to maximize the biological and economic effectiveness against the targeted invasive species. Depending on the risk of the targeted invasive species, rapid response actions may be supported by an emergency situation determination and emergency considerations would include the geographic extent of the infestation, distance from other known infestations, mobility and rate of spread of the invasive species, threat level and potential impacts, and available treatments.

Restored. With respect to performance specifically, the invasive species program is driven by an outcome-based performance measure centered on 'restoration'. An area treated (see "treatment" definition) against invasive species has been 'restored' when the targeted invasive species defined in the project plan was controlled or eradicated directly as a result of the treatment activity. In some instances, actions taken across particular areas to prevent the establishment and spread of specific invasive species are also included in this treatment definition. 'Restored' acres are a subset of 'treated' acres,

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which are tracked annually to determine the effectiveness of treatments. Preventing, controlling, or eradicating invasive species assists in the recovery of the area's resilience and the capacity of a system to adapt to change if the environment where the system exists has been degraded, damaged, or destroyed (in this case by invasive species); and helps to reestablish ecosystem functions by modifying or managing composition and processes necessary to make terrestrial and aquatic ecosystems sustainable, and resilient, under current and future conditions (as described in FSM 2020). In most cases, this is a performance measure defined in the project plan, and project managers have the flexibility to set the parameters for determining when the treated areas have been restored. Absence of an individual invasive species organism, whether through eradication or prevention efforts, is most often the criteria used to determine when acres have been restored. Monitoring treatment efficacy is critical to reporting invasive species management performance.

Resilience. The capacity of an ecosystem to absorb disturbance and reorganize while undergoing change, so as to still retain essentially the same function, structure, identity, and feedbacks. By working toward the goals of diverse native ecosystems that are connected and can absorb disturbance, it is expected that over time, management would create ecological conditions that support the abundance and distribution of native species within a geographic area to provide for native plant and animal diversity.

State Agency. A State Department of Agriculture, State Department of Natural Resources, other State agency, or subdivision thereof, responsible for the administration or implementation of State laws pertaining to invasive species, noxious weeds, exotic species, or other pest/undesirable species.

Structured Decision Making (SDM). A general term for carefully-organized analysis of problems in order to reach decisions that are focused clearly on achieving fundamental objectives. Based in decision theory and risk analysis, SDM encompasses a simple set of concepts and helpful steps, rather than a rigidly-prescribed approach for problem solving. Key SDM concepts include making decisions based on clearly articulated fundamental objectives, dealing explicitly with uncertainty, and responding transparently to legal mandates and public preferences or values in decision making; thus, SDM integrates science and policy explicitly. Every decision consists of several primary elements, management objectives, decision options, and predictions of decision outcomes. By analyzing each component separately and thoughtfully within a comprehensive decision framework, it is possible to improve the quality of decision making. The core SDM concepts and steps to better decision making are useful across all types of decisions: from individuals making minor decisions to complex public sector decisions involving multiple decision makers, scientists and other stakeholders.

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Survey. An invasive species survey is a process of systematically searching a geographic area for a particular (targeted) invasive species, or a group of invasive species, to determine if the species exists in that area. It is important to know where and when surveys have occurred, even if the object of the survey (target species) was not located. Information on the absence of an invasive species can be as valuable as information on the presence of the species, and can be used as a foundation to an early detection system. Unlike inventories, surveys typically do not collect additional detailed attributes of the infestation or the associated site.

Targeted Invasive Species. An individual invasive species or population of invasive species, which has been prioritized at the project-level for management action based upon risk assessments, project objectives, economic considerations, and other priority-setting decision support tools.

Treatment. Any activity or action taken to directly prevent, control, or eradicate a targeted invasive species. Treatment of an invasive species infestation may not necessarily result in the elimination of the infestation, and multiple treatments on the same site or population are sometimes required to affect a change in the status of the infestation. Treatment activities typically fall within any of the four general categories of integrated management techniques: Biological treatments, Cultural treatments, Mechanical treatments, or Chemical treatments. For example, the use of domestic goats to control invasive plants would be considered a biological treatment; the use of a pesticide to control invasive fishes would be characterized as a chemical treatment; planting of native seeds used to prevent invasive species infestations and restore a degraded site would be considered a cultural treatment technique; developing an aquatic species barrier to prevent invasive species from spreading throughout a watershed would be considered a physical treatment; cleaning, scraping, or otherwise removing invasive species attached to equipment, structures, or vehicles would be considered a mechanical treatment designed to directly control and prevent the spread of those species.

Attachment 4

Integrated Vegetation Management Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



INTEGRATED VEGETATION MANAGEMENT PLAN April 2019

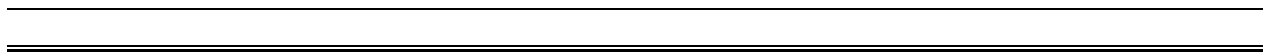


State of California
California Natural Resources Agency
DEPARTMENT OF WATER
RESOURCES
Hydropower License Planning and
Compliance Office

GAVIN C. NEWSOM
Governor
State of California

WADE CROWFOOT
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Overview	1-1
1.2	Project Location and Description	1-1
1.3	Purpose of the Integrated Vegetation Management Plan	1-4
1.4	Goal and Objectives of the Integrated Vegetation Management Plan.....	1-4
1.5	Protocols.....	1-5
2.0	NON-NATIVE INVASIVE PLANT MANAGEMENT	2-1
2.1	Non-Native Invasive Plants within Project Boundary	2-1
2.2	Plans for Prevention and Control of Non-Native Invasive Plants	2-1
2.2.1	Best Management Practices	2-2
2.2.1.1	USFS Recommended BMPs	2-3
2.2.2	Surveying and Documentation	2-3
2.2.3	Control Measures for Existing Populations	2-4
2.2.4	Long-Term Monitoring.....	2-4
2.2.5	Adaptive Management	2-5
2.3	Variations in Treatment on San Bernardino National Forest Lands	2-5
3.0	SPECIAL-STATUS PLANTS, SPECIAL-STATUS NATURAL COMMUNITIES, AND CULTURALLY SENSITIVE PLANT MONITORING	3-7
3.1	Special-Status Plants, Special-Status Natural Community and Culturally Sensitive Plant Surveys	3-7
3.1.1	Survey Area	3-7
3.1.2	Survey Frequency.....	3-8
3.1.2.1	Baseline Surveys.....	3-8
3.1.2.2	Future List Review and Surveys	3-8
3.2	Special-Status Plants, Special-Status Natural Communities, and Culturally Sensitive Plants within Project Boundary	3-8
3.3	Disturbance Monitoring	3-9
3.3.1	Regular Disturbance Activities	3-9
3.3.2	Future Disturbance Activities	3-9
3.4	Special-Status Plants and Special-Status Natural Communities Protection.....	3-10
4.0	VEGETATION MANAGEMENT RELATED TO PROJECT OPERATIONS AND MAINTENANCE	4-1
4.1	Revegetation.....	4-1
4.1.1	Areas Subject to Revegetation.....	4-2
4.1.2	Evaluating Sites for Revegetation	4-2
4.1.3	Revegetation Planning.....	4-3
4.1.4	Revegetation Methods	4-4
4.1.5	Revegetation Monitoring	4-5
4.2	Routine Vegetation Management	4-5
4.2.1	Facility Management.....	4-6
4.2.2	Road Maintenance.....	4-6
4.2.3	Recreation Site Management.....	4-7
5.0	HERBICIDE BEST MANAGEMENT PRACTICES.....	5-1

5.1	Application and Schedule	5-1
5.2	Locations for Herbicide Application.....	5-2
5.3	Application on National Forest System Lands	5-2
5.4	Methods.....	5-2
6.0	TRAINING, CONSULTATION, AND PLAN REVISIONS	6-1
6.1	Employee and Contractor Training	6-1
6.2	Agency Consultation and Biennial FERC Reporting	6-1
6.3	Plan Revisions	6-1
7.0	REFERENCES	7-1

LIST OF FIGURES

Figure 1.2-1.	Devil Canyon Project Vicinity	1-2
Figure 1.2-2.	Land Ownership and Location of the Devil Canyon Project	1-3

LIST OF APPENDICES

Appendix A –	Results of NNIP Surveys
Appendix B –	USFS Recommended BMPs
Appendix C –	Special-Status Plant and Special-Status Natural Community Survey Results

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

BMP	Best Management Practices
Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CNPS	California Native Plant Society
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
ESA	Endangered Species Act of 1973, as amended
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GPS	Global Positioning System
IVMP	Integrated Vegetation Management Plan
NEPA	National Environmental Policy Act
NFS	National Forest System
NNIP	non-native invasive plant
O&M	operations and maintenance
Project	Devil Canyon Project, FERC Project Number 14797
SBNF	San Bernardino National Forest
SWP	State Water Project
SWRCB	State Water Resources Control Board
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

1.1 OVERVIEW

This is an Integrated Vegetation Management Plan (IVMP) for the management of terrestrial vegetation within the Federal Energy Regulatory Commission (FERC) Project boundary¹ of the California Department of Water Resources' (DWR) Devil Canyon Project (Project), which includes hydroelectric facilities, access roads, staging areas, Project recreation areas, rights-of-way, and other appurtenant facilities as described in Exhibit A of the license application. This plan has been prepared in coordination with the San Bernardino National Forest (SBNF), the California Department of Parks and Recreation (DPR), and the California Department of Fish and Wildlife (CDFW). The IVMP addresses management of vegetation within the Project boundary and there are specific requirements that are referenced in the plan for those parts of the Project on National Forest System (NFS) lands as well as State lands on which DPR manages as part of the Silverwood Lake State Recreation Area (SRA). Any specific SBNF and DPR requirements only apply to the lands under the management of each respective agency. This plan is not intended to replace or change those agencies' applicable requirements with regard to land and resource management, but rather, assumes that implementation of the IVMP on those lands are consistent with applicable SBNF and DPR requirements.

1.2 PROJECT LOCATION AND DESCRIPTION

The existing 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 an affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits. The Project is a power recovery project that operates on the southern end of the East Branch of the SWP in the County of San Bernardino, California, between the Cities of Hesperia and San Bernardino (Figure 1.2-1).

Existing Project facilities include Cedar Springs Dam, Silverwood Lake, San Bernardino Tunnel intake, San Bernardino Tunnel and Penstocks, Devil Canyon Powerplant and Switchyard, Devil Canyon Afterbay, Devil Canyon Second Afterbay, recreational facilities, and appurtenant facilities (Figure 1.2-2). As part of the Project relicensing, DWR proposes to modify the existing Project boundary to be consistent with Project operations and maintenance (O&M) needs. This change reduces the acreage of the existing Project boundary, as discussed below. If approved by FERC, the Project area would consist of all lands within the Project boundary proposed by DWR for the new license (herein after referred to as the Project boundary), and as such, this plan would be implemented within the new license Project boundary.

¹ For the purposes of this plan, the boundary is defined as DWR's proposed Project boundary as defined in its Application for New License (See Exhibit G of the license application). If FERC issues a license that includes a different boundary, DWR will amend this plan accordingly.

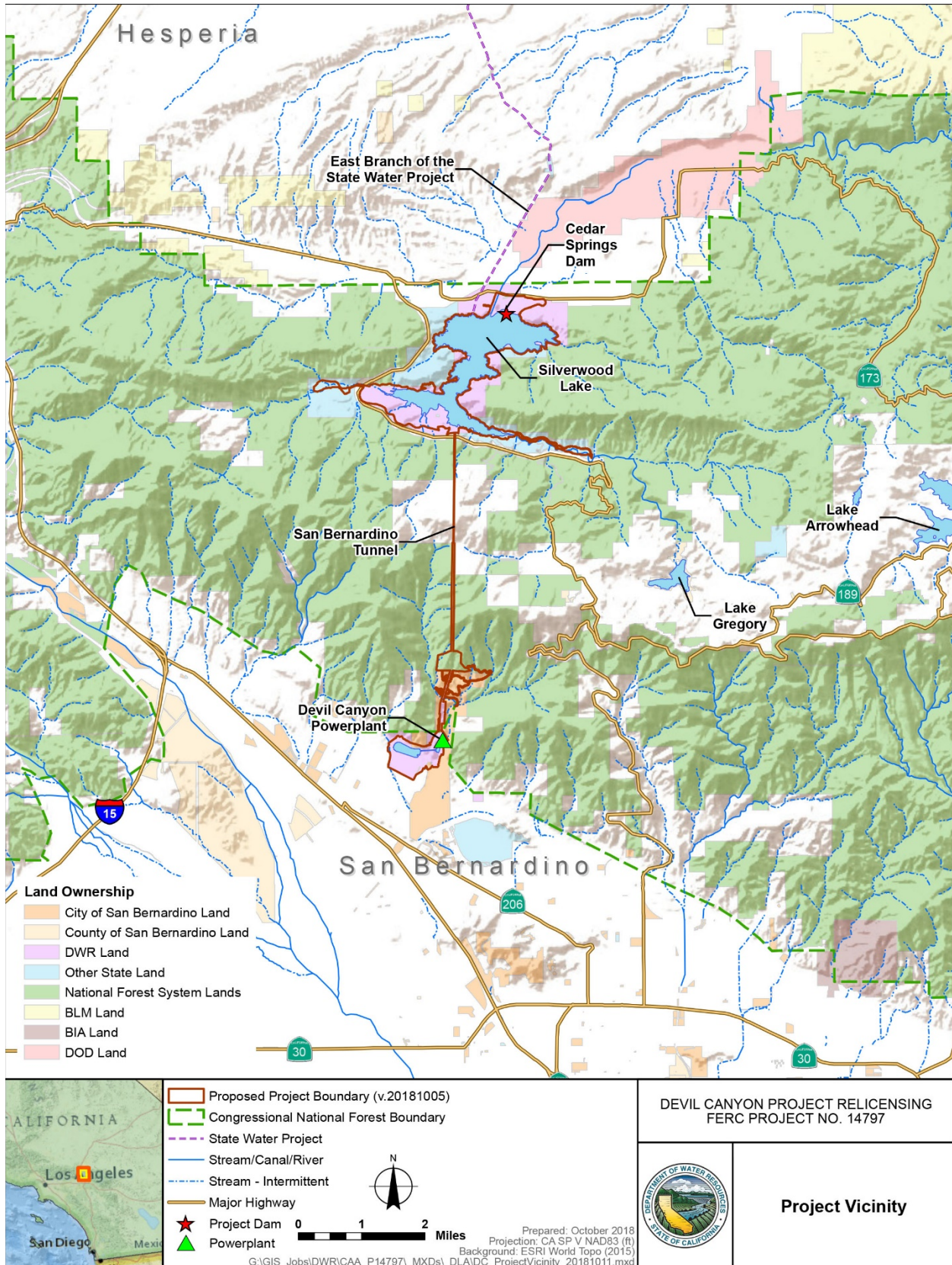


Figure 1.2-1. Devil Canyon Project Vicinity

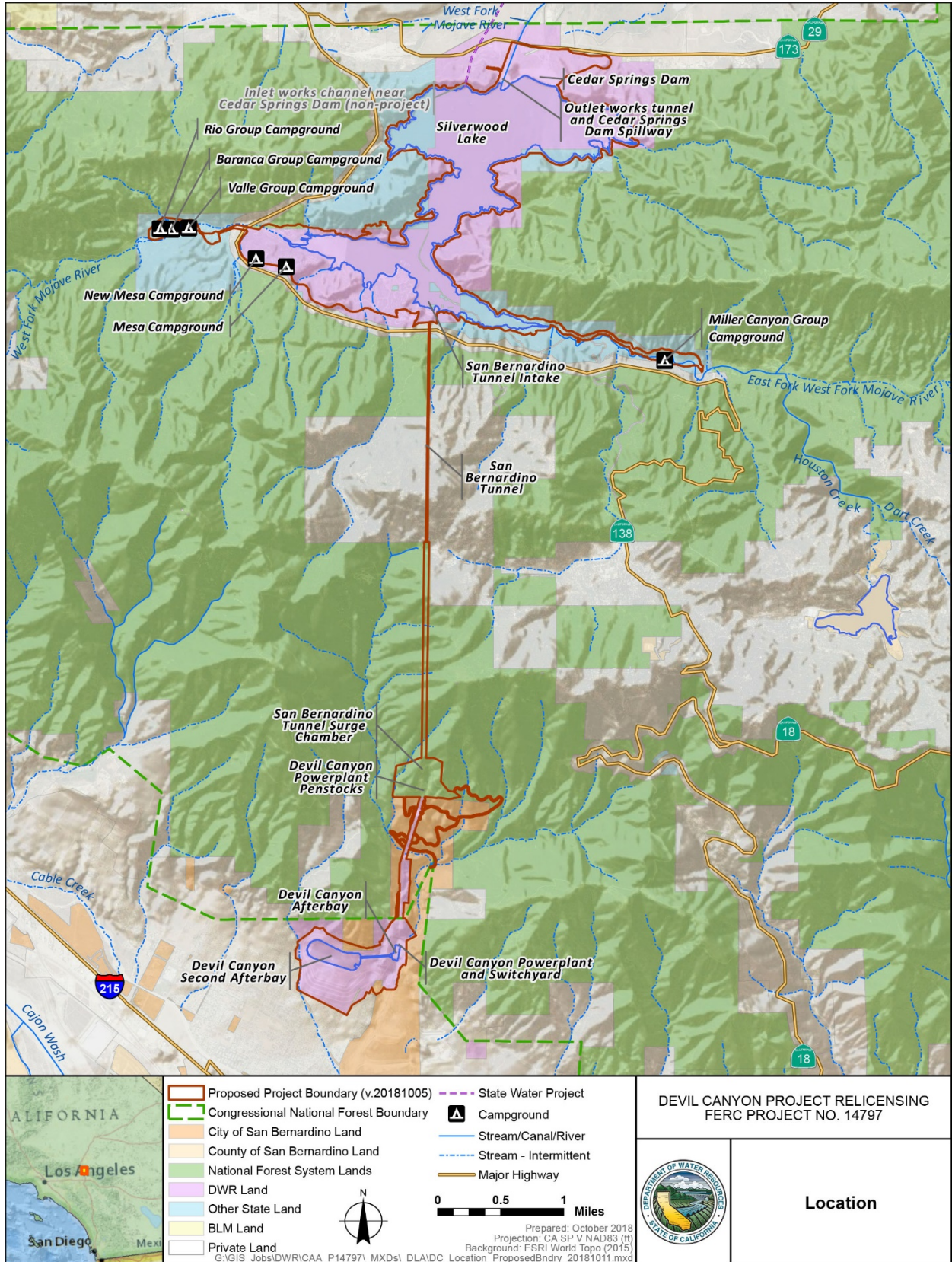


Figure 1.2-2. Land Ownership and Location of the Devil Canyon Project

1.3 PURPOSE OF THE INTEGRATED VEGETATION MANAGEMENT PLAN

This plan provides guidance for the management of terrestrial vegetation within the Project boundary, which includes the implementation of protection measures for special-status plant populations and special-status natural communities, as well as guidance for vegetation management related to Project O&M activities within the Project boundary. The plan area consists of lands within the Project boundary that are reasonably accessible.

This plan is to be used in conjunction with other resource management plans pertaining to Project resources, as coordinated by DWR. These plans will consider the need 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, areas of known special-status natural communities (including riparian zones and wetlands), and other predetermined areas with significant resources (i.e., cultural resources, culturally sensitive plant species).

More specifically, the purpose of this IVMP is to facilitate the integrated management of vegetation with several factors related to operation of the Project, including:

- 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
- Non-native invasive plant (NNIP) management
- Herbicide Best Management Practices (BMP)

1.4 GOAL AND OBJECTIVES OF THE INTEGRATED VEGETATION MANAGEMENT PLAN

The goal of this plan is to provide a terrestrial vegetation management framework that includes identifying, assessing, monitoring, and controlling NNIP within the Project boundary for the duration of the license. The following six 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 infestations.

2. Provide guidance to protect known special-status plants and special-status natural communities that could be affected by future Project O&M and other activities.
3. Provide guidance for vegetation management related to future 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 using BMPs.
6. Provide guidance for protection of sensitive areas from the effects of vegetation management activities.

With the varying ownership there can be different regulatory requirements regarding vegetation management that would apply. Refer to Figure 1.2-2 for land ownership in the Project boundary. For example, on NFS lands, approvals for NNIP control efforts will follow all U.S. Department of Agriculture, Forest Service (USFS) guidance, in addition to the federal, State, and local regulations relating to herbicide applications that are applicable to all other lands.

1.5 PROTOCOLS

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) and *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFW 2009, 2018c). Surveys included data collection on NFS lands that required completing CDFW's 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, 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 natural communities identified during the 2017 baseline botanical surveys were documented using a Global Positioning System (GPS) unit. All data collected was reviewed in a Geographic Information System (GIS) database.

Protocols for any future botanical surveys would utilize the most up to date methods from CDFW, USFWS, and/or USFS, where applicable. In order to maintain a complete dataset, data from new methods or protocols will remain compatible with data previously collected under this plan.

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2.0 NON-NATIVE INVASIVE PLANT MANAGEMENT

2.1 NON-NATIVE INVASIVE PLANTS WITHIN PROJECT BOUNDARY

Surveys for target NNIP were completed in 2017, along with a comprehensive and systematic botanical inventory, within the Project boundary (where accessible) in support of the Project relicensing. A total of 177 occurrences of 13 target NNIP species were observed during field surveys. These occurrences are summarized in Appendix A, as presented in Table A.1-1 and Table A.1-2, and depicted on Figures A.1-1 through A.1-5. For occurrences that extended beyond the Project boundary, attributes of the entire occurrence, including estimated numbers of individuals and acreage, were recorded.

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 species was compiled by looking at the various species that the California Department of Food and Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), and USFS have recorded in the local area. This list 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.1-2.

Target NNIP for treatment within the Devil Canyon Project FERC boundary are CDFA A-, B-, C-, and Q-rated weeds; Cal-IPC high- or moderate-ranked weeds; and those designated by USFS. 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 “Exotic Pest Plants of Greatest Ecological Concern in California.” 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 in its National Forest.

This plan complies with the direction contained within USFS Manual, Section 2900, Invasive Species Management (USFS 2011 or most current). That direction includes initiating, coordinating, and sustaining actions to prevent and control priority infestations of invasive species in terrestrial areas of the NFS that are affected by Project O&M activities using an integrated pest management approach. The plan for control of NNIP within the Project boundary is based on four principal elements:

1. BMPs
2. Surveying and documentation
3. Control of existing infestations

4. Long-term monitoring

2.2.1 Best Management Practices

The following BMPs will be utilized with the objective of minimizing the potential for the introduction and spread of NNIP by Project O&M activities. They will coincide with results, measures, and guidelines outlined in local USFS biological opinions and National Environmental Policy Act (NEPA) documents where applicable. Specifically, the BMPs will be used by DWR and its contractors working within the Project boundary. Note that exceptions may occur in unusual or time-sensitive circumstances (i.e., emergency maintenance and repairs). BMPs used in other circumstances (i.e., construction, stormwater) may differ from those identified in this plan. 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, especially during routine O&M activities. When soil must be moved or stockpiled, DWR will grade the soil to match local contours if the soil is not just being stockpiled temporarily and mulch and/or reseed the disturbed areas with certified weed-free and/or plant materials native to the region.
2. Where possible, restrict travel to established roads, previously disturbed bare areas, and motorized trails, and avoid traveling through areas with known NNIP occurrences. When possible, 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 (e.g., brush tires and/or undercarriages of off-road equipment) after working in infestation areas.
3. Construction equipment that has been used offsite or off road at another site will be cleaned to the extent practical before entering the Project boundary. This is to minimize the risk of establishment by new NNIP through dispersal of seeds and plant fragments.
4. Certified weed-free straw/mulch will be used for all construction, erosion control, or restoration needs, and gravel and sand from weed-free sources (as directed by USFS on NFS lands) will be used where possible.
5. When feasible, DWR will not leave stockpiles from proposed ground disturbance activities of soil uncovered for longer than one month. In general, stockpiles left in place longer than one month will be covered with tarps and plastic to prevent plant growth. DWR will seed topsoil stockpiles when the stockpiles will remain in place for longer than two months to maintain soil microbe health and to help prevent the establishment of NNIP. All topsoil stockpiles will be seeded with commercially available native plant seeds local to the area.
6. DWR will consult with appropriate land management agency specialists and follow applicable procedures, as appropriate, at least one month prior to the

Agency Consultation Meeting (see Section 6.2, Agency Consultation) to determine the appropriate plant material that complies with current guidelines. For areas where fill is required, DWR will use fill material collected onsite where available and revegetated with locally collected plant material if feasible or a commercially available local native seed mix reflective of the affected habitat type.

7. In general, a draft of site-specific revegetation activities will be developed before ground-disturbing actions larger than 0.25 acres. If the ground-disturbing actions occur on NFS lands, DWR 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 to 60 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 in the Agency Consultation Meeting. In some situations, seeding in the fall may be preferred due to timing of rainfall and the type of plant species involved with revegetation activities.
8. Erosion control materials that do not pose an entanglement risk 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.
9. Erosion control BMPs will not pose a risk or barrier to wildlife movement and will be installed to allow for the safe passage of wildlife movement, particularly less agile species (such as small mammals and reptiles), out of the project area. Long, continuous lengths of silt-fencing or other erosion control BMP materials installed without gaps can create a barrier to wildlife movement, trapping animals within the project area. Areas of safe passage can be easily accommodated by leaving small gaps between parallel and overlapping lengths of erosion control BMPs.

2.2.1.1 USFS Recommended BMPs

In addition to the BMPs mentioned above, USFS recommended BMPs outlined in the *National Best Management Practices for Water Quality Management on National Forest System Lands* (USFS 2012) that may be applicable in certain situations on NFS lands. The names and objectives of 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

Current information on known locations of target NNIP within the proposed Project boundary was developed from comprehensive botanical surveys in 2017 (Table 2.1-1). The NNIP surveys documented species' composition, location, and relative abundance.

DWR will use the results of the NNIP surveys as a baseline inventory of the existing target NNIP within the Project boundary.

2.2.3 Control Measures for Existing Populations

Where contiguous NNIP occurrences extend beyond the Project boundary by up to 50 feet, DWR, DPR, and USFS (when also on NFS lands) will coordinate at the annual agency consultation meeting to develop a schedule and identify the appropriate level of control measures for existing populations of target NNIP populations that are in areas where there is a high potential for disturbance and/or dispersal to areas beyond the existing occurrence. This may include plans to cooperatively manage existing known target NNIPs. Control measures may include but are not limited to manual methods (manual pulling, hoeing), mechanical methods (such as mowing, grubbing), and chemical methods (herbicides). Results and methods of the plans will be tracked and analyzed to help determine which methods are most successful for each target species. DWR will assess the use and appropriateness of control methods on a case-by-case basis.

Target NNIP will be designated for active management efforts aimed at eradication of small occurrences and control of larger ones on lands within the proposed Project boundary in those cases where the occurrence poses a threat to other resources, such as special-status wildlife species. 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 done on a case-by-case basis. For instance, it is not possible to completely eliminate 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 feasible to prevent the yellow star-thistle from outcompeting the special-status plant for resources. NNIP populations that do not pose a threat to other resources will not be targeted for eradication. All management activities will be consistent with State and federal law, which will take precedence in the event any conflicts occur. Control and containment of NNIP will be reviewed at the Agency Consultation Meeting. Site-specific circumstances may dictate deviations from these guidelines.

2.2.4 Long-Term Monitoring

As described in Sections 1.5 and 2.1 (above), comprehensive baseline botanical surveys were completed in 2017. NNIP occurrences posing a threat to other resources will be treated with herbicide or other appropriate control method as discussed in Section 5.0. Following initial treatment, occurrences will be monitored annually for three years, beginning with the first year of application of control treatments (generally within 30 days of treatment). Over time, during the three years, if monitoring results show declining or complete eradication of NNIP populations in the treatment area, the frequency of monitoring may be reduced or eliminated. Conversely, during the three years, if monitoring results show an increase of NNIP populations in the treatment area, the frequency of monitoring may be increased. Monitoring of specific populations will

continue until a population is considered to no longer warrant control measures due to a consistent reduction in occurrence or the elimination of NNIP onsite.

DWR will evaluate the need to update the inventory every five to 10 years based on available information at the time of the evaluation. If surveys are warranted, they will target NNIP populations in areas where there is high chance for disturbance and/or dispersal, such as the recreation areas or areas that are disturbed by frequent Project O&M activities.

2.2.5 Adaptive Management

Weed management techniques will and could change over time in response to new data, techniques, and scientific research. New data from research and agency-developed methods should be incorporated into the decision-making process to identify the use and application of new techniques for this plan. Results from monitoring data (weed control measures) will be entered into a central database and used to inform future management decisions. Where available, new, more efficient techniques will be incorporated into the adaptive management program.

This plan may be modified or amended as resources are added or removed from sensitive species lists, survey protocols are changed, or new survey technology emerges. 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 DWR database.

2.3 VARIATIONS IN TREATMENT ON SAN BERNARDINO NATIONAL FOREST LANDS

NNIP will be controlled on NFS lands within the Project boundary. On NFS lands, approvals for control efforts will follow all USFS guidance (USFS 1994, 2013) including local USFS Biological Opinions and NEPA documents, in addition to all federal, State, and local regulations relating to herbicide applications.

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3.0 SPECIAL-STATUS PLANTS, SPECIAL-STATUS NATURAL COMMUNITIES, AND CULTURALLY SENSITIVE PLANT MONITORING

3.1 SPECIAL-STATUS PLANTS, SPECIAL-STATUS NATURAL COMMUNITY AND CULTURALLY SENSITIVE PLANT SURVEYS

In 2017, DWR conducted comprehensive floristic surveys and mapped locations of special-status plant populations and special-status natural communities within the Project boundary. The surveys included: (1) determining presence of any special-status plants or natural communities; and (2) revising previously documented special-status plants or natural communities. Results of the surveys are included in Appendix C.

Special-status plants are defined as the following:

- Listed as a USFS sensitive species and occurs on NFS lands;
- 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 CNPS 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.

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

Culturally sensitive plants are defined as the following: a concentration of a specific plant species and/or plant gathering or collection areas as identified by a Native American tribe to be culturally significant. A list of species important to the San Manuel Tribe was provided to the botanical group for survey purposes, but is not referenced due to the sensitive nature of the information, which is considered to be Privileged, and provided only to those on a need to know basis.

3.1.1 Survey Area

The existing FERC Project boundary comprises 3,744 acres of land and is depicted on Figures 1.2-1 and 1.2-2. Within the total acreage, about 221.0 acres are federal lands managed by USFS as part of the NFS. As part of the relicensing effort, DWR proposes to reduce the existing FERC Project boundary to consist of 2,070.4 acres, with about 125.9 acres of NFS lands (i.e., new license Project boundary). Most of these federal lands are located on the west side of Silverwood Lake, San Bernardino Tunnel and surge chamber, and a small section of the Devil Canyon Powerplant penstocks area.

The survey area for the 2017 relicensing studies, where a baseline inventory of NNIP and botanical resources were completed, occurred within the proposed Project boundary, excluding the area above the San Bernardino Tunnel.

3.1.2 Survey Frequency

3.1.2.1 *Baseline Surveys*

Between April 4, 2017 and June 16, 2017, DWR conducted a comprehensive botanical inventory of the entire area within the Project boundary, excluding the area over the San Bernardino Tunnel, to identify locations of special-status and culturally sensitive plant species. See Exhibit E of the license application for details of methodology and results of the study. No Project O&M activities occur in the area over the San Bernardino Tunnel because the tunnel is underground. No federal ESA- or CESA-listed plant species were observed in surveyed areas within the proposed Project boundary.

3.1.2.2 *Future List Review and Surveys*

Beginning in the second calendar year after license issuance, a biennial review of current USFWS, CDFW, CNPS, USFS, and San Manuel Tribe lists of special-status plants potentially occurring within the Project boundary will be conducted. In the event a species is newly listed by the USFWS, CDFW, CNPS, USFS, or San Manuel Tribe, DWR will confer with the appropriate resource agency to determine if the species or unsurveyed suitable habitat for the species is likely to occur within the Project boundary. If a newly protected species is likely to occur within the Project boundary, DWR will assess the potential for the species to be affected by planned maintenance or other ground-disturbing activities, and implement appropriate surveys or resource protection measures, if necessary.

Incidental observations of special-status plants and sensitive natural communities during NNIP monitoring, DWR and contractor observations, and pre-construction/pre-disturbance surveys will be recorded to identify if any of these resources are within areas of potential disturbance. After an observation is reported, surveys will be conducted to determine the extent of the newly observed special-status plant species or natural community in the Project boundary.

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

Forty-three occurrences of three different CNPS-listed species were observed during the 2017 baseline botanical surveys, as summarized in Table C.1-1, and depicted in Figures C.1-1 through C.1-3. None of the species is listed under the ESA, CESA, or USFS Special-Status Species lists. All have been assigned a California Rare Plant Rank of 4.2, which denotes plants of limited distribution that are moderately threatened in California (defined by CNPS as “20 to 80 percent occurrences threatened, with a moderate degree and immediacy of threat”) (CNPS 2018). In addition, during other DWR relicensing studies, there were no incidental observations of special-status plants.

One occurrence of a special-status natural community was observed during field surveys: valley foothill riparian, as depicted in Figures C.1-4 through C.1-5. This community is generally characterized by wetland trees and shrubs along or within water bodies. In general, this community is located in relatively isolated areas not likely to be affected by future Project O&M activities as discussed in the license application (see Exhibit E).

Although some plant species on the San Manuel's list were identified within the study area during the *Botanical Resources Study* survey, no locations specific to tribal collection were identified during the *Tribal Resources Study* (Lerch and Swope 2019) conducted as part of the relicensing. Therefore, no locations of culturally sensitive plants requiring avoidance or other management measures have been identified at this time. However, it is possible that plant gathering areas may be defined as such during the term of the new license by the San Manuel tribe or other Native American tribes. Should such plant gathering areas be identified by a participating tribe during the term of the new license, DWR will consult with the tribe to determine the appropriate management measures for any location identified prior to implementing herbicide use or ground-disturbing activities as part of the IVMP

3.3 DISTURBANCE MONITORING

3.3.1 Regular Disturbance Activities

As of the 2017 surveys, no special-status plants listed under the ESA, CESA, USFS, or sensitive natural communities have been documented in areas that would be disturbed by regular Project O&M activities. The three CNPS plants species listed as 4.2 observed during surveys are not listed under the ESA, CESA, or USFS. Therefore, no effects are expected to occur to ESA, CESA and USFS special-status plants or sensitive natural communities due to continued Project O&M activities.

3.3.2 Future Disturbance Activities

For future scheduled O&M activities (i.e., non-emergency, ground-disturbing construction activities) that will be conducted near documented special-status plant or special-status natural community occurrences, including riparian/wetland zones, a pre-construction assessment and post-construction monitoring will be conducted. Prior to construction, a pre-construction assessment will be completed of the planned disturbance area(s). The planned disturbance areas will be defined, mapped, and cross-referenced with the GIS database containing known sensitive resources. If the proposed disturbance site occurs within 100 feet of a sensitive resource, it will be considered within or adjacent to a sensitive resource and exclusion fencing/protection measures should be installed where feasible. If construction impacts are unavoidable, CDFW (for activities within State lands) and USFS (for activities on NFS lands) should be consulted to determine if mitigation measures are required.

Disturbance areas near sensitive areas will be monitored during and after the activity to determine if any impacts to special-status plant populations, special-status natural

communities, or riparian/wetland zones occurred as a result of the disturbance. Disturbance to a resource can include events such as eliminating special-status plant individuals, encroaching on wetland/riparian boundaries, and/or increasing the density of NNIP. Documentation of such events will be included as part of the monitoring activities. Sites that warrant revegetation will begin revegetation efforts within 30 days, or as soon as feasible depending on weather, seasonality, or other considerations affecting the success of the effort. Post-construction monitoring will commence within 30 days of construction and will continue on a yearly basis for up to three years. The subsequent annual monitoring will take place during the time when the resource is identifiable (i.e. blooming period). Monitoring will occur at resource locations identified by qualified staff in the most recent comprehensive surveys that are within or adjacent to the disturbance activity. Monitoring will be conducted both before the planned disturbance (flagging the resource prior to the disturbance activity), during (to ensure protection of the resource), and after to ensure disturbance did not occur within the flagged area, and may be coordinated with other surveys if they occur in the

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

- Subjective assessment of the population or vegetation community's health, viability, or changes from observations during previous comprehensive survey(s), and
- Measured changes in size of the population or vegetation community (geographic extent or number of individuals).

If the disturbance and associated 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 as much as feasible given the phenology. At a minimum, the data collected will include the resource type and document the amount of disturbance occurred within the flagged area. If the flagged area was not properly avoided and disturbance occurred outside of the blooming period, the area will be re-assessed within one year during the appropriate time of year for a period of up to three years following the disturbance.

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 SPECIAL-STATUS NATURAL COMMUNITIES PROTECTION

Multiple measures will be used to protect special-status plants, special-status 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:

- CDFW, DPR (on land within the SRA), and USFS (on NFS lands) will be consulted in the development of specific usage plans for areas surrounding known occurrences of sensitive natural communities and sensitive resources areas. This includes any impacts to the bed, bank, or channel of a lake or stream requiring CDFW notification and consultation.
- Employee training with appropriate staff (employees and contractors) will be conducted every two years and it will include information on recognition of special-status plant species and the location of existing occurrences of sensitive resources and areas to be avoided (including special-status natural communities and riparian/wetland zones)
- Flagging will be installed to facilitate avoidance of sensitive areas within a site and resource-specific buffer prior to any vegetation management activities, including management for target NNIP
- Manual activities (e.g., utilizing hand tools) will be encouraged, where reasonable, in sensitive areas

Emergency work is exempt from the measures above. However, DWR will work with CDFW and/or USFS (if applicable) to ensure that routine vegetation management occurs proactively and 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 with the initial notification by phone within 3 days, with detailed reporting and/or any applicable reports being submitted as soon as possible. Sensitive resource disturbances on NFS lands will also be reported to USFS. 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, DWR will work with USFS on NFS lands and CDFW on State and private lands to determine any necessary mitigation measures (e.g., if substantial disturbance, a mitigation plan may be required; if minor disturbance, corrective actions may be discussed at the Agency Consultation Meeting).

Emergency work includes, but is not limited to, emergency repairs to Project facilities necessary to maintain service essential to the public health, safety, or welfare. Emergency repairs include those that require a reasonable amount of planning where delay of a project or activity would result in substantial safety or environmental impacts. Furthermore, emergency projects include specific actions necessary to prevent or mitigate an emergency. Emergency projects or activities do not include 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

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 includes erosion control, site restoration, and replanting. The main functions of revegetation are to conserve native plant resources, reduce soil erosion, and restore wildlife habitat.

Certain Project areas such as the Cedar Springs Dam face must remain free of vegetation and will not undergo revegetation. Some public use areas and other developed areas that contain existing ornamental landscaping and hardscape will also not be revegetated with native plants. Sites that are subject to continual disturbance (e.g., berm roads) or 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 also not be revegetated. Legacy sites – areas that are not deliberately kept unvegetated, but have not naturally revegetated prior to license issuance – will not be subject to revegetation.

Revegetation objectives include the following:

- Native vegetation cover is within 20 percent absolute cover when compared to similar sites on the adjacent undisturbed Revegetation within areas where NNIP are present will keep/reduce NNIP to low levels, with the following guidelines:
 - If the area adjacent (i.e. within 50 feet) to the revegetation site contains less than 25 percent cover of NNIP, revegetation will be considered acceptable when the cover of NNIP on the revegetation site is equal to or less than five percent
 - If the area adjacent to the revegetation site contains 25 to 50 percent cover of NNIP, revegetation will be considered acceptable when the cover of NNIP on the revegetation site does not exceed 10 percent
 - If the area adjacent to the revegetation site contains more than 50 percent cover of NNIP, revegetation will be considered acceptable when the cover of NNIP on the revegetation site does not exceed 25 percent
- Reduce potential for significant erosion and the delivery of sediment to channels; rills at the end of revegetation should be eliminated if feasible. If not feasible, BMP measures should be implemented to ensure the rills do not deliver sediment to nearby channels and/or water bodies.
- Implement native vegetation that is vigorous, self-sustaining, and contains a diverse mixture of natives that is consistent with the adjacent undisturbed areas

4.1.1 Areas Subject to Revegetation

DWR 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 one-quarter acre treated for NNIP that have resulted in bare ground or limited vegetation growth; and
- Areas over one-half acre 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 one-half acre, DWR will follow the revegetation guidelines from Section 4.1.4 of this IVMP without further consultation.

Areas over one-quarter acre treated for NNIP require further 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. However, if the treatment site is severely degraded and native plants are absent or in low abundance, active revegetation efforts may be required to promote recovery of the native plant community. NNIP treatment sites requiring revegetation will be identified at the Agency Consultation Meeting following the site evaluations detailed in Section 6.2 of this IVMP.

4.1.2 Evaluating Sites for Revegetation

Prior to ground disturbance within the Project boundary, after DWR has determined a disturbed area may be subject to revegetation (post-disturbance activity), DWR 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). 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 (25 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 in the proposed Project boundary. If none of the criteria are met, then revegetation at the site will be deemed unnecessary. Instead, the site will be monitored annually for up to three years for percent vegetation cover (species composition, richness, and density), NNIP presence, and erosion. 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 remedial actions will be developed and implemented annually for up to three additional years until the revegetated native plant cover is within 20 percent of the adjacent reference site. If target native cover is unattainable, the site will be re-evaluated. CDFW (on State lands) and USFS (on NFS lands) will be informed of the adjustment to the success criteria for erosion control, rather than native plant success criteria, given site-specific circumstances.

For events that are considered outside of DWR's control, the criteria for active revegetation will be re-evaluated. The majority of these areas would no longer meet the criteria required for active revegetation. Other remedial actions will be developed, where applicable, including passive revegetation following a wildfire.

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. The first step of the revegetation process will be an additional site assessment, which will include:

- 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

For non-routine sites (i.e., sites larger than one-half acre on NFS lands), 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.² USFS will have at least 30 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 30 days, the Revegetation Plan will be implemented as written. When possible, the Revegetation Plan will be developed and submitted to USFS at least 10 days prior to the Agency Consultation Meeting, with the potential for a total of 30 to 60 days for review (i.e.,

² USFS currently has site-specific desired condition statements for NFS land, which will be followed in the Revegetation Plans.

10 days for review prior to the Agency Consultation Meeting and between 20 to 50 days for review after the meeting). In these cases, comments will be discussed at the Agency Consultation Meeting and provided to DWR in writing for incorporation into the final Revegetation Plan. It should be noted that the timeframe specified above assumes that this timeline is feasible; shorter deadlines may be required and negotiated to complete FERC mandated repairs or maintenance, as dictated by the specific orders or mandates.

For sites smaller than one-half acre on NFS lands, DWR will develop a list of revegetation actions, including species to be planted, methods of revegetation and an implementation schedule. The list of actions will be submitted to USFS for approval within 30 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 30 days, DWR will implement the revegetation actions.

4.1.4 Revegetation Methods

On NFS lands, revegetation will be consistent with USFS guidelines for revegetation (USFS 1994, 2013). 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 (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. In sites that are being seeded, seeding will take place a few days after topsoil is replaced, or 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. DWR will consult with DPR on the proposed plant pallets, and will use commercially available native seed mixes collected from the immediate vicinity of the project site and comprised of the same species as those being disturbed by the project.

For sites over one-quarter acre and smaller than one-half acre on USFS lands, DWR will use a native seed mix that is commercially-available and composed of native seed only, which will be reviewed by USFS during the Agency Consultation Meeting. In general, standard or customized commercially available seed mixes will be used on larger sites greater than one-half acre, as detailed in the site-specific Revegetation Plans or actions. A mixture of seeding techniques may be used and will be described in the individual Revegetation Plans or actions. Seeding rates will be determined based on

pure live seed methods and in a mixture to improve seeding success. Seeds will be covered with not more than three times the thickness of the seed. Sites will be covered with mulch from onsite materials (e.g., chipped trees/slash) after seeding, with the intent of covering the surface through germination. If there is no onsite material or an insufficient amount, certified weed free mulch will be utilized.

Larger sites will typically be replanted, where consistent with existing habitat, with a mixture of native trees, shrubs, and forbs. 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 will be used. Specifics will be described in detail in the site actions or 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, success criteria are not met, remedial measures will be implemented. An additional two years of monitoring will follow the implementation of remedial measures. If at the end of an additional two years of monitoring success criteria identified are still not met, the site will be listed as problematic and strategies to deal with the site will be developed in consultation with relevant resource agencies.

Monitoring of revegetation projects may include monitoring vegetation cover, species richness, survivorship, and native and invasive tree and shrub species counts. When requested by USFS, a revegetation monitoring report will be provided to USFS on the status of revegetation projects on NFS lands. Revegetation monitoring reports 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 may 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 Fire Prevention and Response Plan). 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 Special-Status Natural Communities Monitoring). Examples of routine vegetation management include facility and transmission line management, road maintenance, hazard tree removal, and recreation site management.

4.2.1 Facility Management

Vegetation will be routinely controlled as required for safety and compliance in the immediate vicinity of Project facilities, including powerhouses, access roads, support facilities, access trails, tunnels, conduits, transmission lines, 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 special-status natural communities will be protected from vegetation management at facilities (see Section 3.0, Special-Status Plants and Special-Status Natural Communities Monitoring).

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. As much as practical, 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. DWR will take reasonable measures to prevent the potential for 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 as soon as reasonably possible. When areas of dense shrubs are cut/mowed, they will be chipped onsite. However, 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 a barrier to wildlife movement. If mulch from onsite materials is unavailable, then a certified weed-free mulch will be obtained from other sources, if a weed-free product is commercially available. When mulch is needed to prevent weed establishment along roads, it will have high void spaces (long-fiber mulch), low water-holding capacity and be relatively deep (dependent on the type of weed, a depth of 2 to 4 inches). Material from right-of-way clearing (e.g., road-side brushing) can be shredded (to create long-fiber mulch), but woody NNIP species will not be shredded or used as mulch.

Any documented occurrences of special-status plants or special-status natural communities will be protected from vegetation management during road maintenance activities (see Section 3.0, Special-Status Plants and Special-Status Natural Communities Monitoring).

4.2.3 Recreation Site Management

At Project recreation sites, vegetation management activities include the removal of vegetation, hazardous branches, and hazard trees, as identified by DPR and DWR, to facilitate recreation activities, protect public safety, and reduce fire hazards. Hazardous trees will be surveyed for wildlife usage before removal, unless immediate removal is required to protect life and property. Any documented occurrences of special-status plants or special-status natural communities at Project recreation facilities will be protected from recreation site vegetation management activities (see Section 3.0, Special-Status Plants and Special-Status Natural Communities Monitoring).

Within and adjacent to all developed Project recreation sites on State lands, DPR and DWR will coordinate with fuels reduction treatments (removal of standing and downed dead fuels) at developed Project recreation facilities. Slash will be chipped and broadcast onsite, or piled at an agreed upon location for DPR to burn.

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5.0 HERBICIDE BEST MANAGEMENT PRACTICES

5.1 APPLICATION AND SCHEDULE

Treatment in areas that are required to be void of vegetation generally requires the use of herbicides, and is DWR's 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. Proposed vegetation management treatments on NFS lands will be part of the Agency Consultation Meeting (see Section 6.2, Agency Consultation) between DWR 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.
- 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. At a minimum, the following information essential for review will be provided:

- 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. 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 powerhouse, access roads, gaging stations, and land beneath overhead powerlines. Treatment in these areas generally requires the use of herbicides and is DWR's 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 Figures 2.1-1 through 2.1-5 for currently known locations of invasive weeds. Although these areas of current NNIP locations will change over the course of the license term, the majority of herbicide application locations are anticipated to be within the Project boundary. In some cases, NNIP locations may be outside the Project boundary, but still have a high potential for dispersal into the Project boundary; these will be discussed during the Agency Consultation Meeting and will be managed in a coordinated effort by DWR, DPR, and USFS.

5.3 APPLICATION ON NATIONAL FOREST SYSTEM LANDS

When feasible, herbicide use and application on NFS lands should be avoided. During the Agency Consultation Meeting, a request for approval of planned uses of herbicides on NFS lands for the upcoming year will be submitted to USFS. If herbicide use is necessary on NFS lands, only USFS-approved herbicides, such as Glyphosate, Triclopyr, Imazapyr or Sporax, will be used.

5.4 METHODS

Prior to each site-specific treatment, DWR's 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
- Availability and effectiveness of biological control methods
- 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 within the NFS and once permission is obtained from USFS, all USFS policies and practices and California regulations 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. All chemical application contractors will be qualified, trained, and licensed herbicide contractors, and will be supervised to ensure adherence to rules, regulations, and reporting requirements.

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6.0 TRAINING, CONSULTATION, AND PLAN REVISIONS

6.1 EMPLOYEE AND CONTRACTOR TRAINING

Biennial environmental training for appropriate staff and contractors working within the Project boundary will be provided, as outlined in Section 3.4 above. The goal of the training will be to familiarize staff and contractors with special-status species, target and watch list NNIP, and sensitive areas known or suspected to occur within the Project boundary, and procedures to avoid adverse effects. The training will include information on the following:

- NNIP BMPs, with an emphasis on preventing spread of existing occurrences
- Recognition of special-status plants
- Recognition of high-priority terrestrial NNIP species (based on guidelines described above)
- Reporting procedures for special-status plants and NNIP

6.2 AGENCY CONSULTATION AND BIENNIAL FERC REPORTING

A biennial report on plan compliance will be submitted to FERC by December 31, in the third calendar year after the license is issued. The second calendar year after license issuance, a report or other form of consultation with USFS and other resource agencies (if applicable) regarding this IVMP will be conducted. During this consultation, the agencies will be notified of all planned vegetation management activities to be conducted within their respective lands in the coming two years and will provide the results of prior activities.

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 required to avoid or mitigate potential effects. At each Agency Consultation Meeting, DWR will 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 two calendar years on NFS lands, identify any IVMP revisions needed for these activities, and make adjustments to the IVMP or schedule for these activities, as deemed appropriate.

6.3 PLAN REVISIONS

DWR will evaluate the requirements of this IVMP during the life of the new license and may modify those requirements in consultation with USFS, DPR, and CDFW. DWR will provide USFS, DPR, and CDFW with 30 calendar days to provide written comments on the draft updated plan, including any recommendations to the updated plan. DWR will include all relevant documentation of consultation with USFS, DPR, and CDFW in the biennial reports filed with FERC. If DWR does not adopt a particular written

recommendation by USFS, DPR, and CDFW, the biennial report to FERC will include DWR's reasoning for the decision.

7.0 REFERENCES

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Appendix A

Results of NNIP Surveys

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Table A.1-1. Target NNIP Species Surveyed Within the Project Boundary

Scientific Name ¹	Common Name	CDFA Rating ²	Cal-IPC Rating ³	NFS Invasive Non-Native Plant Species List ^{4,5}
* <i>Ageratina adenophora</i>	eupatory	--	Moderate	Y
** <i>Ailanthus altissima</i>	tree-of-heaven	C	Moderate	Y*
** <i>Arundo donax</i>	giant reed	B	High	Y*
* <i>Brassica nigra</i>	black mustard	--	Moderate	Y
* <i>Brassica tournefortii</i>	Sahara mustard	--	High	Y
* <i>Bromus diandrus</i>	ripgut brome	--	Moderate	Y
* <i>Bromus madritensis ssp. rubens</i>	red brome	--	High	Y
* <i>Bromus tectorum</i>	cheatgrass	--	High	Y*
** <i>Centaurea melitensis</i>	toçalote	C	Moderate	Y
** <i>Centaurea solstitialis</i>	yellow star-thistle	C	High	Y*
** <i>Cirsium vulgare</i>	bull thistle	C	Moderate	Y
* <i>Cortaderia selloana</i>	Pampas grass	--	High	Y*
* <i>Eucalyptus globulus</i>	blue gum	--	Limited	Y
* <i>Festuca (=Schedonorus) arundinacea</i>	reed fescue	--	Moderate	Y
* <i>Ficus carica</i>	edible fig	--	Moderate	Y
* <i>Foeniculum vulgare</i>	fennel	--	Moderate	Y
* <i>Hedera helix</i> and <i>H. canariensis</i>	English Ivy, Algerian Ivy	--	High	A Y
* <i>Picris (=Helminthotheca) echioides</i>	bristly ox-tongue	--	Limited	Y
* <i>Holcus lanatus</i>	common velvet grass	--	Moderate	Y
* <i>Lolium perenne ssp. multiflorum</i>	Italian ryegrass	--	--	Y
* <i>Medicago polymorpha</i>	California burclover	--	Limited	A
* <i>Nicotiana glauca</i>	tree tobacco	--	Moderate	Y
* <i>Pennisetum setaceum</i>	crimson fountain grass	--	Moderate	A
* <i>Ricinus communis</i>	castor bean	--	Limited	Y
* <i>Robinia pseudoacacia</i>	black locust	--	Limited	Y
* <i>Rubus armeniacus (=discolor)</i>	Himalayan blackberry	--	High	Y
** <i>Salsola tragus</i>	Russian thistle	C	Limited	Y
** <i>Saponaria officinalis</i>	bouncing-bet	C	Limited	Y
* <i>Schinus molle</i>	Peruvian pepper tree	--	Limited	Y
* <i>Schismus arabicus, S. barbatus</i>	Mediterranean grass	--	Limited	Y
* <i>Silybum marianum</i>	milk thistle	--	Limited	A Y?

Table A.1-1. Target NNIP Species Surveyed Within the Project Boundary (continued)

Scientific Name ¹	Common Name	CDFA Rating ²	Cal-IPC Rating ³	NFS Invasive Nonnative Plant Species List ^{4,5}
** <i>Spartium junceum</i>	Spanish broom	C	High	Y*
** <i>Tamarix parviflora</i> , <i>T. ramosissima</i>	saltcedar	B	High	Y*
* <i>Verbascum thapsus</i>	woolly mullein	--	Limited	Y
* <i>Vinca major</i>	periwinkle	--	Moderate	Y
Subtotal of NNIP Species with CDFA and Cal-IPC Ratings		9	35	36 species are identified by USFS as occurring in or near SBNF
Total		36		

Notes:

*Full-datasets collected only on NFS land

**Occurrence mapped wherever found

¹For species that are not listed by CDFA (identified with one asterisk), data were collected in accordance with USFS protocols (United States Department of Agriculture, Forest Service. 2013. Forest Service National Strategic Framework for Invasive Species Management. Available online: <https://www.fs.usda.gov/main/r5/plants-animals>. Accessed: August 28, 2018.) only for occurrences on NFS 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.

²CDFA Ratings:

- B = Pest of known economic or environmental detriment and, if present in California, it is of limited distribution;
- C = Pest of known economic or environmental detriment and, if present in California, it is usually widespread.

³Cal-IPC Ratings (Cal-IPC ratings are provided for reference but were not a criterion in determining which species were target species):

- 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.

⁴USFS Designation:

- A = adjacent or near Forest, reasonable to expect invasion on Forest lands within next five years (as cited in U.S. Department of Agriculture, Forest Service. 2005. Land Management Plan Part 1, Southern California National Forests. USFS Pacific Southwest Region. R5-MB-075. September 2005.)
- Y = present on Forest
- Y* = Forest is currently treating, in process of treating or has treated in past
- Y? = plants are adjacent or near and highly likely to be present but not documented

⁵U.S. Department of Agriculture, Forest Service. 2005. Land Management Plan Part 1, Southern California National Forests. USFS Pacific Southwest Region. R5-MB-075. September 2005.

Key:

Cal-IPC = California Invasive Plant Council
 CDFA = California Department of Food and Agriculture
 NFS = National Forest System
 SBNF = San Bernardino National Forest
 USFS = U.S. Department of Agriculture, Forest Service

Table A.1-2. NNIP Target Species Occurrences Within the Project Boundary

Scientific Name	Common Name	NFS Land Occurrence	Number of Occurrences in the Proposed Project Area
<i>Ailanthus altissima</i>	tree of heaven	No	3
<i>Brassica nigra</i>	black mustard	Yes	2
<i>Bromus diandrus</i>	ripgut brome	Yes	2
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	Yes	1
<i>Bromus tectorum</i>	cheat grass	Yes	1
<i>Centaurea melitensis</i>	totalote	Yes	29
<i>Cirsium vulgare</i>	bull thistle	No	61
<i>Robinia pseudoacacia</i>	black locust	Yes	1
<i>Salsola australis/tragus</i>	Russian thistle	No	4
<i>Saponaria officinalis</i>	bouncing bet	No	10
<i>Silybum marianum</i>	blessed milk thistle	Yes	1
<i>Spartium junceum</i>	Spanish broom	Yes	38
<i>Tamarix parviflora, T. ramosissima</i>	saltcedar	No	24
Total			177

Note: NNIP target species occurrences within the Project boundary were documented during DWR's 2017 field surveys. Excludes the area over the San Bernardino Tunnel.

Key:

NFS = National Forest System

NNIP = non-native invasive plant

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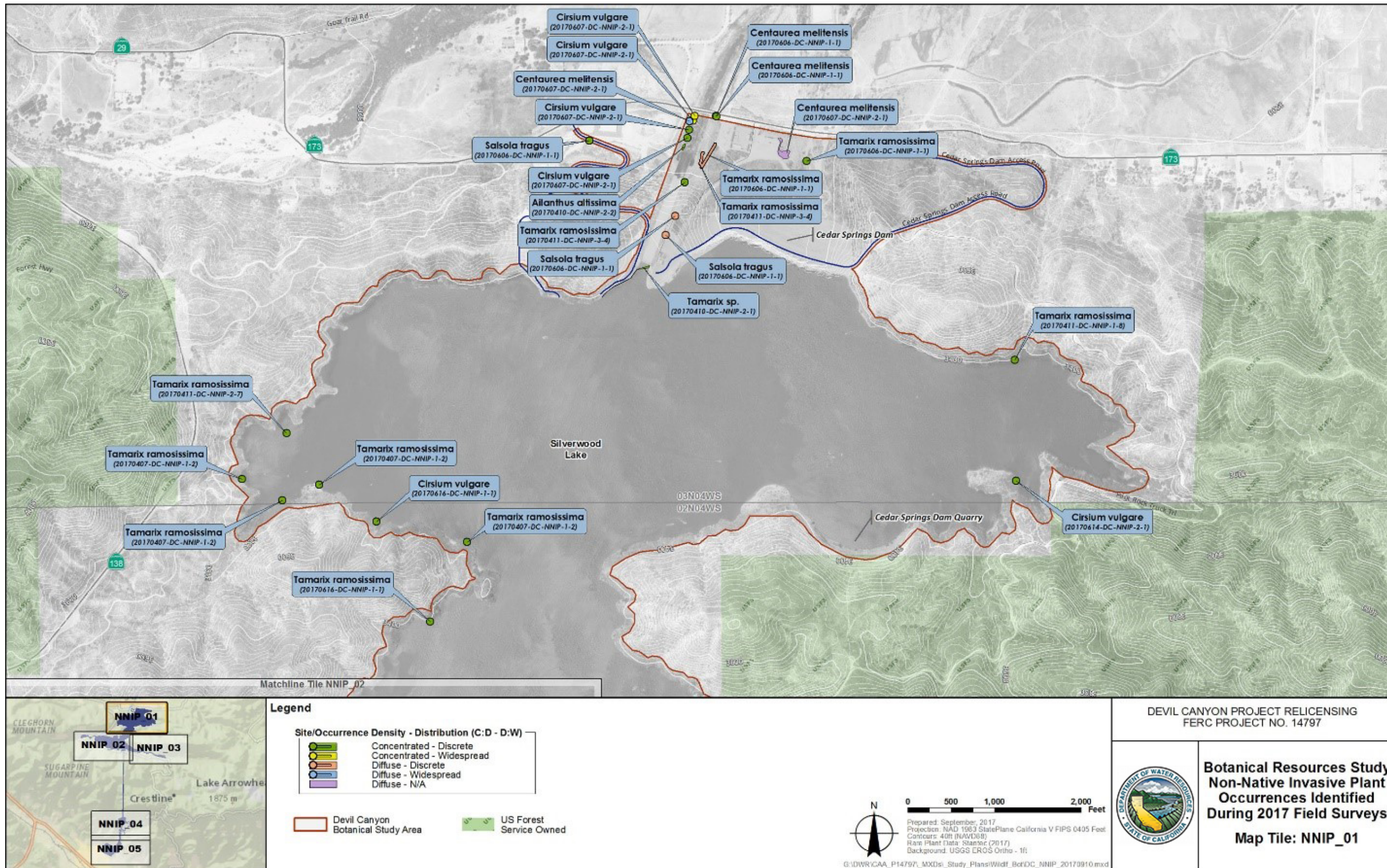


Figure A.1-1. Non-Native Invasive Plant Occurrences Identified During 2017 Field Surveys

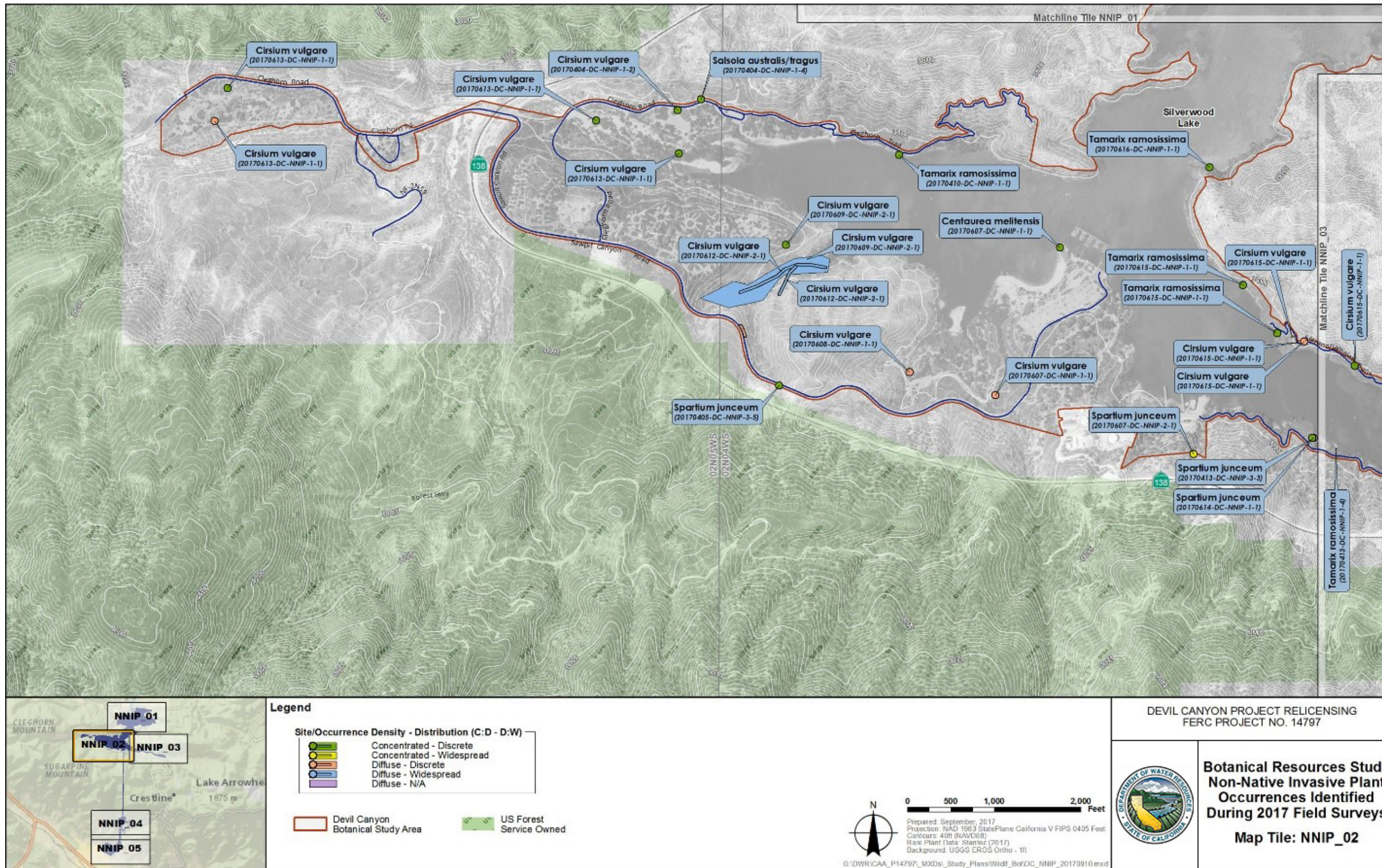


Figure A.1-2. Non-Native Invasive Plant Occurrences Identified During 2017 Field Surveys

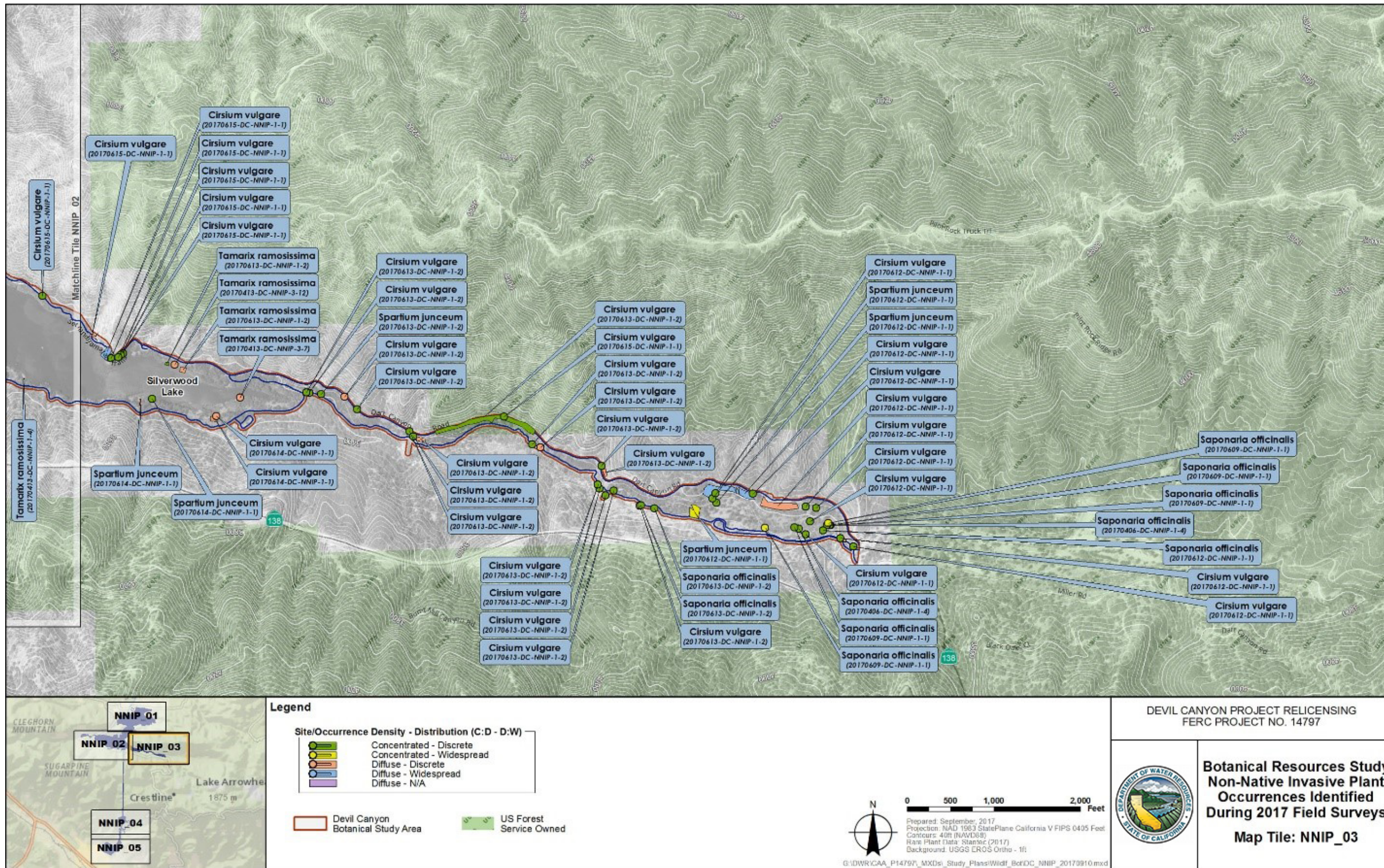


Figure A.1-3. Non-Native Invasive Plant Occurrences Identified During 2017 Field Surveys

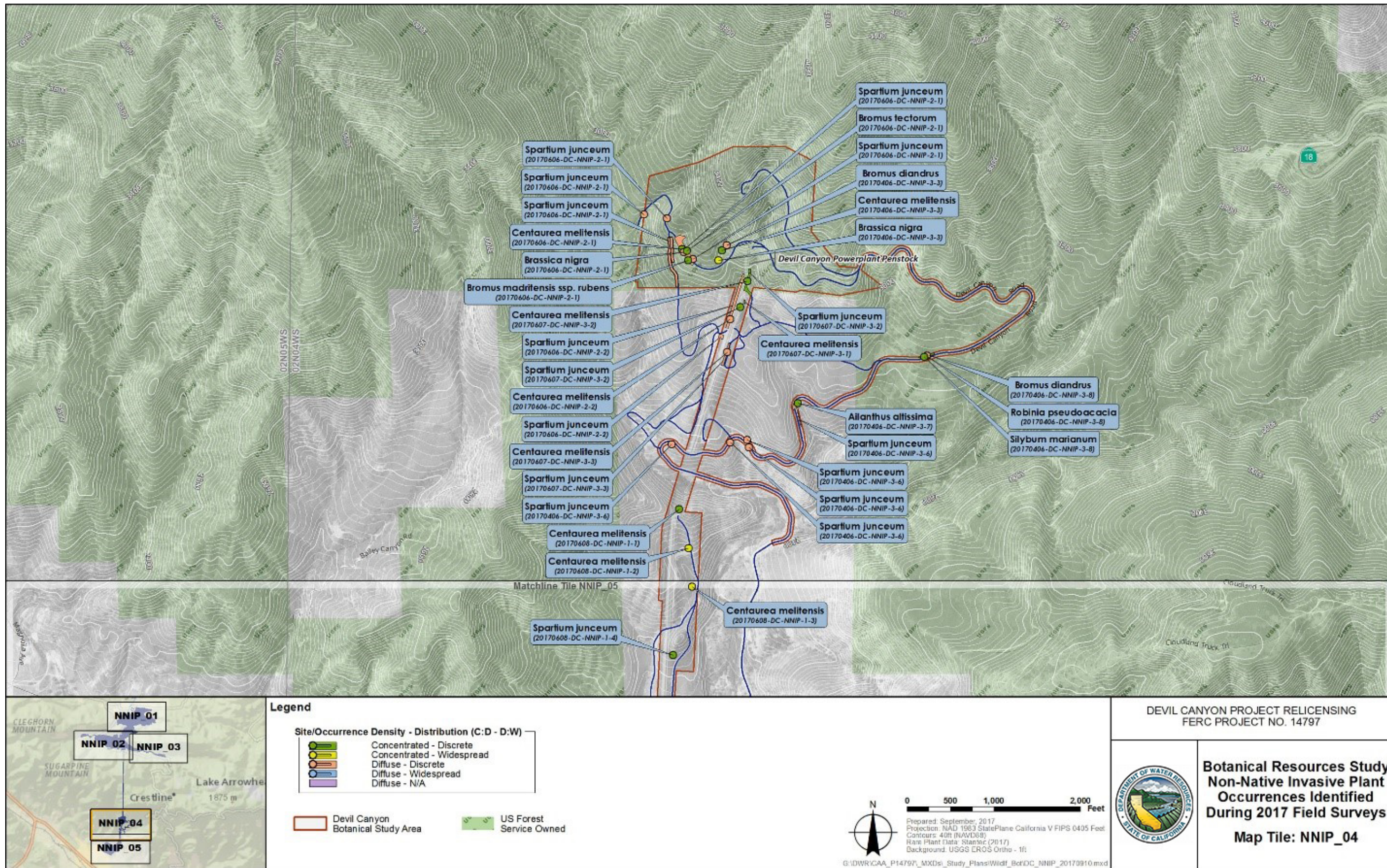


Figure A.1-4. Non-Native Invasive Plant Occurrences Identified During 2017 Field Surveys

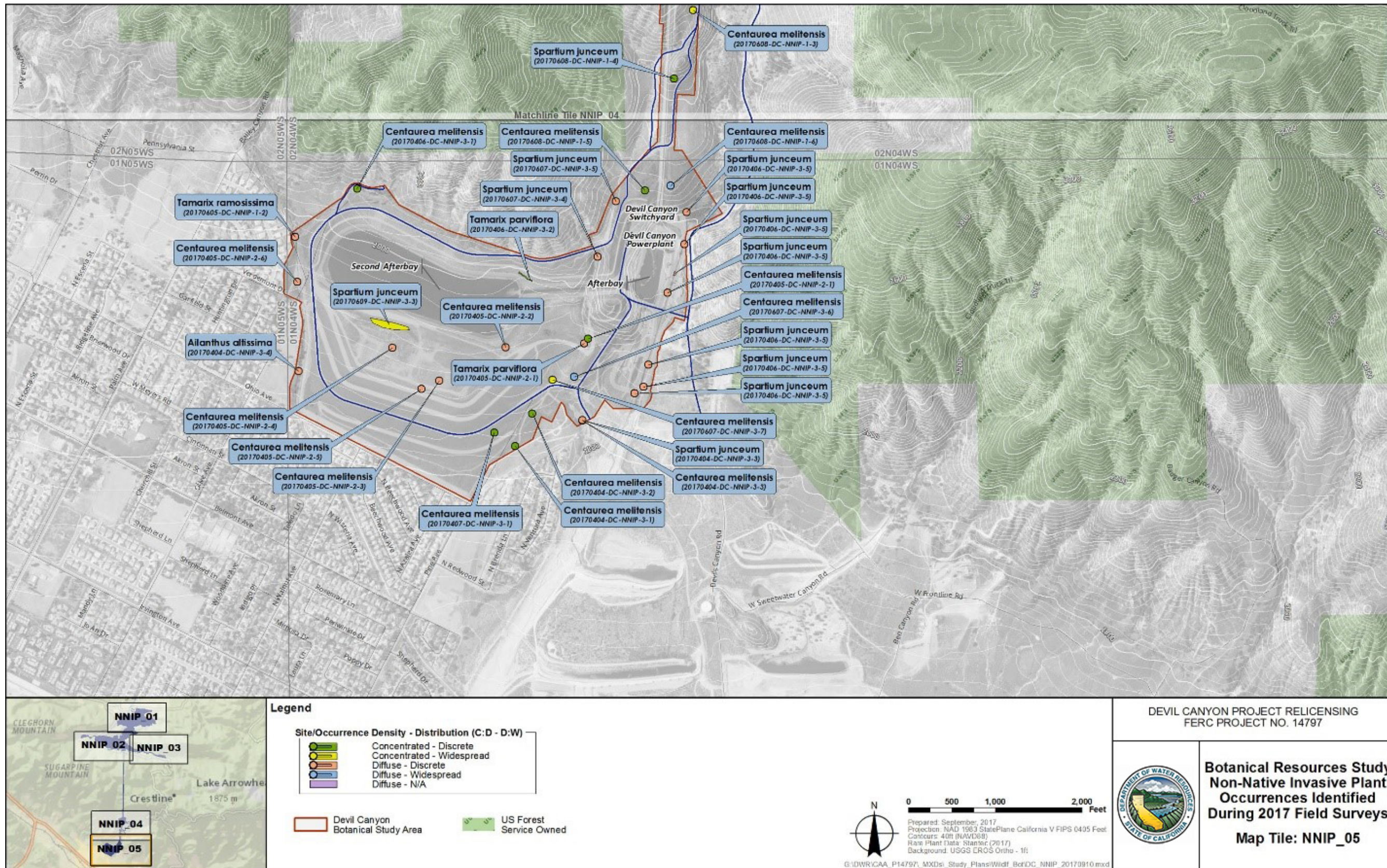


Figure A.1-5. Non-Native Invasive Plant Occurrences Identified During 2017 Field Survey

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Appendix B

USFS Recommended BMPs

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Road Management Activities BMPs

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

Special-Status Plant and Special-Status Natural Community Survey Results

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Table C.1-1. Special-Status Plant Occurrences Observed During 2017 Surveys

Scientific Name	Common Name	CNPS Ranking ²	Number of Occurrences	Location of Occurrences	Site Quality	Threats
<i>Calochortus plummerae</i>	Plummer's mariposa lily	4.2	20	Throughout the Project boundary (Figure 1.2-1); no occurrences were on NFS lands.	5 sites excellent, 10 sites good, 5 sites fair, 1 site poor	Recreation/human use; one occurrence on the west side of Silverwood Lake (feature 20170616-rp-sl-24-A) is threatened by erosion
<i>Juglans californica</i>	Southern California black walnut	4.2	21	Most occurrences are near Devil Canyon Powerplant. One occurrence is near the Silverwood Lake marina. Five occurrences were on NFS lands.	14 sites good, 21 sites fair, 1 site poor	Encroachment of NNIP, road and vehicle use, and human use; occurrences located within the powerplant area may potentially be affected by facilities maintenance
<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	Ocellated Humboldt lily	4.2	2	East Fork of the West Fork Mojave River. No occurrences were found on NFS lands.	2 sites good	Recreation/human use
Total	3 Plant Species	4.2	43	--	--	--

Source: California Department of Fish and Wildlife. 2018. California Natural Diversity Database. Special Vascular Plants, Bryophytes, and Lichens List. August 2018. Quarterly publication. 126 pp. Available online: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline>. Accessed: August 28, 2018.

Notes:

¹CNPS Ranking: 4.2 = Plants of limited distribution that are moderately threatened in California (defined by CNPS as "20 to 80 percent occurrences threatened, with a moderate degree and immediacy of threat")

²An occurrence includes all plants of a given species mapped within 0.25-miles. Occurrences may include more than one "site" within 0.25-mile radius. Therefore, the number of sites may be greater than the number of occurrences.

Key:

CNPS = California Native Plant Society

NFS = National Forest System

NNIP = non-native invasive plant

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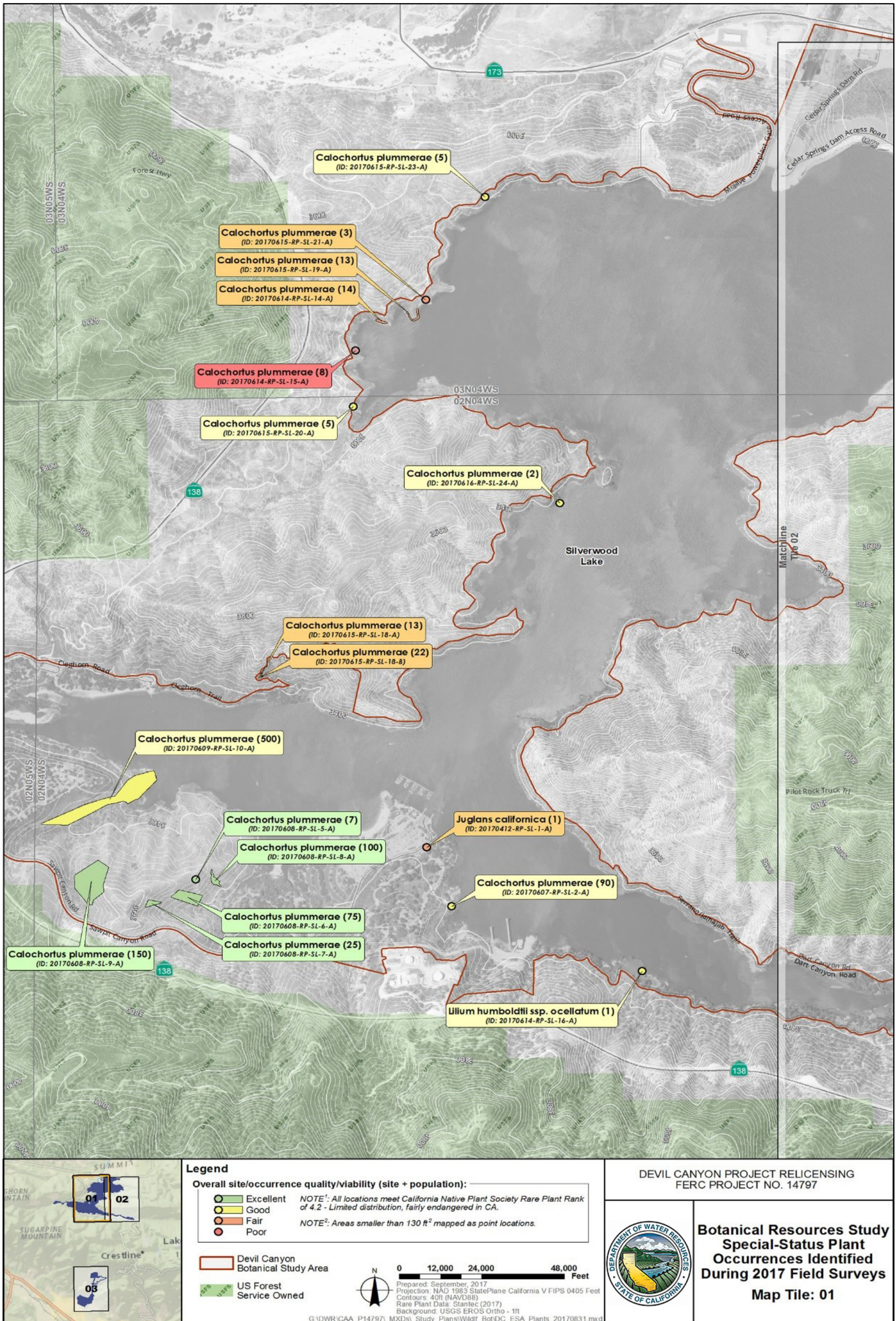


Figure C.1-1. Special-Status Plant Occurrences Identified During 2017 Field Surveys

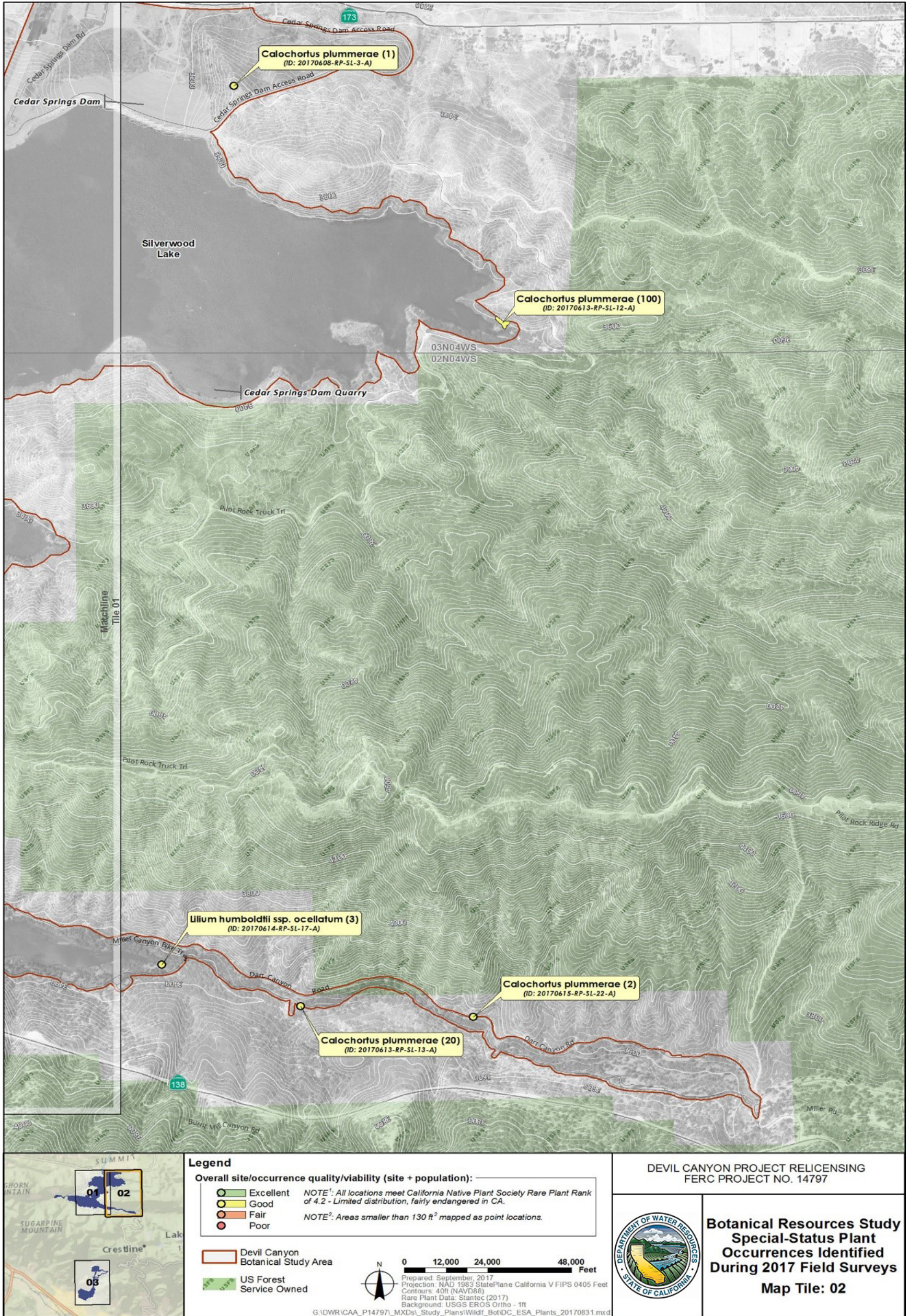


Figure C.1-2. Special-Status Plant Occurrences Identified During 2017 Field Surveys

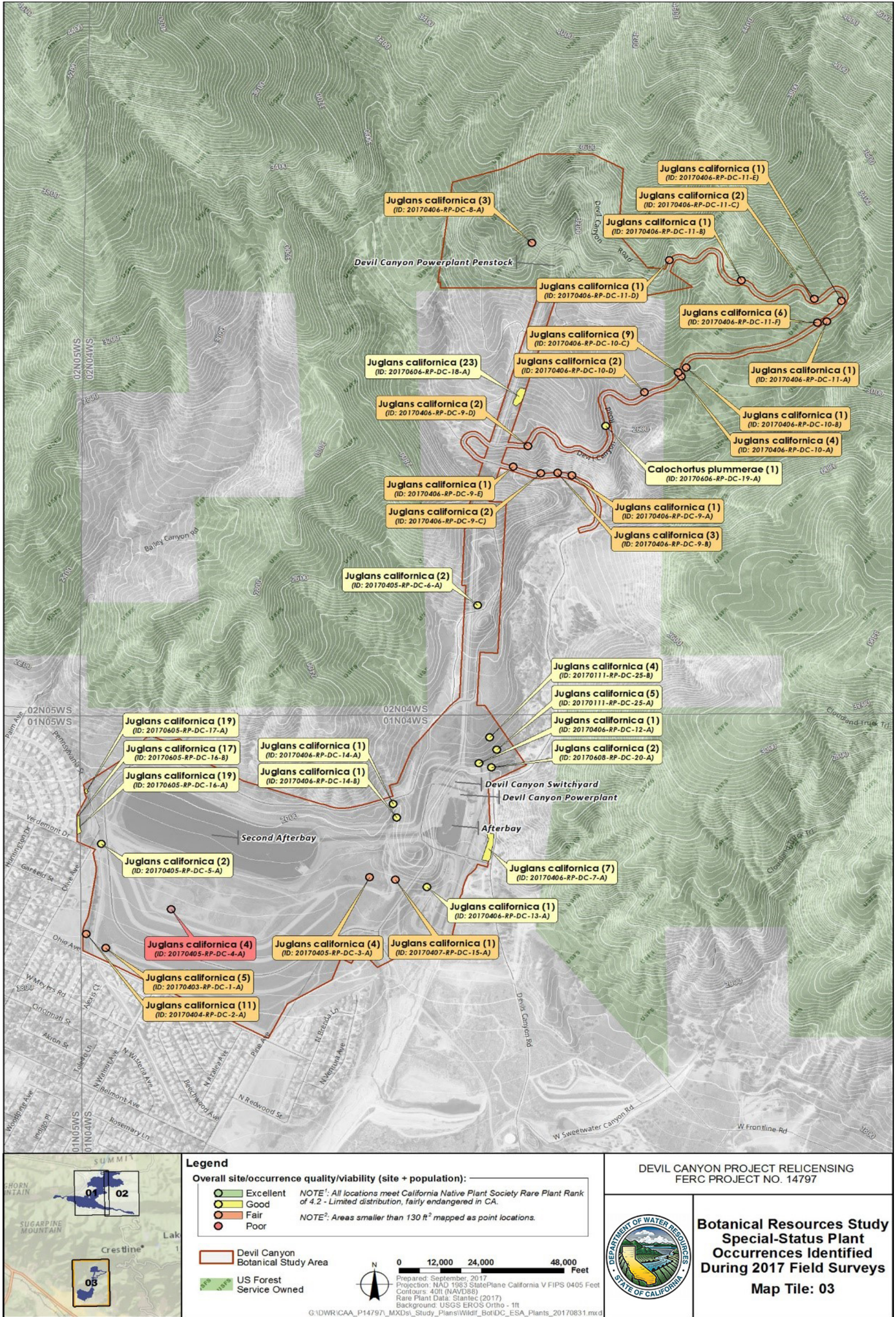


Figure C.1-3. Special-Status Plant Occurrences Identified During 2017 Field Surveys

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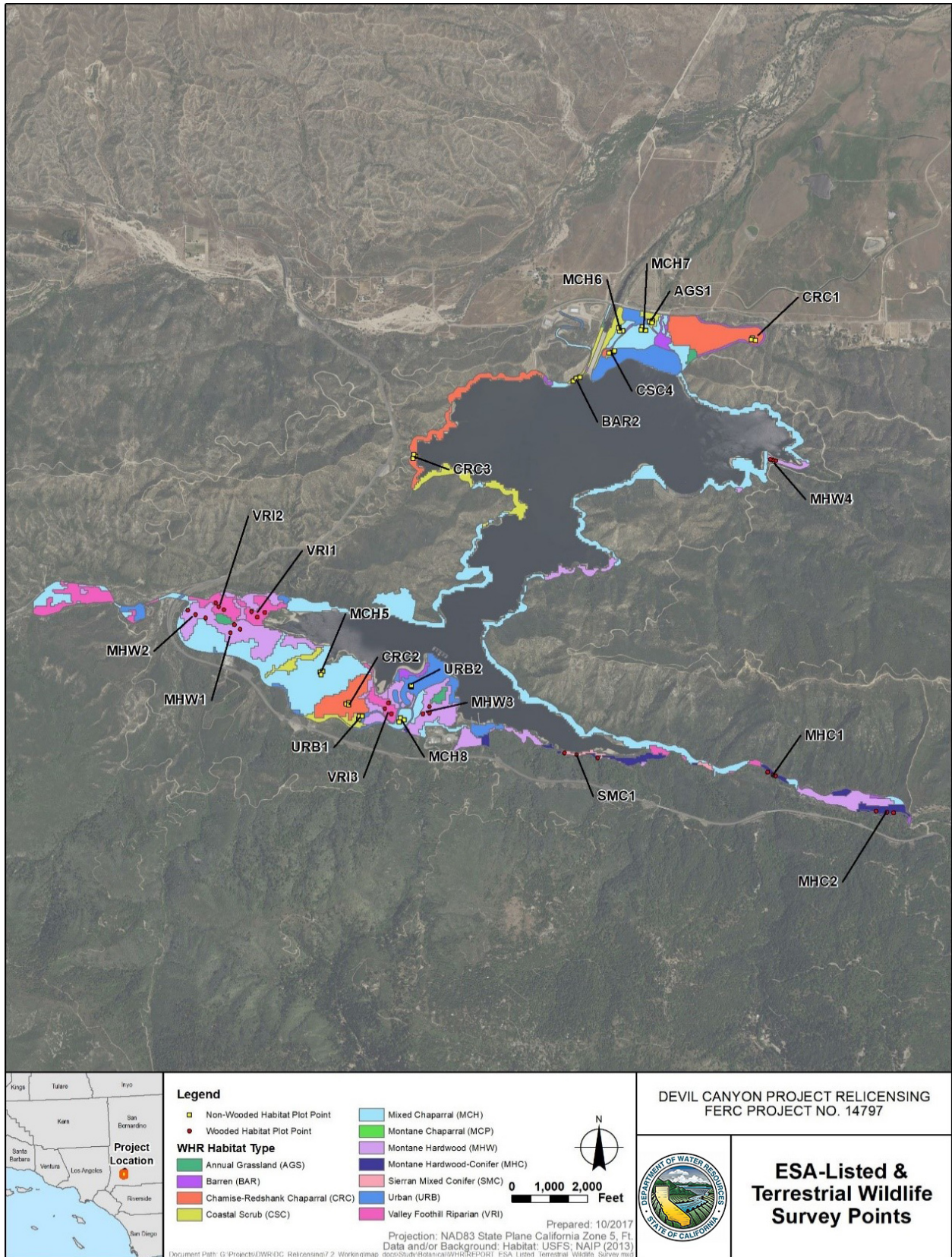


Figure C.1-4. Vegetation Communities Identified During 2017 Field Surveys

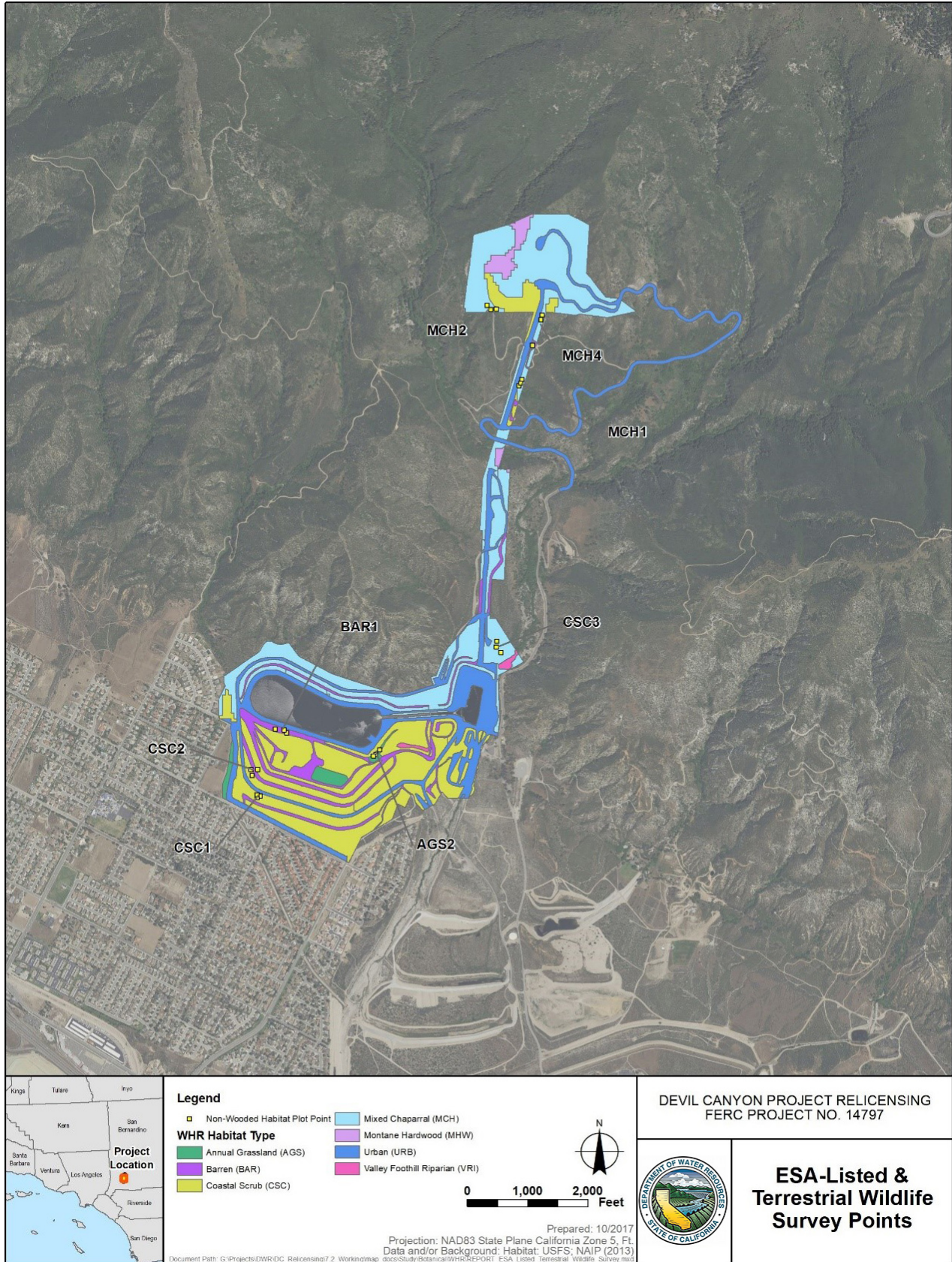


Figure C.1-5. Vegetation Communities Identified During 2017 Field Surveys

Attachment 5

Transportation System Management Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



TRANSPORTATION SYSTEM MANAGEMENT PLAN

November 2018



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

EDMUND G. BROWN JR.
Governor
State of California

JOHN LAIRD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources

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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Brief Description of the Project.....	1-1
1.2	Purpose of the Plan	1-5
1.3	Goals and Objectives of the Plan.....	1-5
1.4	Contents of the Plan	1-5
2.0	IDENTIFICATION OF PRIMARY PROJECT ROADS AND TRAILS	2-1
2.1	Roads and Trails Used by DWR to Access Project Facilities.....	2-1
2.1.1	Vehicular Access.....	2-1
2.1.1.1	San Bernardino Tunnel Outlet	2-1
2.1.1.2	San Bernardino Tunnel Surge Chamber.....	2-1
2.1.1.3	Devil Canyon Powerplant Penstocks	2-2
2.1.1.4	Cedar Springs Dam and Cedar Springs Dam Spillway... ..	2-3
2.1.1.5	San Bernardino Tunnel Intake	2-4
2.1.2	Foot or Off-Highway Vehicle Access.....	2-5
2.2	List of Primary Project Roads and Trails.....	2-5
3.0	MAINTENANCE OF PRIMARY PROJECT ROADS AND TRAILS.....	3-1
3.1	Primary Project Roads	3-1
3.1.1	Short- and Long-Term Maintenance Program.....	3-2
3.1.1.1	Short-Term Maintenance of Primary Project Roads	3-2
3.1.1.2	Long-Term Maintenance of Primary Project Roads	3-3
3.1.2	Primary Project Road Maintenance Measures.....	3-3
3.1.3	Road Rehabilitation Measures	3-4
3.2	Primary Project Trails.....	3-4
4.0	CONSULTATION, REPORTING AND PLAN REVISIONS	4-1
4.1	Consultation and Reporting	4-1
4.2	Plan Revisions	4-1
5.0	REFERENCES CITED	5-1

LIST OF FIGURES

Figure 1.1-1.	Devil Canyon Project Vicinity	1-3
Figure 1.1-2.	Proposed Devil Canyon Project Boundary	1-4

LIST OF TABLES

Table 2.2-1.	Primary Project Roads and Trails.....	2-7
Table 3.1-1.	USFS Maintenance Levels.....	3-1

LIST OF APPENDICES

Appendix A Primary Project Roads

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

Application for New License	DWR's Application for a New License for Major Project – Existing Dam for the Devil Canyon Project, FERC Project Number 14797
CFR	Code of Federal Regulations
CLAWA	Crestline-Lake Arrowhead Water Agency
DOT	U.S. Department of Transportation
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
general access road	A road, or segment of a road, used at times by agencies and members of the public to access Project facilities, but is not in the Project license, is not used exclusively to access the Project, and is not maintained exclusively by DWR
general access trail	A trail, or segment of a trail, used at times by agencies and members of the public to access Project facilities, but is not in the Project license, is not used exclusively to access the Project, and is not maintained exclusively by DWR
GIS	Geographic Information System
Integrated Vegetation Management Plan	DWR's Integrated Vegetation Management Plan included as a DWR-proposed PM&E in its Application for New License
long-term maintenance	Repairs that are scheduled around specific events that impact the overall integrity of a given Primary Project Road, such as heavy-haul events or unusually heavy storm events; such events require repairs that are beyond the scope and budget of the short-term maintenance procedures. Long-term Primary Project Road repairs are undertaken in addition to short-term maintenance activities
ML	Maintenance Level
MUTCD	U.S. Department of Transportation's Manual on Uniform Traffic Control Devices
NFS	National Forest System
Plan	Transportation System Management Plan

PM&E measures	Potential Mitigation and Enhancement measures, which are operation and management activities to: (1) mitigate impacts from continued operation and maintenance of the Project; and (2) enhance resources affected by continued Project operation and maintenance
Primary Project Road	A road, or segment of a road, that is identified in the Project's new license as a Project facility, is used almost exclusively to access the Project, is within the FERC Project boundary, and is operated and maintained exclusively by DWR as a Project feature
Primary Project Trail	A trail, or segment of a trail, that is identified in the Project's new license as a Project facility, is used almost exclusively to access the Project, is within the FERC Project boundary, and is operated and maintained exclusively by DWR as a Project feature
Project	Devil Canyon Project
Project boundary	The area to which DWR requires access for normal Project operations and maintenance; the boundary is shown in Exhibit G of DWR's Application for New License
Recreation Plan	DWR's Recreation Plan included as a DWR proposed PM&E in its Application for New License
SBNF	San Bernardino National Forest
short-term maintenance	Routine or periodic repairs, inspections, and maintenance activities conducted annually, periodically, or seasonally to address normal wear and tear during road use under typical annual weather conditions
SRA	State Recreation Area
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service

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1.0 INTRODUCTION

In XXXX 2018, the California Department of Water Resources (DWR), pursuant to Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act [FPA], Part 4, Subpart F [Application for License for Major Project – Existing Dam] [Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project).

DWR included this Transportation System Management Plan (Plan) in its XXXX 2018 Application for New License. This Plan addresses Primary Project Roads and Primary Project Trails, which include any road or any trail, or segment of a road or trail, that is identified in the new license as a Project facility, is used almost exclusively to access the Project, is within the FERC Project boundary, and is operated and maintained exclusively by DWR as a Project feature.

This Plan does not address roads and trails associated with Project recreation; these roads and trails are part of Project recreation facilities and are addressed in DWR’s relicensing Recreation Plan. Recreation-associated roads include, among others: all roads that access Project recreation facilities, most of which are located within the Silverwood Lake SRA; the access road from State Highway 138 to the entrance station to the SRA; Dart Canyon Road, which provides a parking area for the public and vehicle access for Silverwood Lake SRA maintenance staff to service recreation facilities on the Miller Canyon area of Silverwood Lake SRA..

In addition, this Plan does not address maintenance of general access roads and trails, which are roads and trails, or segments of roads and trails, used at times by agencies and members of the public to access Project facilities, but are not in the Project license, are not used exclusively to access the Project, and are not maintained exclusively by DWR.

All elevation data in this Plan 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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities

range in elevation from 3,378 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation, on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., Crestline Lake Arrowhead Water Agency intake and the Pacific Crest Trail [PCT]) are located within or traverse the Proposed Project boundary, but are not Project facilities. The Project does not include any open water conduits, excluding the 1,000-foot-long Cross Channel that connects the Devil Canyon Afterbay and Devil Canyon Second Afterbay. The Project interconnects with the regional electric transmission system grid at the Devil Canyon Powerhouse and, therefore, does not include any transmission lines. DWR operates the Project in a run-of-release mode using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities, and a slight modification to the existing Project boundary. The boundary change would result in a reduction of the area within the boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest System (NFS) lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005), as subsequently amended.

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures, which are operation and maintenance (O&M) activities to: (1) protect resources against potential impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's Proposed Project boundary.

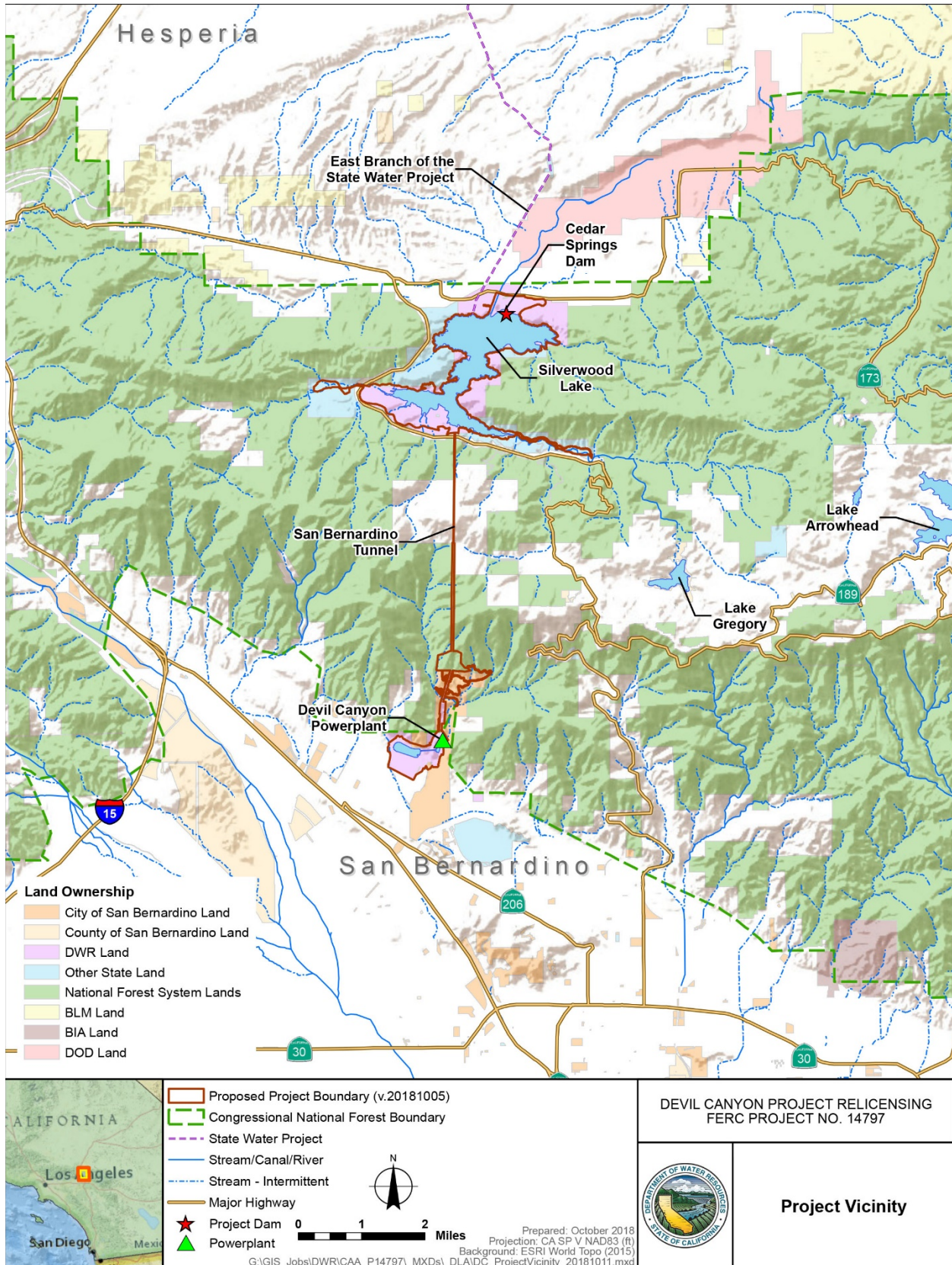


Figure 1.1-1. Devil Canyon Project Vicinity

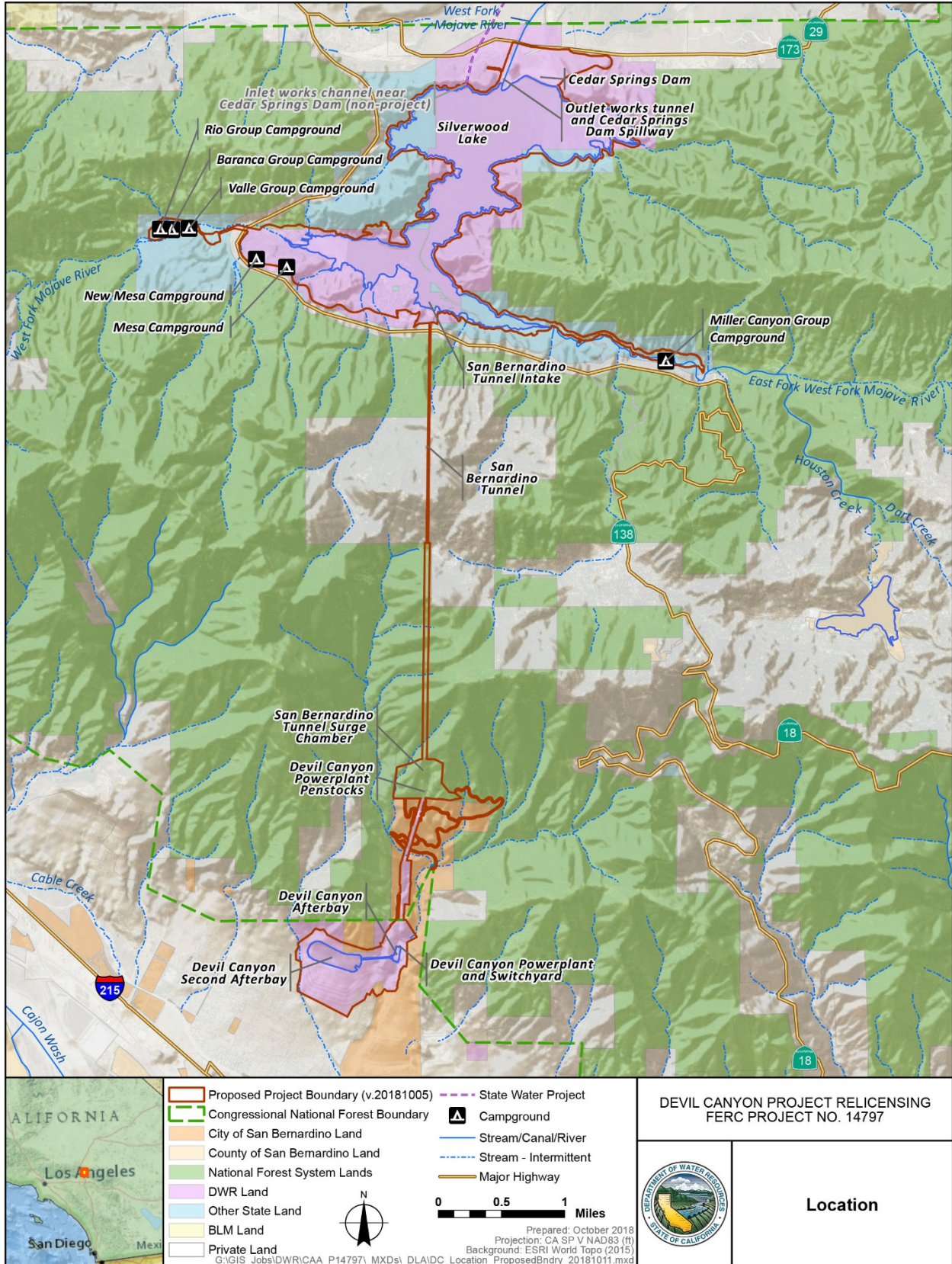


Figure 1.1-2. Proposed Devil Canyon Project Boundary

1.2 PURPOSE OF THE PLAN

This Plan is intended to provide guidance for the operation and maintenance of Primary Project Roads and Trails to minimize environmental effects from these roads and trails.

To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

The primary goals of this Plan are to list Primary Project Roads and Trails, and to describe the maintenance and scope of improvements known at this time, if any, for Primary Project Roads and Trails. The objective of the Plan is to describe the management of Primary Project Roads and Trails to meet the Plan's purpose and goals.

1.4 CONTENTS OF THE PLAN

The Plan includes the following:

- Section 1.0. Introduction. Includes introductory information, including the purpose and goals of the Plan.
- Section 2.0. Identification of Primary Project Roads and Trails. Describes the roads and trails used by DWR to access Project facilities, and identifies which of those roads and trails are Primary Project Roads and Trails, and why. In addition, this section provides detailed information regarding each Primary Project Road and Trail.
- Section 3.0. Management of Primary Project Roads and Trails. Describes the manner in which DWR will maintain and operate Primary Project Roads and Trails, recognizing that requirements on NFS lands are different than those on non-NFS lands.
- Section 4.0. Consultation, Reporting and Plan Revisions. Describes consultation and Plan review between DWR and USFS regarding Primary Project Roads and Trails on NFS lands.
- Section 5.0. References Cited. Includes the resource documents cited in this Plan.

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2.0 IDENTIFICATION OF PRIMARY PROJECT ROADS AND TRAILS

This section describes the roads and trails used by DWR to access Project facilities, and identifies which of those roads and trails are Primary Project Roads and Trails, and why. In addition, this section provides detailed information regarding each Primary Project Road and Trail.

2.1 ROADS AND TRAILS USED BY DWR TO ACCESS PROJECT FACILITIES

2.1.1 Vehicular Access

DWR staff access Project facilities via vehicle from the Project's Devil Canyon Powerplant complex, which is a fenced and gated area at 6900 Devil Canyon Road in San Bernardino, California. The fenced area includes the Devil Canyon Powerplant and Switchyard, the lower portion of the San Bernardino Penstocks, Devil Canyon Afterbay and Second Afterbay, and associated paved parking areas. The complex is closed to the public at the entrance gate. The route from the Devil Canyon Powerplant complex, or the nearest federal or State highway, that DWR Operations staff use to access each Project facility is described below. Road lengths provided below are rounded to the nearest tenth of a mile and are based on DWR's relicensing Geographic Information System (GIS) database. Road widths are in feet and are based on DWR's relicensing GIS database.

2.1.1.1 *San Bernardino Tunnel Outlet*

DWR Operations staff access the San Bernardino Tunnel Outlet by turning north onto Devils Canyon Road from Devil Canyon Powerhouse and driving to a locked gate. Devils Canyon Road to the gate is on City of San Bernardino lands, and is maintained by the County of San Bernardino. The gate is maintained by DWR. DWR Operations staff continue past the gate along two road segments, both of which are paved. The first segment is 1.4 miles long, intersects a portion of the San Bernardino Penstocks that is buried, and is located on City of San Bernardino lands and State of California lands. The second segment is 1.0 mile long, is on NFS lands, and extends from the end of the first segment to the San Bernardino Tunnel Outlet, where the tunnel transitions to the penstocks.

Devils Canyon Road to the locked gate is a general access road since it is used for multiple purposes, including access to private residences. The road from the gate, including the gate, to the outlet is a Primary Project Road, since it is maintained by DWR and is solely used by DWR to access the outlet. This Primary Project Road, which is entirely within the Proposed Project boundary, is referred to in this Plan as the "Tunnel Portal Access Road." Figure 1 in Appendix A is a map of the Tunnel Portal Access Road.

2.1.1.2 *San Bernardino Tunnel Surge Chamber*

DWR Operations staff access the San Bernardino Tunnel Surge Chamber from the Tunnel Portal Access Road described above by driving 0.5 miles along a paved road to

the surge chamber. The access road is on NFS lands and is entirely within the Proposed Project boundary. The access road is a Primary Project Road because it is maintained solely by DWR for Project purposes, and is referred to in this Plan as the "Surge Chamber Access Road." Figure 2 in Appendix A is a map of the Surge Chamber Access Road.

2.1.1.3 Devil Canyon Powerplant Penstocks

DWR Operations staff access the Devil Canyon Powerplant Penstocks from four roads that occur on NFS, City of San Bernardino, and State of California lands.

Upper Penstocks

The upper penstocks are accessed by DWR Operations staff from three roads. The first road provides access to the west portion of the upper penstocks, has a native surface, and extends from the Tunnel Portal Access Road at the San Bernardino Tunnel Outlet for approximately 1.1 miles from the locked gate before reconnecting to the Tunnel Portal Access Road further to the south, near where the upper penstocks go underground. The road has three segments. The first segment is 0.4 miles long, is on NFS lands, and extends from the San Bernardino Tunnel Outlet to the intersection of NFS and DWR property boundaries. The second segment is 0.3 miles long, is on City of San Bernardino and State of California lands, and extends from the intersection of NFS and DWR property boundaries to the penstocks. The third segment is 0.5 miles long, is on City of San Bernardino lands, NFS lands, and State of California lands, and extends from the second segment to the intersection with the Tunnel Portal Access Road. The road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the "Upper Penstocks (West) Access Road." Figure 3 in Appendix A is a map of the Upper Penstocks (West) Access Road.

The second road provides access to the upper east portion of the upper penstocks, has a native surface, and extends from the Tunnel Portal Access Road to the penstocks. The road has two segments. The first segment is 0.4 miles long, is on City of San Bernardino and State of California lands, and extends from the Tunnel Portal Access Road to the upper portion of the penstocks. The second segment is 0.3 miles long, is on City of San Bernardino and State of California lands, and extends from the first segment to the penstocks. The road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the "Upper Penstocks (Upper East) Access Road." Figure 4 in Appendix A is a map of the Upper Penstocks (Upper East) Access Road.

The third road provides access to the lower east portion of the upper penstocks, and extends from the Tunnel Portal Access Road to the penstocks. The road has one segment that has a native surface, is 0.1 miles long, is on City of San Bernardino and State of California lands, and extends from the Tunnel Portal Access Road to the penstocks. The road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the "Upper

Penstocks (Lower East) Access Road.” Figure 5 in Appendix A is a map of the Upper Penstocks (Lower East) Access Road.

Lower Penstocks

The lower portion of the Devil Canyon Powerplant Penstocks is accessed by DWR Operations staff from one road that originates at the northern end of the Devil Canyon Powerplant complex. The road has three segments. The first segment is 0.5 miles long, crosses the penstocks from west to east, is on State of California lands, and extends from a locked gate at the complex along the east side of the penstocks. The second segment is less than 0.1 miles long, is on State of California lands, and extends from the first segment to the penstocks. The third segment is 0.3 miles long, is on City of San Bernardino lands and State of California lands, and extends from the complex along the west side of the penstocks and connects with the first segment. The road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the “Lower Penstocks Access Road.” Figure 6 in Appendix A is a map of the Lower Penstocks Access Road.

2.1.1.4 Cedar Springs Dam and Cedar Springs Dam Spillway

The upper portion of Cedar Springs Dam is accessed by DWR Operations staff from one road, which also accesses the east side of the Cedar Springs Dam Spillway. The downstream face of the dam and west side of the spillway are accessed by different roads. Each of these roads is entirely on State of California lands and is described below.

Cedar Springs Dam and East Side of Cedar Springs Dam Spillway

From State Highway 173, DWR Operations staff turn onto a paved road at a locked gate maintained by DWR and located at the intersection with State Highway 173. The road beyond the locked gate has two segments. The first segment is approximately 0.9 miles long, and extends from a DWR locked gate off State Highway 173 to a DWR locked gate on Cedar Springs Dam Road on the other side of Cedar Springs Dam. The second segment is approximately 0.1 miles long and extends from the first road segment to the upstream end of the spillway.

Cedar Springs Dam Road is a general access road off State Highway 173 because it provides public access to a public parking area near the east side of the Cedar Springs Dam and is used by the NFS and NFS recreationists (OHV users) to access the Forest Road 2N33 and for other access purposes. In the past, DWR has used Cedar Springs Dam Road on rare occasions for heavy equipment deliveries to the east side of the dam since the road provides more clearance than the west side access. However, this was done for convenience and is not a necessity. The road between the locked gates is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the “Dam and Spillway Access Road.” Figure 7 in Appendix A is a map of the Dam and Spillway Access Road.

Downstream Face of Cedar Springs Dam

From the Dam and Spillway Access Road, DWR Operations staff turn onto a native surfaced road that provides access to the downstream face of Cedar Springs Dam. The road has two segments. The first segment is approximately 0.2 miles long, and extends along the foot of the dam from the Dam and Spillway Access Road to a locked gate. A portion of Segment 1 parallels the Pacific Crest Trail.¹ DWR maintains a chain-link fence with slats along the uphill side of the road to prohibit public access to the dam face. In addition, the fence limits the view of the dam face to Pacific Crest Trail hikers. The second segment extends from the locked gate to the downstream face of the dam (primarily accesses dam seepage monitors), is approximately 0.2 miles long, and has a native surface.

The road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the “Dam Downstream Face Access Road.” Figure 8 in Appendix A is a map of the Dam Downstream Face Access Road.

West Side of Cedar Springs Dam Spillway

DWR Operations staff exit State Highway 173 near the spillway, and turn onto an access road to the Mojave Power/Pumping Plant, a non-Project facility. The access road has two segments. The first segment begins approximately 0.4 miles from State Highway 173 along a road that provides access to the Mojave Power/Pumping Plant and is approximately 0.2 miles long, and extends to the western side of the spillway channel. The second segment is approximately 0.1 miles long and extends from the end of the first road segment down towards Silverwood Lake.

The road to the Mojave Power/Pumping Plant is a general access road because it provides access to both the Project and a non-Project facility. The access road is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the “Spillway Access Road.” Figure 9 in Appendix A is a map of the Spillway Access Road.

2.1.1.5 San Bernardino Tunnel Intake

From State Highway 138, DWR Operations staff turn onto a road that provides access to the Crestline-Lake Arrowhead Water Agency (CLAWA) Water Treatment Plant, and use Silverwood Lake SRA roads to reach a DWR-maintained gate that prohibits vehicular access to the San Bernardino Tunnel Intake. The road from the gate to the intake is on State of California lands and is approximately 0.1 miles long. In addition,

¹ On March 26, 1980, the State of California, acting through DWR, granted the United States, acting through the USFS, non-exclusive agreements for use of certain State of California-owned parcels in San Bernardino County to locate, construct, use, maintain, relocate and repair the Pacific Crest Trail. DWR reserved its right to use the area for its purposes.

from the CLAWA Water Treatment Plant Road DWR Operations Staff access a gated parking area for the San Bernardino Tunnel Access Shaft.

The road to the CLAWA Water Treatment Plant is a general access road because it is used by both CLAWA and DWR Operations staff. The gated parking area for the San Bernardino Tunnel Access Shaft is not a Primary Project Road; but just a parking area. The road from the gate to the intake is a Primary Project Road because it is maintained solely by DWR for Project purposes. This Primary Project Road is referred to in this Plan as the "Intake Access Road." Figure 10 in Appendix A is a map of the Intake Access Road.

2.1.2 Foot or Off-Highway Vehicle Access

DWR does not maintain any trails for foot or off-highway vehicle access to Project facilities, other than those related to recreation. Those trails are addressed in DWR's relicensing Recreation Plan.

2.2 LIST OF PRIMARY PROJECT ROADS AND TRAILS

The Project includes ten Primary Project Roads with 19 road segments, for a total distance of 7.6 miles. Three of the 19 segments (1.9 miles in total length) are entirely on NFS lands; one segment (0.5 miles) is on a combination of NFS lands (i.e., less than 100 feet of the 0.5 miles), City of San Bernardino, and State of California lands; six segments (2.8 miles) are on a combination of City of San Bernardino and State of California lands; and the remaining nine segments (2.4 miles) are entirely on State of California lands (Table 2.2-1.) None of the Primary Project Road segments are open to public vehicular traffic; all have locked vehicle gates.

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Table 2.2-1. Primary Project Roads and Trails

Designation in This Plan (Figure in Appendix A)	Segment Number	Begins	Ends	Road Travel Surface	Road Width (feet)	Gated or Otherwise Restricted to Public	Land Ownership	USFS Maintenance Level, If on NFS Lands	Length (mi)	Project Use	Typical Number of DWR Operations Staff Roundtrips
PRIMARY PROJECT ROADS											
Tunnel Portal Access Road (Figure 1)	1	Locked gate on Devils Canyon Road	Intersection of private and NFS lands	Paved	35	Yes	City of San Bernardino and State of California ¹	--	1.4	Access to San Bernardino Tunnel Outlet	1-2 round trips per day
	2	Intersection of private and NFS lands	San Bernardino Tunnel Outlet	Paved	35		NFS	4 ³	1.0		
Surge Chamber Access Road (Figure 2)	1	Tunnel Outlet Access Road	San Bernardino Tunnel Surge Chamber	Paved	30	Restricted by locked gate on Tunnel Outlet Access Road	NFS	4 ³	0.5	Access to San Bernardino Tunnel Surge Chamber	1-2 round trips per day
Upper Penstocks (West) Access Road (Figure 3)	1	San Bernardino Tunnel Outlet	Intersection of private and NFS lands	Native	20	Restricted by locked gate on Tunnel Outlet Access Road	NFS	2	0.4	Access to west side of Upper Portion of Devil Canyon Penstocks	1-2 round trips per day
	2	Intersection of private and NFS lands	Devil Canyon Powerplant Penstocks	Native	25		City of San Bernardino and State of California	--	0.3		
	3	Segment 2	Tunnel Outlet Access Road	Native	20		City of San Bernardino, NFS lands ² , State of California	2	0.5		
Upper Penstocks (Upper East) Access Road (Figure 4)	1	Tunnel Outlet Access Road	Devil Canyon Powerplant Penstocks	Native	15	Restricted by locked gate on Tunnel Outlet Access Road	City of San Bernardino and State of California	--	0.4	Access to east side of Upper Portion of Devil Canyon Powerplant Penstocks	1-2 round trips per day
	2	Segment 1	Devil Canyon Powerplant Penstocks	Native	15		City of San Bernardino and State of California	--	0.3		
Upper Penstocks (Lower East) Access Road (Figure 5)	1	Tunnel Outlet Access Road	Devil Canyon Powerplant Penstocks	Native	15	Restricted by locked gate on Tunnel Outlet Access Road	City of San Bernardino and State of California	--	0.1	Access to east side of Upper Portion of Devil Canyon Powerplant Penstocks	1-2 round trips per day

Table 2.2-1. Primary Project Roads and Trails (continued)

Designation in This Plan	Segment Number	Begins	Ends	Road Travel Surface	Road Width (feet)	Gated or Otherwise Restricted to Public	Land Ownership, and USFS Road Designation, If on NFS Lands	USFS Maintenance Level, If on NFS Lands	Length (mi)	Project Use	Typical Number of DWR Operations Staff Roundtrips
Lower Penstocks Access Road (Figure 6)	1	Locked gate at Devil Canyon Powerplant Complex	Devil Canyon Powerplant Penstocks	Paved	25	Restricted by locked gate in Devil Canyon Powerplant complex	State of California	--	0.5	Access to Lower Portion of Devil Canyon Powerplant Penstocks	1-2 round trips per day
	2	Segment 1	Devil Canyon Powerplant Penstocks	Paved	40		State of California	--	<0.1		
	3	Locked gate at Devil Canyon Powerplant Complex	Devil Canyon Powerplant Penstocks	Paved	25		City of San Bernardino and State of California	--	0.3		
Dam and Spillway Access Road (Figure 7)	1	Locked gate at State Highway 173	Locked gate at Cedar Springs Dam Road	Paved	25	Yes	State of California	--	0.9	Access to Cedar Springs Dam and east side of Cedar Springs Dam Spillway	1-2 round trips per day
	2	Segment 2	Silverwood Lake	Native	25			--	0.1		
Dam Downstream Face Access Road (Figure 8)	1	Dam and Spillway Access Road	Locked gate	Native	30	Restricted by locked gates on Dam and Spillway Access Roads	State of California	--	0.2	Access to downstream face of Cedar Springs Dam	1-2 round trips per day
	2	Locked gate	Locked gate	Native	30		State of California	--	0.2		
Spillway Access Road (Figure 9)	1	Mojave Power/Pumping Plant Road	Cedar Springs Dam Spillway	Paved	20	Restricted by locked gate off State Highway 173	State of California	--	0.2	Access to west side of Cedar Springs Dam Spillway	1-2 round trips per day
	2	Upper end of Spillway	Silverwood Lake	Native	15			--	0.1		
Intake Access Road (Figure 10)	1	Locked gate	San Bernardino Tunnel Intake	Paved	30	Restricted by locked gate	State of California	--	0.1	Access to San Bernardino Tunnel Intake	1-2 round trips per day
Total	10 Primary Project Roads; 19 Segments (3 Segments entirely on NFS Lands)						7.6 Total Miles (1.9 Miles on NFS Lands)				
PRIMARY PROJECT TRAILS											
None											

¹ State of California lands include any combination of DWR and CDPR lands.

² Less than 100 feet of the road segment is on NFS lands.

³ The road segment is generally a ML 2 road, but the SBNF considers it a ML 4 road because it is paved.

3.0 MAINTENANCE OF PRIMARY PROJECT ROADS AND TRAILS

3.1 PRIMARY PROJECT ROADS

As shown in Table 2.1-1, Primary Project Roads are located on a combination of City of San Bernardino, State of California and NFS lands. With regard to Primary Project Roads on NFS lands, DWR maintains these roads in compliance with prescribed USFS Maintenance Levels (ML). Refer to Table 3.1-1, below, for USFS descriptions of the applicable MLs for each Primary Project Road.

Table 3.1-1. USFS Maintenance Levels

Parameters	Maintenance Level				
	1	2	3	4	5
Service Life	Intermittent Service-Closed Status	Constant Service or Intermittent Service-Open Status (Some uses may be restricted under 36 CFR.§ 261.50)			
Traffic Type	Open for non-motorized uses; Closed to motorized traffic.	Administrative, permitted, dispersed recreation specialized, commercial haul	All National Forest Traffic – General Use, Commercial Haul		
Vehicle Type	Closed - N/A	High clearance, pick-up, 4x4, log trucks, etc.	All types - passenger cars to large commercial vehicles		
Traffic Volume	Closed - N/A	Traffic volume increases with maintenance level			
Typical Surface	All types	None; Native, or Aggregate – may be dust abated	Aggregate – usually dust abated; paved		
Travel Speed	Closed - N/A	Travel speed increases with maintenance level			
User Comfort and Convenience	Closed - N/A	Not a consideration	Low priority	Moderate priority	High priority
Functional Classification	All types	Local collector	Local collector arterial	Local collector arterial	Local collector arterial
Level of Service	Closed - N/A	J	G, H, I - Traffic service level increases with maintenance level		
Management Strategy	Prohibit or eliminate	Discourage or prohibit cars. Accept or discourage high clearance vehicles	Encourage, accept	Encourage	Encourage

Source: USFS (2005b)

Key:

N/A = Not applicable

J = Traffic flow is slow and may be blocked by management activities. Two-way traffic is difficult, backing may be required. Rough and irregular surface. Travel with low clearance vehicles is difficult. Single purpose facility.

G = Free flowing, mixed traffic; stable, smooth surface. Provides safe service to all traffic.

H = Congested during heavy traffic, slower speeds and periodic dust; accommodates any legal-size load or vehicle.

I = Interrupted traffic flow, limited passing facilities, may not accommodate some vehicles. Low design speeds. Unstable surface under certain traffic or weather.

With regard to Primary Project Roads on City of San Bernardino and State of California lands, DWR generally maintains these roads in compliance with current protocols. DWR's maintenance of Primary Project Roads, regardless of land ownership, as described below.

3.1.1 Short- and Long-Term Maintenance Program

In general, DWR's maintenance program has two components with regard to timing of Primary Project Road maintenance activities: short-term and long-term maintenance. Short-term Primary Project Road maintenance is defined as routine or periodic repairs, inspections, and maintenance activities conducted annually, periodically, or seasonally to address normal wear and tear during Primary Project Road use under typical annual weather conditions. Long-term maintenance is defined as repairs that are scheduled around specific events that impact the overall integrity of a given Primary Project Road, such as heavy-haul events or unusually heavy storm events; such events require repairs that are beyond the scope and budget of the short-term Primary Project Road maintenance procedures. Long-term Primary Project Road repairs are normally undertaken in addition to short-term Primary Project Road maintenance activities. Further details regarding components of the short- and long-term maintenance programs are described below.

3.1.1.1 Short-Term Maintenance of Primary Project Roads

Short-term maintenance of Primary Project Roads generally includes annual maintenance of the travel surface such as spot treatment of asphalt paving, blading dirt and aggregate surfaces, filling in pot holes, minor and major trimming of vegetation along the travel surface edge to maintain a line of sight for safety purposes and provide ample room for vehicle travel, and repairing/replacing signs and markers. Short-term maintenance may also include routine inspection and maintenance of Primary Project Road drainage features, such as periodically inspecting and clearing culverts and drainage ditches, rock fall cleanup, and landslide cleanup and repair, as needed, to mitigate erosion, stabilize hillslopes, and restore proper function of drainage features. In addition, work may include maintaining water bars for Primary Project Roads that are infrequently used, and maintaining gates. Primary Project Roads are normally inspected regularly throughout the year by DWR Operations staff as they travel the roads for operations of the Project, with increased attention paid to reporting/repairing Primary Project Road drainage and damage issues observed during periodic rainfall and runoff events.

Under short-term maintenance, repairs are typically completed as soon as possible after identification of a problem, often related to a periodic weather event. Depending upon the identified problem (e.g., plugged culvert and road obstruction), DWR usually prioritizes scheduling the needed repair with respect to safety and impacts and liabilities, and completes the needed repair as soon as possible. For other repairs, such as a damaged or missing sign, a replacement sign is usually ordered, which may take several weeks to receive, and is then installed.

DWR may also address hazard trees under short-term maintenance. For this Plan, a hazard tree is a tree along a Primary Project Road that is likely to fall under natural conditions within the foreseeable future and that will pose a risk to the Primary Project Road, members of the public using the Primary Project Road, or DWR Operations staff maintaining the Primary Project Road. Hazard trees may or may not be within the Project boundary. DWR typically handles hazard trees on a case-by-case basis and based on visual inspection by DWR Operations staff. Annually, and after a large event (e.g., fire or early/late snowfall or wind storm), Primary Project Roads are usually examined for hazard trees which may have been healthy but now represent a hazard. Specific measures for management of hazard trees are discussed in DWR's relicensing Integrated Vegetation Management Plan.

Short-term maintenance procedures may also include annual development of a list of priority sites for Primary Project Road-related repairs for the upcoming year. Depending upon the magnitude of cost to repair a given location on the list, the actual repair at that location may fall under short- or long-term maintenance. Short-term maintenance is budgeted annually by DWR.

3.1.1.2 Long-Term Maintenance of Primary Project Roads

In general, long-term maintenance of Primary Project Roads is geared towards major repairs that occur infrequently and is usually related to road damage caused by a heavy haul project, a major flood event that caused washouts, and other road-related damage at a scale that is beyond the scope of the short-term maintenance budget. Long-term maintenance may also occur at the end of a road's expected life, such as repaving the entire road. For heavy haul-type projects, the costs of major Primary Project Road repairs are typically included in the overall funding of the project. Long-term maintenance activities are normally completed in a timely manner where public safety or additional facilities/resource damage is a concern.

3.1.2 Primary Project Road Maintenance Measures

All traffic control devices (e.g., signs and road markings) on all Primary Project Roads, regardless of land ownership, are typically maintained according to the schedules outlined below in order to conform to the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices (MUTCD) (DOT 2012). Additionally, when signs are replaced or modified, they usually conform to the MUTCD and DWR's internally defined standards, as well as standards required by USFS if the sign occurs on a Primary Project Road on NFS lands. If DWR proposes a new Primary Project Road during the term of the new license, it will conform to current standards.

Road maintenance best management practices are used to guide the types of road treatments and the resource protection measures needed to mitigate the potential environmental impacts from road use. For Primary Project Roads on NFS lands, the designated USFS ML is usually used to identify the type, scope, frequency, and cost of road maintenance activities. DWR will maintain Segment 2 of the Tunnel Portal Access Road and the Surge Chamber Access Road (Table 2.1-1), which are on NFS lands, to

ML 2 standard, with the exception of the paved travelway, which will be managed to ML 4 standards. For Primary Project Roads not on NFS lands, the road surface type and ongoing level of use is usually used to define the road maintenance measures.

In general, Primary Project Roads on NFS lands have a paved or native surface designed for daily to weekly use by passenger trucks (Table 2.2-1). For Primary Project Roads with a paved surface travel way, road maintenance activities usually include: ditch grading and cleaning; culvert cleaning and repair; road drain cleaning and repair; road patching and re-surfacing; vegetation trimming along the travel surface edge to maintain a line of sight and provide ample room for vehicle travel; vehicle clearance for safety purposes; and erosion control and hillside stabilization to prevent landslides. For Primary Project Roads with a native surface travel way, road maintenance activities usually include: ditch grading and cleaning; culvert cleaning and repair; road drain cleaning and repair; road surface blading; minor and major vegetation trimming along the travel surface edge to maintain a line of sight and vehicle clearance for safety purposes and to provide ample room for vehicle travel; and erosion control and hillside stabilization to prevent landslides.

Normally, annual vegetation management along Primary Project Roads on NFS lands is performed by mastication, unless the SBNF explicitly agrees that DWR may use herbicides. Annual vegetation management along Primary Project Roads not on NFS lands is normally performed by mastication and herbicides applied by licensed herbicide applicators. Specific measures regarding vegetation management along Primary Project Roads are presented in DWR's relicensing Integrated Vegetation Management Plan.

Culvert replacements on Primary Project Roads on NFS lands are usually sized according to requirements in the SBNF Land Management Plan, as amended; other USFS directives; and in consultation with SBNF staff. Design of culvert replacements may vary based on location, but meet relevant guidelines for passage of wildlife and fish. Culvert replacements on Primary Project Roads not on NFS lands are usually designed to meet applicable standards.

3.1.3 Road Rehabilitation Measures

3.2 PRIMARY PROJECT TRAILS

DWR does not maintain any trails for foot or off-highway vehicle access to Project facilities, other than those related to recreation. Those trails are addressed in DWR's relicensing Recreation Plan.

4.0 CONSULTATION, REPORTING AND PLAN REVISIONS

4.1 CONSULTATION AND REPORTING

DWR will annually review with the SBNF activities related to Primary Project Roads and Trails on NFS lands completed in the previous calendar year, as well as any activities planned for Primary Project Roads and Trails on NFS lands for the current calendar year. In addition, DWR will consult with the SBNF, as needed, regarding Primary Project Roads, and Primary Project Trails on NFS lands if any Primary Project Roads or Trails are added to or removed from the Project.

4.2 PLAN REVISIONS

DWR, in consultation with the SBNF, will review, update and/or revise this Plan, as it pertains to Primary Project Roads and Trails on NFS lands. Any updates to the Plan will be prepared in coordination and consultation with the SBNF if the update pertains to non-recreation Primary Project Roads or Trails on NFS lands. Sixty days will be allowed for the SBNF to provide written comment and recommendations before DWR files the updated Plan with FERC for FERC's approval. DWR will include documentation of all relevant coordination and consultation associated with the updated Plan filed with FERC. If DWR does not adopt a particular recommendation by the SBNF, the filing will include DWR's reasons for not doing so. DWR will implement the Plan as approved by FERC. The Plan will not be considered revised until FERC issues its approval.

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5.0 REFERENCES CITED

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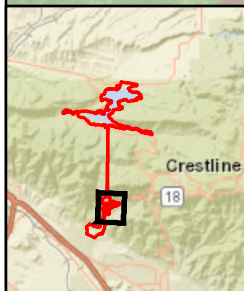
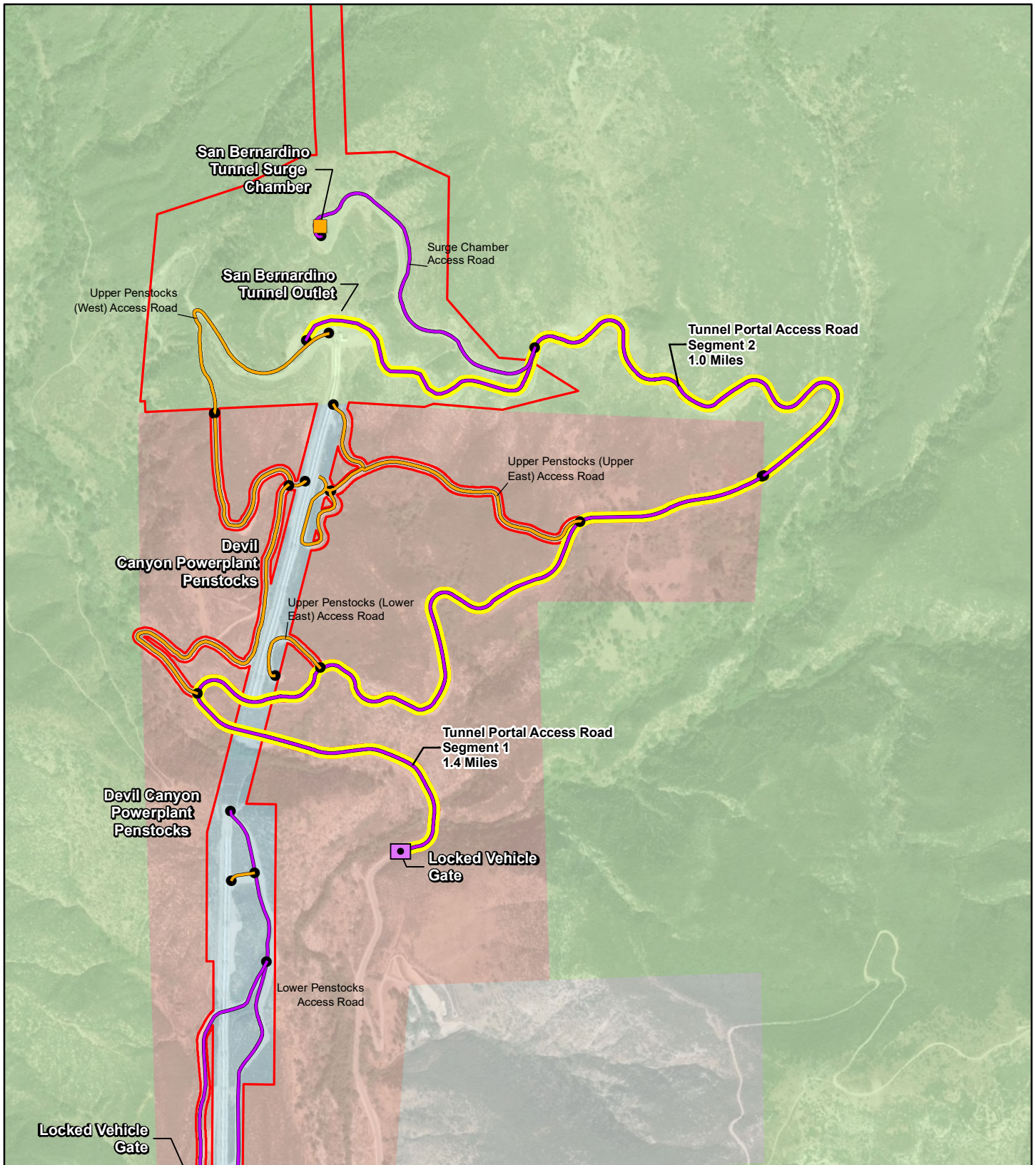
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Appendix A

Primary Project Roads

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Project Road Segment

- Proposed Project Boundary Devil Canyon

Surface

- Paved
- Native

Land Ownership

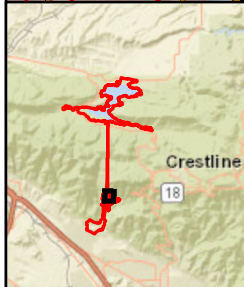
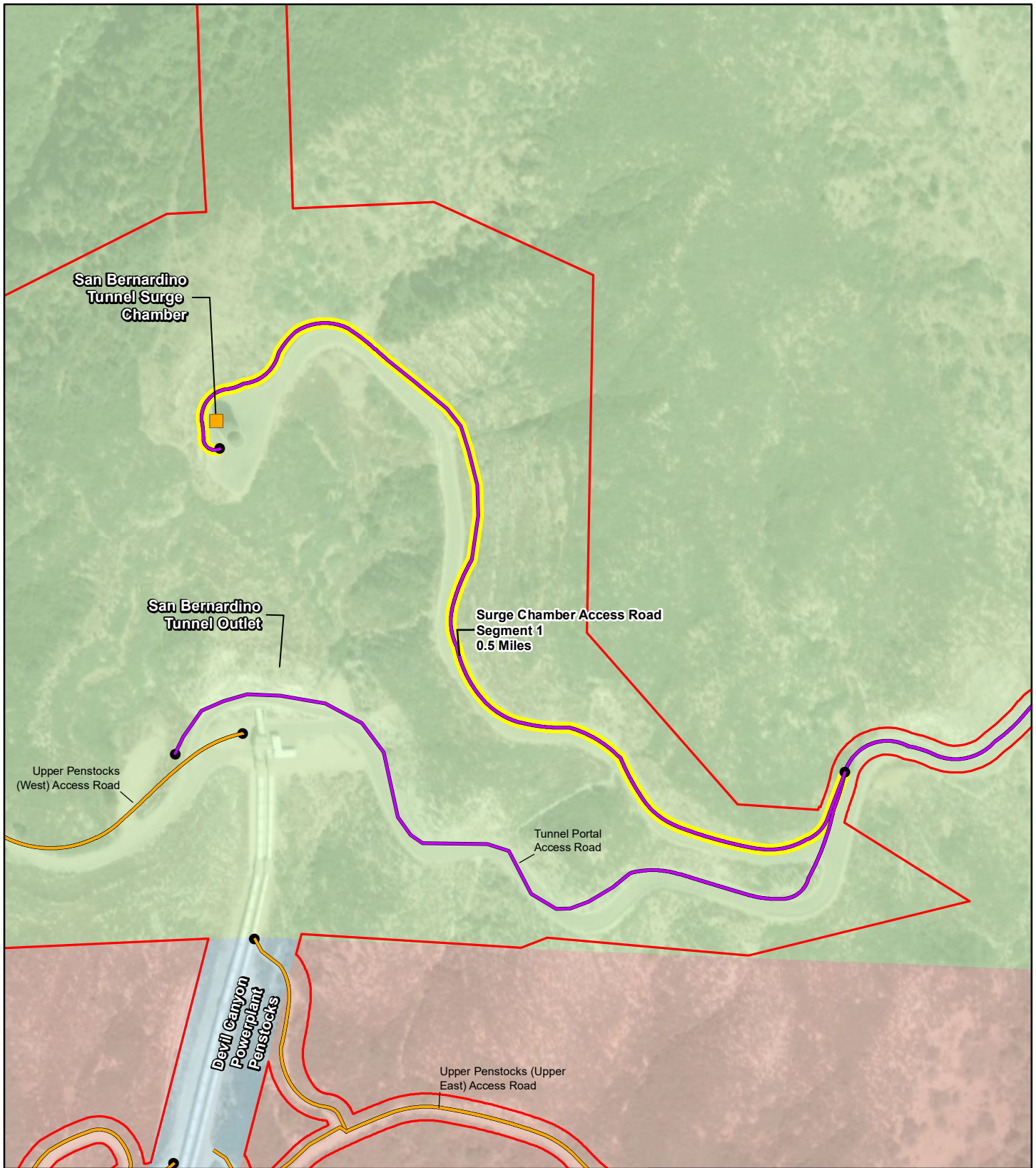
- City of San Bernardino
- US Forest Service
- State of California
- Private (or other)

Prepared: 9/6/2018
 Projection: CA StatePlane Zone 5, US FT
 Data and/or Background: Esri Imagery, CA DWR Roads.

0 Feet 680 1,360

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 1 OF 10

TUNNEL PORTAL ACCESS ROAD
 (Road Highlighted in Yellow)



Project Road Segment Surface

- Paved
- Native

Land Ownership

- Proposed Project Boundary Devil Canyon
- City of San Bernardino
- US Forest Service
- State of California

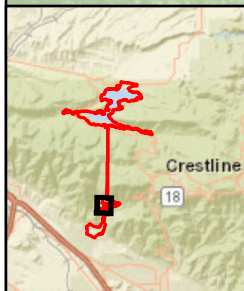
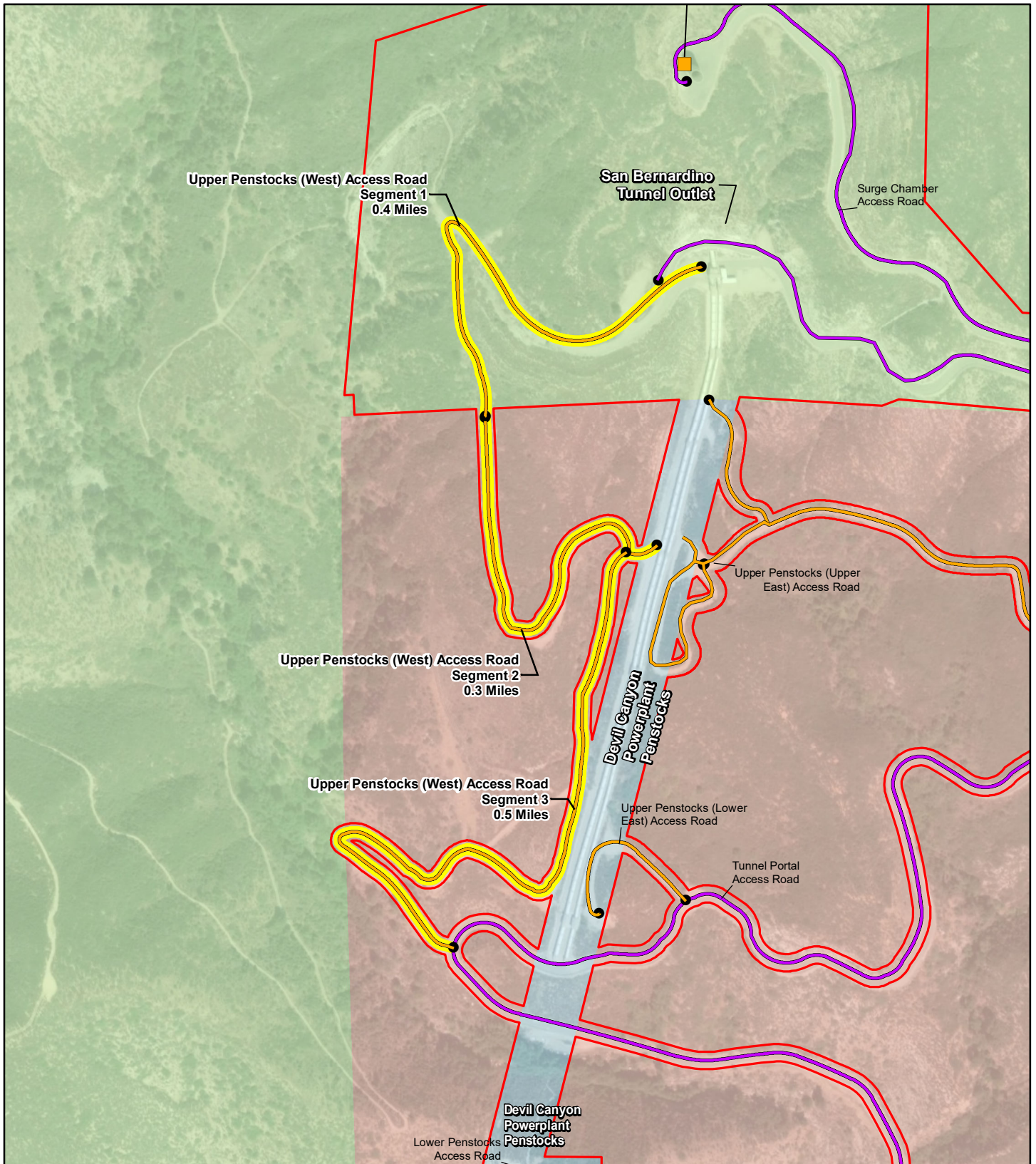
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0 240 480
 Feet

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 2 OF 10



SURGE CHAMBER ACCESS ROAD
 (Road Highlighted in Yellow)



Project Road Segment

- Proposed Project Boundary Devil Canyon

Surface

- Paved
- Native


Land Ownership

- City of San Bernardino
- US Forest Service
- State of California

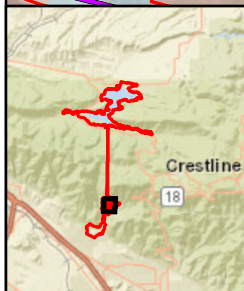
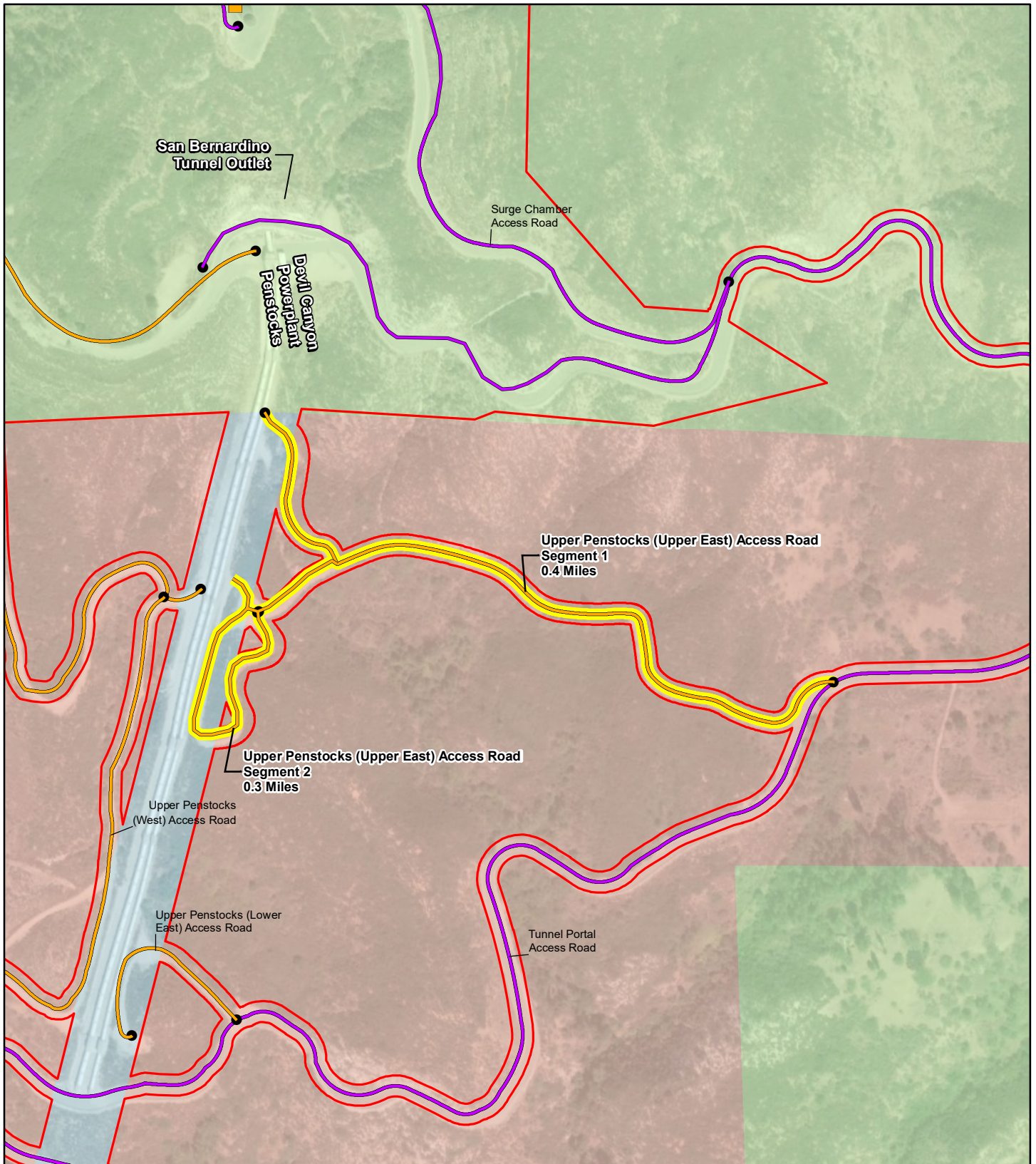
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Feet
 0 370 740

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 3 OF 10



**UPPER PENSTOCKS (WEST)
 ACCESS ROAD
 (Road Highlighted in Yellow)**



Project Road Segment Surface

- Paved
- Native

Land Ownership

- Proposed Project Boundary Devil Canyon
- City of San Bernardino
- US Forest Service
- State of California

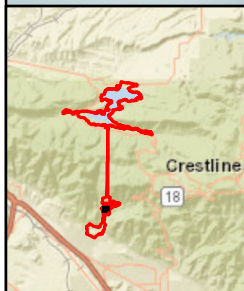
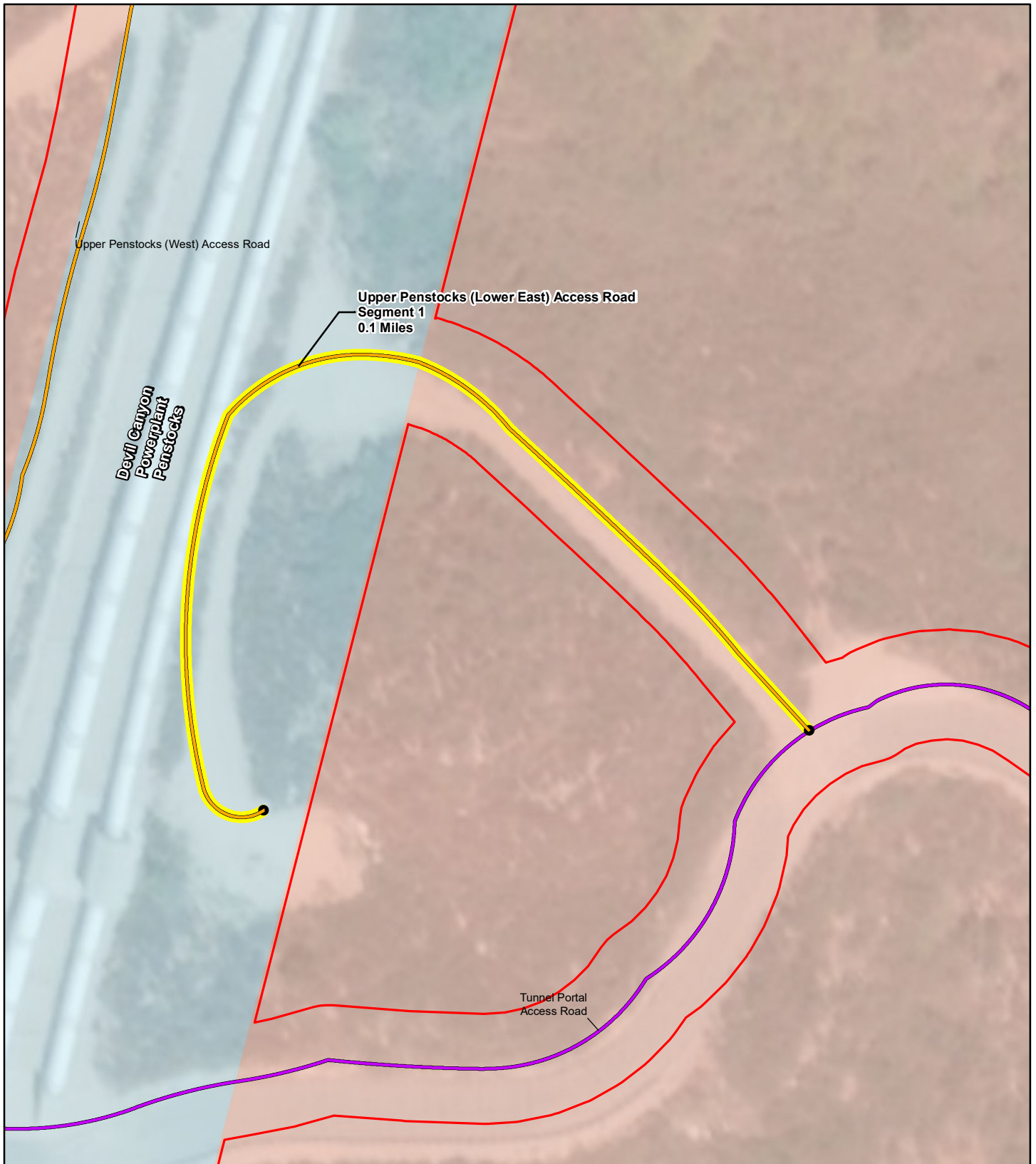
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0 300 600 Feet

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 4 OF 10

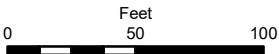


UPPER PENSTOCKS (UPPER EAST) ACCESS ROAD
 (Road Highlighted in Yellow)



- Project Road Segment**
- Proposed Project Boundary Devil Canyon
- Surface**
- Paved
 - Native
- Land Ownership**
- City of San Bernardino
 - State of California

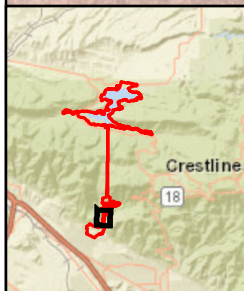
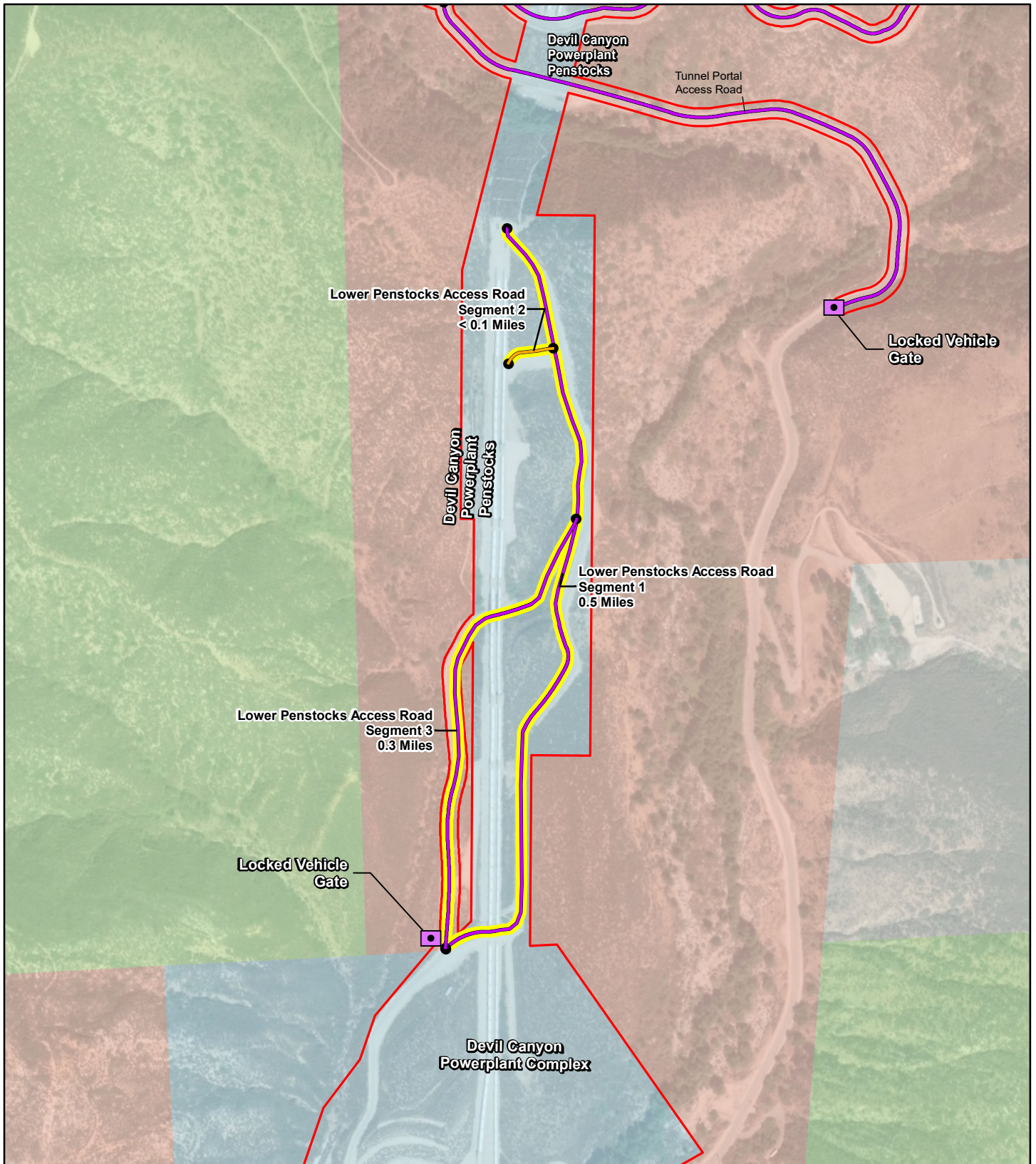
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DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 5 OF 10



UPPER PENSTOCKS (LOWER EAST) ACCESS ROAD
 (Road Highlighted in Yellow)



Project Road Segment

- Proposed Project Boundary Devil Canyon

Surface

- Paved
- Native

Land Ownership

- City of San Bernardino
- US Forest Service
- State of California
- Private (or other)

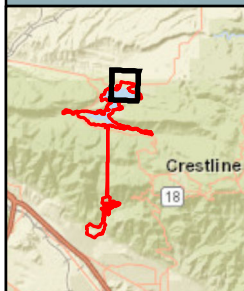
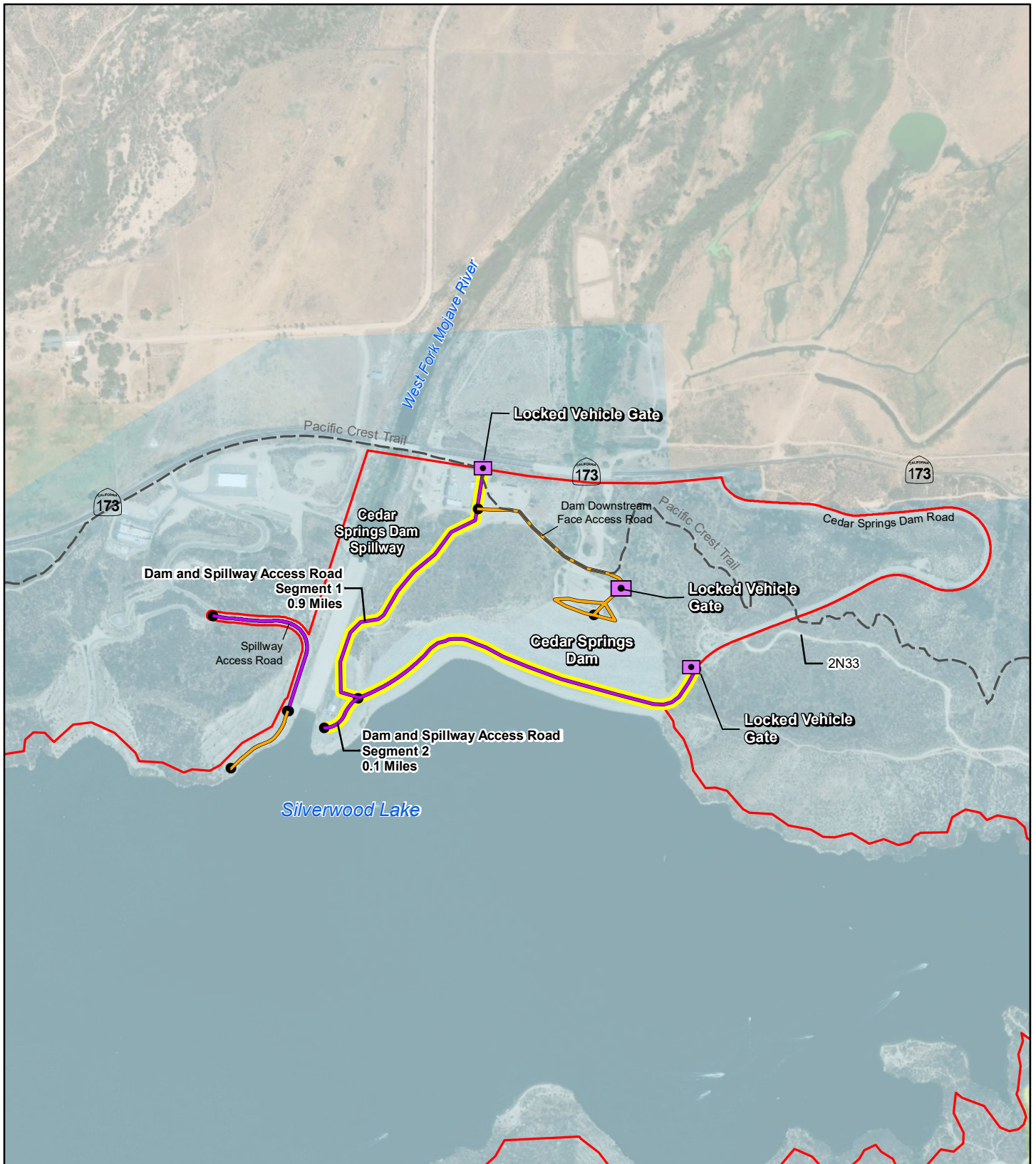
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0 Feet 360 720

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 6 OF 10



LOWER PENSTOCKS ACCESS ROAD
 (Road Highlighted in Yellow)




<p>— — — Pacific Crest Trail</p> <p>Project Road Segment</p> <p>Surface</p> <p>● — ● Paved</p> <p>● — ● Native</p>	<p>▭ Proposed Project Boundary Devil Canyon</p> <p>Land Ownership</p> <p>■ US Forest Service</p> <p>■ State of California</p> <p>■ Private (or other)</p>
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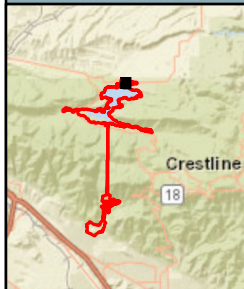
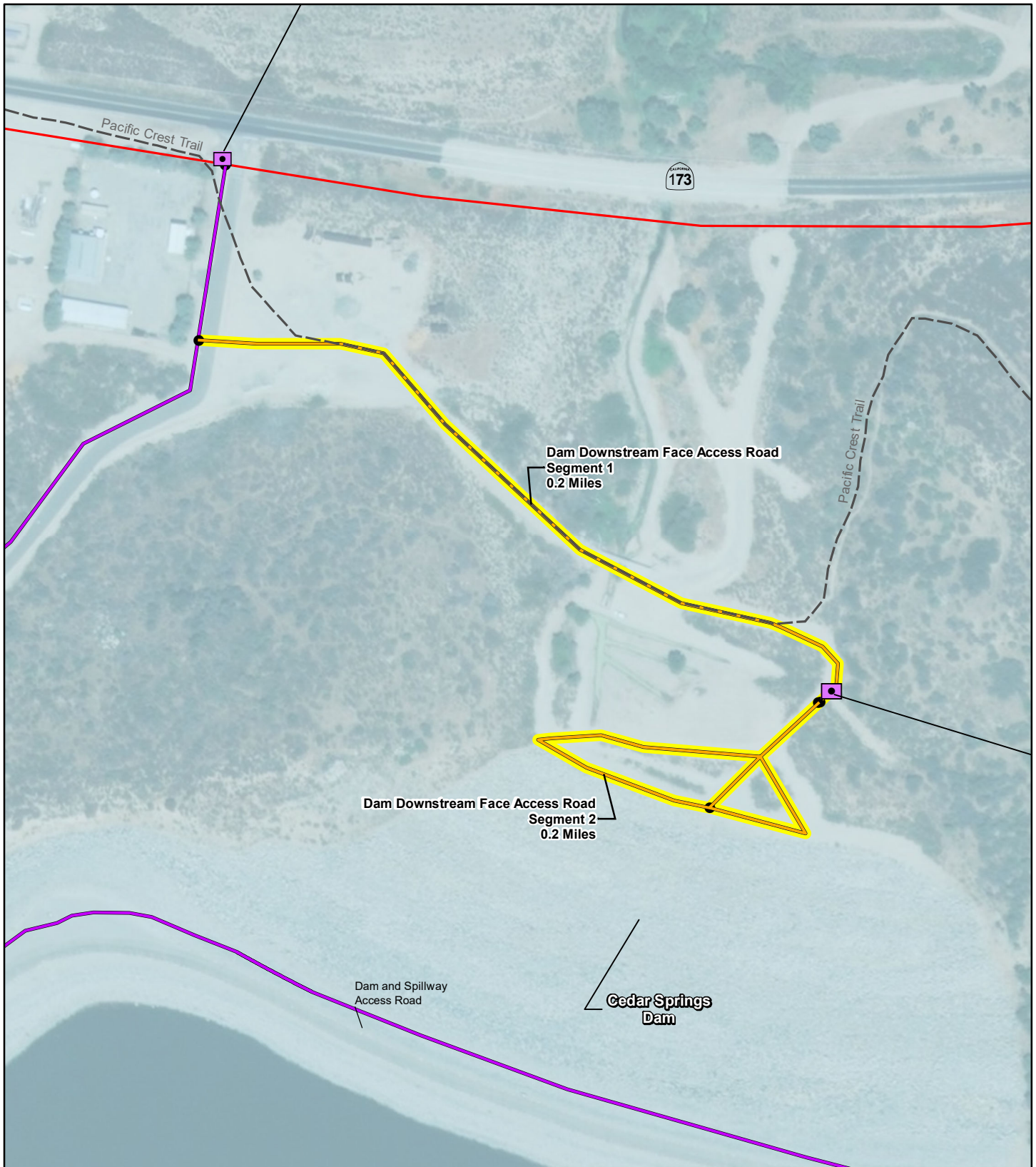
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0 Feet 1,400
 700

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 7 OF 10



DAM AND SPILLWAY ACCESS ROAD
 (Road Highlighted in Yellow)



- - - Pacific Crest Trail
Project Road Segment
Surface
 ●—● Paved
 ●—● Native
 ■ Proposed Project Boundary Devil Canyon
Land Ownership
 ■ State of California

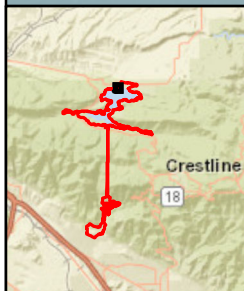
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Feet
 0 160 320

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 8 OF 10



**DAM DOWNSTREAM FACE
 ACCESS ROAD
 (Road Highlighted in Yellow)**



Project Road Segment

Surface

- Paved
- Native

Land Ownership

- Proposed Project Boundary Devil Canyon
- State of California

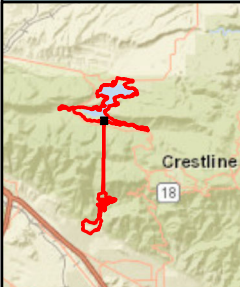
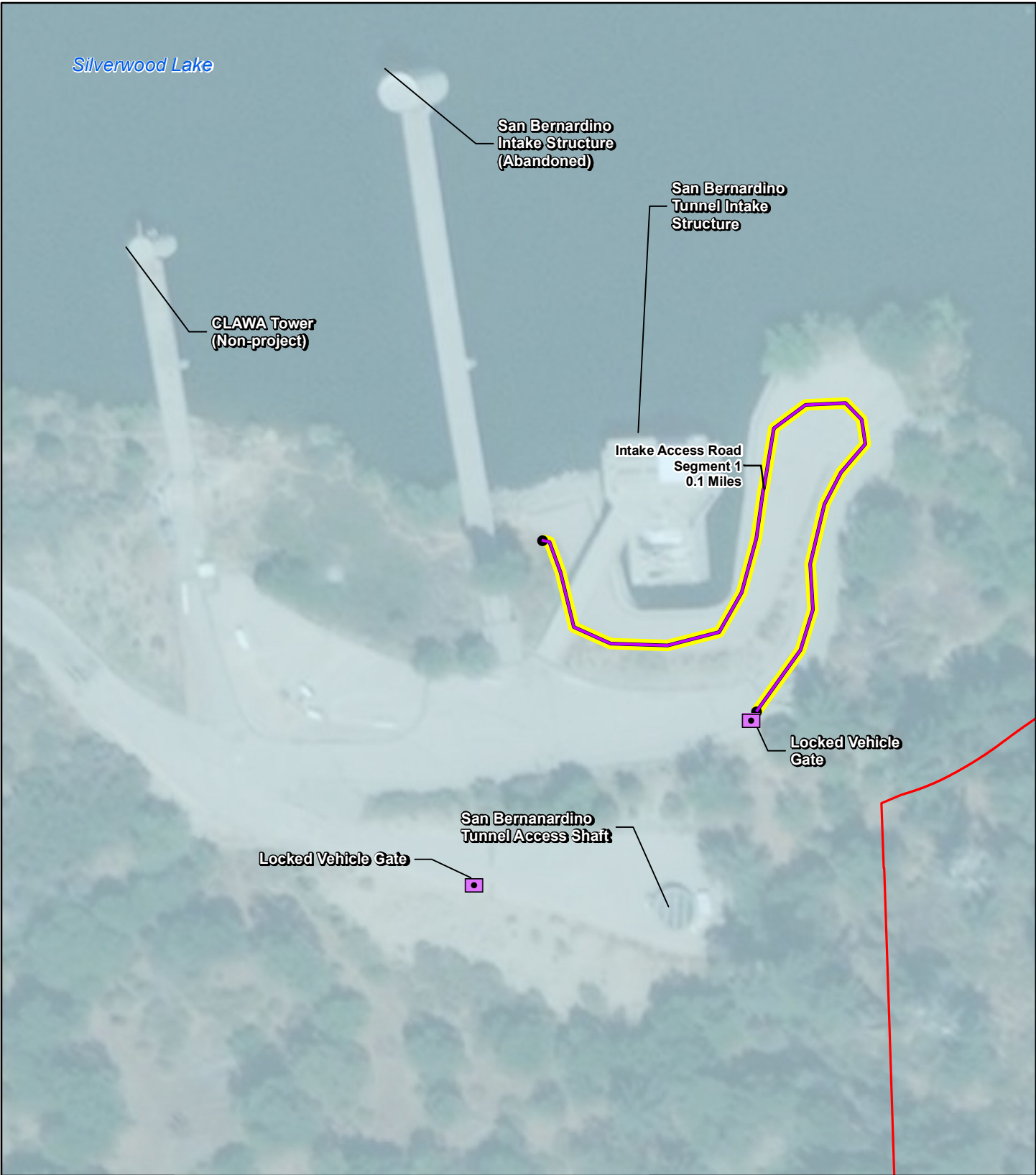
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0 Feet 280
 140

DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 9 OF 10

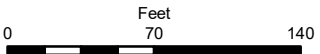


**SPILLWAY ACCESS ROAD
 (Road Highlighted in Yellow)**



- Project Road Segment**
- Proposed Project Boundary Devil Canyon
 - Paved
 - Native
- Land Ownership**
- State of California

Prepared: 9/6/2018
 Projection: CA StatePlane Zone 5, US FT
 Data and/or Background: Esri Imagery, CA DWR Roads.



DEVIL CANYON PROJECT RELICENSING
 TRANSPORTATION SYSTEM MANAGEMENT PLAN
 APPENDIX A - PRIMARY PROJECT ROADS
 FIGURE 10 OF 10



**INTAKE ACCESS ROAD
 (Road Highlighted in Yellow)**

Attachment 6

Fire Prevention and Response Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



FIRE PREVENTION AND RESPONSE PLAN

November 2018

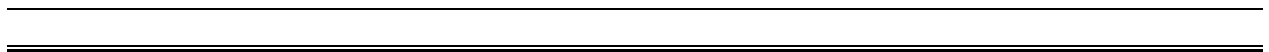


State of California
California Natural Resources Agency
DEPARTMENT OF WATER
RESOURCES
Hydropower License Planning and
Compliance Office

EDMUND G. BROWN JR.
Governor
State of California

JOHN LAIRD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Brief Description of the Project.....	1-1
1.2	Purpose of the Plan	1-5
1.3	Goals and Objectives of the Plan.....	1-5
1.4	Contents of the Fire Prevention and Response Plan	1-5
2.0	METHODS.....	2-1
2.1	Information/Data Collection and Research	2-1
2.1.1	Federal Agency Land Use and Resource Management Plans.....	2-1
2.1.2	Fire Management, Fire Prevention, Fire Response, and Fuel Management Plans	2-1
2.1.3	Agency Management Goals for Implementation of Fire Prevention and Response Actions	2-2
2.1.4	Cooperative Agreements, Regulations, and Codes	2-2
2.1.5	Emergency Communication Plans	2-2
3.0	FIRE PREVENTION AND PROTECTION ACTIONS	3-1
3.1	General Fire Prevention and Protection Action Summary.....	3-1
3.2	Specific Fire Prevention and Protection Requirements Applicable to Project-Related Operations & Maintenance.....	3-1
3.3	Project Operations Requiring the Use of Fire/Burning	3-2
3.4	Protection, Applicable Codes, and Code Compliance Actions.....	3-2
3.4.1	Applicable Codes	3-3
3.4.2	Project Area Code Compliance and Inspections.....	3-3
3.5	Fire Prevention Requirements for Project Area Tool and Equipment Use	3-3
3.6	Fire Hazard Zone Levels.....	3-3
3.7	Project Activity Level Planning Requirements for the Project Area	3-3
4.0	FIRE RESPONSE ACTIONS.....	4-1
4.1	Emergency Response Preparedness	4-1
4.2	Reporting Fires	4-1
4.3	Fire Control/Extinguishing Fires.....	4-1
4.4	Road Access.....	4-4
4.4.1	Directions to Project Facilities	4-4
4.4.1.1	Devil Canyon Powerplant	4-4
4.4.1.2	San Bernardino Tunnel Outlet	4-4
4.4.1.3	San Bernardino Tunnel Surge Chamber.....	4-4
4.4.1.4	Devil Canyon Powerplant Penstocks, Upper Portion	4-4
4.4.1.5	Devil Canyon Powerplant Penstocks, Lower Portion	4-5
4.4.1.6	Cedar Springs Dam and Spillway	4-5
4.4.1.7	Project Recreation Facilities at Silverwood Lake SRA	4-6
4.4.1.8	San Bernardino Tunnel Intake	4-6
4.4.2	Directions from the Project Facilities.....	4-6
4.4.2.1	Devil Canyon Powerplant	4-6
4.4.2.2	San Bernardino Tunnel Outlet	4-6

4.4.2.3	San Bernardino Tunnel Surge Chamber.....	4-6
4.4.2.4	Devil Canyon Powerplant Penstocks, Upper Portion	4-7
4.4.2.5	Devil Canyon Powerplant Penstocks, Lower Portion	4-7
4.4.2.6	Cedar Springs Dam and Spillway	4-7
4.4.2.7	Project Recreation Facilities at Silverwood Lake SRA	4-7
4.4.2.8	San Bernardino Tunnel Intake	4-8
4.5	Helicopter Landing ZONES within the Project Boundary	4-8
4.6	Fire Suppression Equipment and Personnel.....	4-8
4.7	Key Personnel Contact Directory.....	4-9
4.7.1	Emergency Contacts.....	4-9
4.7.1.1	USFS Emergency Contacts – San Bernardino National Forest	4-9
4.7.1.2	CAL FIRE / San Bernardino County Fire Department Emergency Contacts	4-9
4.7.2	Non-Emergency Contacts.....	4-10
4.7.2.1	USFS Non-Emergency Contacts – San Bernardino National Forest	4-10
4.7.2.2	CAL FIRE / San Bernardino County Fire Department Non-Emergency Contacts.....	4-10
4.7.2.3	State Parks Non-Emergency Contacts	4-11
4.7.2.4	DWR Non-Emergency Contacts – Devil Canyon Project	4-11
5.0	CONSULTATION, REPORTING, AND PLAN REVISIONS.....	5-1
5.1	Consultation and Reporting	5-1
5.2	Plan Revisions	5-1
6.0	REFERENCES CITED	6-1

LIST OF FIGURES

Figure 1.1-1.	Devil Canyon Project Vicinity	1-3
Figure 1.1-2.	Proposed Devil Canyon Project Boundary.....	1-4
Figure 3.6-1.	Land Ownership in the Vicinity of the Devil Canyon Project.....	3-5
Figure 3.6-2.	Fire Hazard Levels in the Vicinity of the Devil Canyon Project.....	3-6
Figure 4.3-1.	Firefighting Jurisdictions in the Devil Canyon Project Vicinity	4-3

APPENDICES

Appendix A	Fire Plan for Construction and Service Contracts
Appendix B	Agency Checklist and Instructions for Determining Project Activity Levels Variances

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

ACC	Area Control Center
Application for New License	DWR's Application for a New License for Major Project – Existing Dam for the Devil Canyon Project, FERC Project Number 14797
CAL FIRE	California Department of Forestry and Fire Protection
CPRC	California Public Resource Code
DOI	United States Department of Interior
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FSM	Forest Service Manual
NFS	National Forest System
O&M	operation and maintenance
PAL	project activity levels
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
Prevention	Activities directed at reducing the number of person-caused fires, including public education, law enforcement, dissemination of information, and the reduction of hazards
Project	Devil Canyon Project
Project boundary	The Project boundary is the area to which DWR requires access for normal Project operations and maintenance. The boundary is shown in Exhibit G of DWR's Application for New License
SBNF	San Bernardino National Forest
SRA	State Recreation Area
Suppression	All the work of extinguishing or containing a fire, beginning with its discovery

SWP	State Water Project
U.S.	United States
USDA	United States Department of Agriculture
USFS	United States Department of Agriculture, Forest Service
USFWS	United States Fish and Wildlife Service
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

1.0 INTRODUCTION

In XXXX 2018, the California Department of Water Resources (DWR), pursuant to Title 18 of the Code of Federal Regulations, Subchapter B (Regulation under the Federal Power Act [FPA]), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project).

DWR has included this Fire Prevention and Response Plan (Plan) in its XXXX 2018 Application for New License. This Plan addresses fire prevention procedures, reporting, and safe fire practices for DWR 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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities range in elevation from 3,378 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation, on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., the Pacific Crest Trail) traverse or are located in the Silverwood Lake SRA but are not Project facilities. The Project does not include any open water conduits or transmission lines. DWR operates the Project in a run-of-release mode using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities, and a slight modification to the existing Project boundary. The boundary change would result in a reduction of the area within the boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest System (NFS) lands managed by the U.S. Department of Agriculture (USDA), Forest Service (USFS), as part of the San

Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005), as subsequently amended (USFS 2006).

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures. PM&E measures are operation and maintenance (O&M) activities to: (1) protect resources against potential impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's Proposed Project boundary.

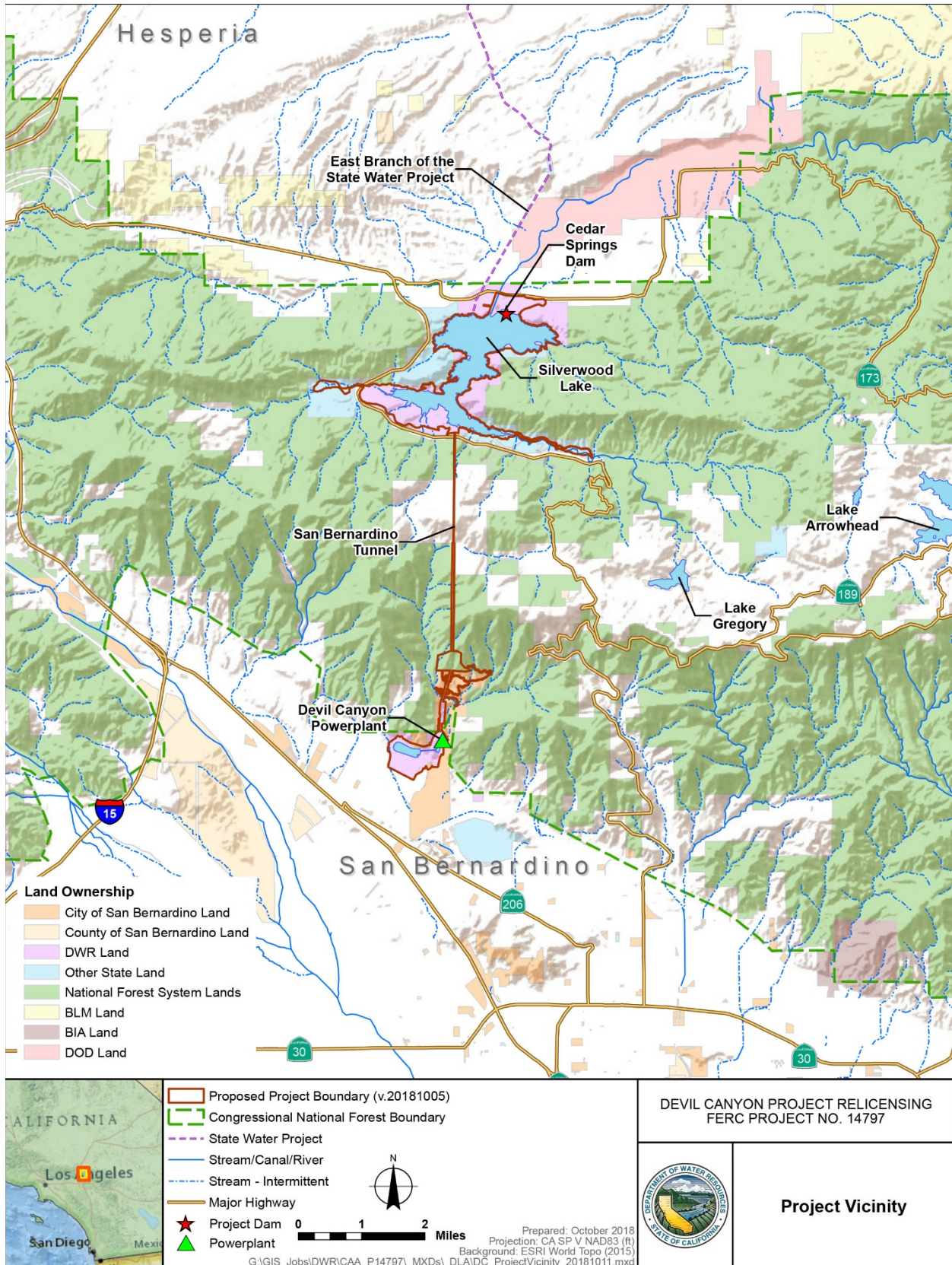


Figure 1.1-1. Devil Canyon Project Vicinity

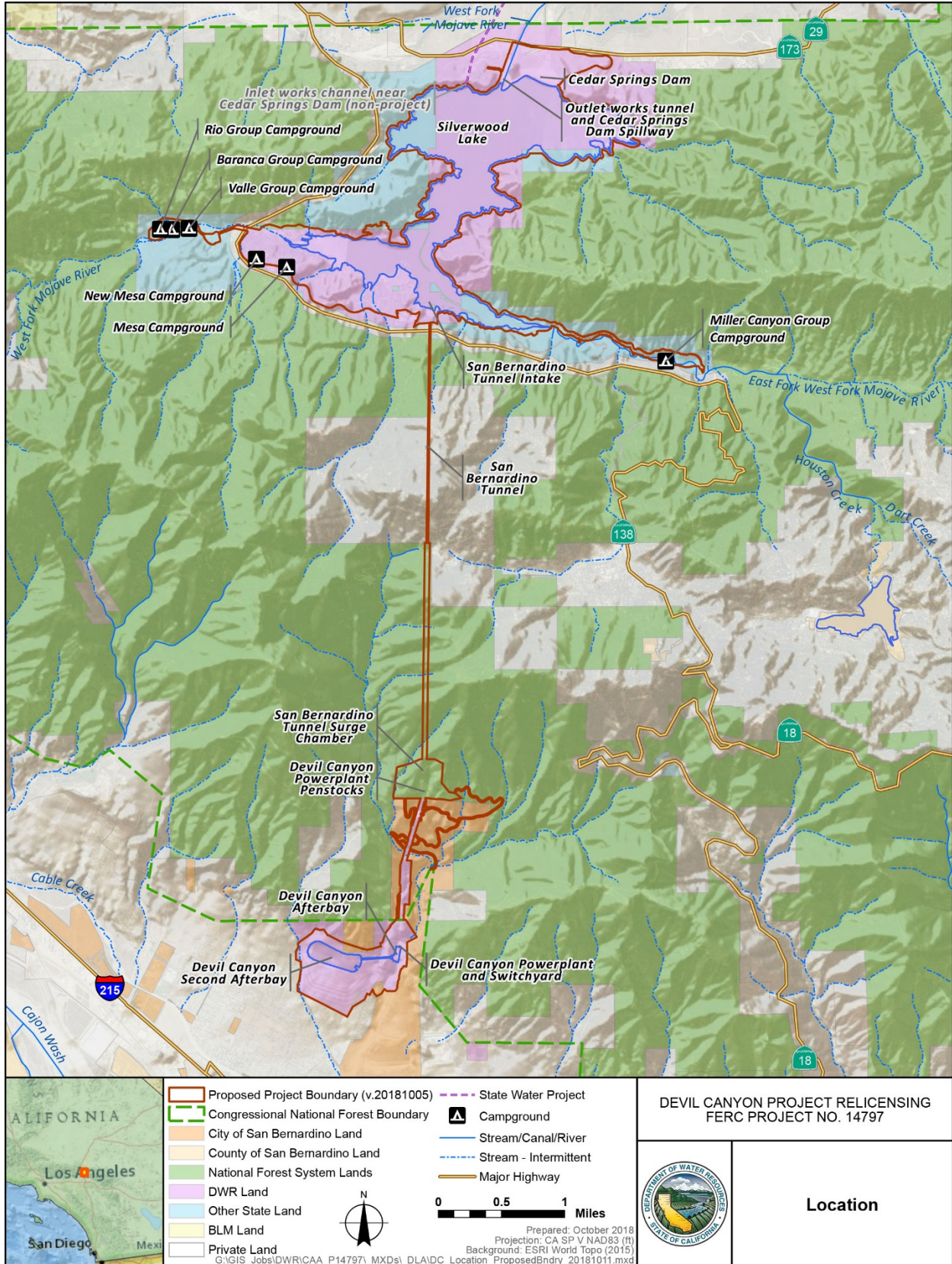


Figure 1.1-2. Proposed Devil Canyon Project Boundary

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 O&M of the Project.

To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

The goals of the Plan are to guide Project 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 purposes and 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 and goals of the Plan.
- Section 2.0. Methods. 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. Consultation, Reporting, and Plan Revisions. This section describes consultation between DWR and SBNF, reporting, 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 METHODS

A variety of methods and research were utilized in the development of 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 FERC Project boundary were reviewed to provide appropriate background and technical reference for the development of this Plan. Note that not all of the information sources listed below may be applicable to the Project and DWR.

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:

- SBNF Land Management Plan 2006 Revision Final Environmental Impact Statement, Record of Decision (USFS 2006)
- SBNF Land Management Plan, Part 2 (USFS 2005)
- SBNF Land Management Plan Monitoring and Evaluation Report: Fiscal Year 2016 (USFS 2017)

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:

- California Department of Forestry and Fire Protection (CAL FIRE) San Bernardino Unit Strategic Fire Plan for San Bernardino, Inyo and Mono Counties, 2017 (CAL FIRE 2017)
- USFS Fire Management Planning Guide, 2017 (USFS 2017)
- Forest Service Manual (FSM) 5100 – Forest Service Policies for Wildland Fire Management – Wildfire Prevention (USFS 2010)
- Forest Service Handbook 5109.18 – Forest Service Wildland Fire Prevention Handbook (USFS 2015)
- CAL FIRE, Strategic Fire Plan for California, 2012 (CAL FIRE 2012)
- San Bernardino County, Community Wildfire Protection Plan, Arrowhead Communities (San Bernardino County 2005a)

- San Bernardino County, Community Wildfire Protection Plan, Wrightwood Communities (San Bernardino County 2005b)
- California Interagency Mobilization Guide, 2018 (California Wildland Fire Coordinating Group 2018)
- Interagency Standards for Fire and Fire Aviation Operations, 2016 (U.S. Department of the Interior [DOI] and USDA 2016)
- The National Strategy, The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy, 2014 (Wildland Fire Leadership Council 2014)

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

The Interagency Standards for Fire and Fire Aviation Operations (DOI and USDA 2016) contains fire and fire aviation program management direction for federal land managers on federal lands at the following federal agencies: USFS; DOI; Bureau of Land Management; DOI, Fish and Wildlife Service (USFWS); and the DOI, National Park Service.

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 four 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 Proposed Project boundary were reviewed. These references include: California Public Resource Codes (CPRC) 4291-4293, 4421-4423, 4425, 4427-4428, 4430-4431, 4433, 4442, 4442.5, 4443, and 4446; California Health and Safety Codes 12101, 13000, 13001, and 13005; the FSM 5100; CAL FIRE Power Line Fire Prevention Field Guide (2008); the California Master Cooperative Wildland Fire Management and Stafford Act Response Agreement (2013-2018); and Current San Bernardino 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
- Federal Interagency Communications Center, 2018

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3.0 FIRE PREVENTION AND PROTECTION ACTIONS

3.1 GENERAL FIRE PREVENTION AND PROTECTION ACTION SUMMARY

DWR Project operators will adhere to the following codes, regulations, requirements, measures, and activities on NFS lands:

- All applicable laws of the CPRCs listed in Section 2.1.4 of this document
- The general fire prevention requirements applicable to Project-related operations, maintenance, equipment, tool use, and fire use activities
- SBNF's project activity levels (PAL) fire restrictions

DWR will contact DPR when proposed projects maintenance, or repair will be conducted on State Park Property and will coordinate proper fire contingency specifications with DPR.

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

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

- DWR will comply with all applicable laws of the State of California, CPRCs, and California Health and Safety Codes, in compliance with State Fire Marshal annual audits.
- DWR will secure special written permission from the SBNF's District Ranger (on NFS lands), District Fire Management Officer (on NFS lands), CAL FIRE battalion chief (on private lands only), or any of their officially designated representatives, before engaging in any of the activities listed below:
 - Blasting and storage of explosives and detonators (explosives permit required by California Health and Safety Code, Section 12101)
 - Burning, as authorized under the current operating plan
 - Welding, cutting, and grinding. DWR always follows Code of Safe Work Practices and established DWR Policies and Procedures for safe work, especially hot work.
- In the event of discovery of a fire within the FERC Project boundary, the Area Control Center (ACC) will notify USFS and/or CAL FIRE dispatch centers.
- In general, DWR will equip each work-related O&M vehicle on NFS lands with the following firefighting equipment at all times:

- 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 backpack water pump ready for use
- One five-pound or greater ABC fire extinguisher
- An axe and saw
- Radio for coordination with the DWR Control Center in the event of a fire on NFS lands.
- DWR normally provides to O&M work groups in the field a water trailer with one of the vehicles.
- Fire-fighting equipment will be accessible at the job site in the event of an emergency.
- National Fire Protection Association placards will be posted at locations with hazardous materials to alert emergency responders.

DWR will review the SBNF PAL website or call the dedicated phone line daily for NFS lands to determine the PAL. See Appendix A, Fire Plan for Construction and Service Contracts, for PAL requirements. If emergency repairs on NFS lands (i.e., those repairs necessary for public safety or to prevent damage to facilities) are necessary that require welding, grinding, or cutting, and DWR does not have a permit, DWR 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 SBNF by phone as soon as reasonably possible after responding to the emergency. In the event of an emergency, DWR staff onsite will contact DWR’s ACC and the ACC will then contact the responsible fire agency while staff onsite proceed with emergency repairs.

3.3 PROJECT OPERATIONS REQUIRING THE USE OF FIRE/BURNING

DWR will obtain permission from SBNF prior to burning on NFS lands.

3.4 PROTECTION, APPLICABLE CODES, AND CODE COMPLIANCE ACTIONS

DWR is responsible for complying with all applicable laws of the State of California, CPRCs, California Health and Safety Codes, and USFS codes.

DWR practices ongoing fire protection measures to comply with applicable codes and safeguard Project assets. For example, DWR creates a defensible space around all Project structures, including the powerplant 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

DWR will ensure that the Project is managed for compliance with applicable codes and orders, unless otherwise exempt.

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

3.4.2 Project Area Code Compliance and Inspections

Inspections of equipment utilized in maintaining the Project facilities and surrounding vegetation are the responsibility of DWR. Project compliance inspections will be completed at periodic intervals to comply with applicable State of California Codes and USFS regulations. The purpose of the inspections is to look for missing or damaged equipment that may be an ignition source and identify vegetation that does not comply with all applicable codes.

3.5 FIRE PREVENTION REQUIREMENTS FOR PROJECT AREA TOOL AND EQUIPMENT USE

DWR's Operations staff involved with any type of equipment/tool use within the Proposed 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. DWR will follow the applicable equipment use-specific restrictions detailed by PAL ratings, as identified in Appendix A.

3.6 FIRE HAZARD ZONE LEVELS

USFS and 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. Nearly all of the area within the Proposed Project boundary lies within the Very High fire hazard level, and within the Moderate fire hazard level along the perimeter of Silverwood Lake in the northern portion of the Project area. Figure 3.6-1 shows land ownership in the Project vicinity, and Figure 3.6-2 shows fire hazard levels as designated by the SBNF and CAL FIRE in the vicinity of the FERC Project boundary.

3.7 PROJECT ACTIVITY LEVEL PLANNING REQUIREMENTS FOR THE PROJECT AREA

The 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 DWR's Project O&M

that involves equipment/tool use within the Proposed Project boundary, DWR will monitor fire danger conditions and comply with the appropriate PAL fire prevention requirements. Project vicinity lands reside within SBNF PAL jurisdictions.

The SBNF may, in most cases, determine the following day's activity level on NFS lands by 4:00 PM each afternoon. DWR can obtain Project Area PAL fire and activity restrictions on NFS lands for the following day by calling 909-382-2997, or going to the SBNF website after 4:00 PM: <https://www.fs.usda.gov/detailfull/sbnf/alerts-notices/?cid=stelprdb5156627&width=full>. DWR will then comply with the prescribed requirements and restrictions for that day.

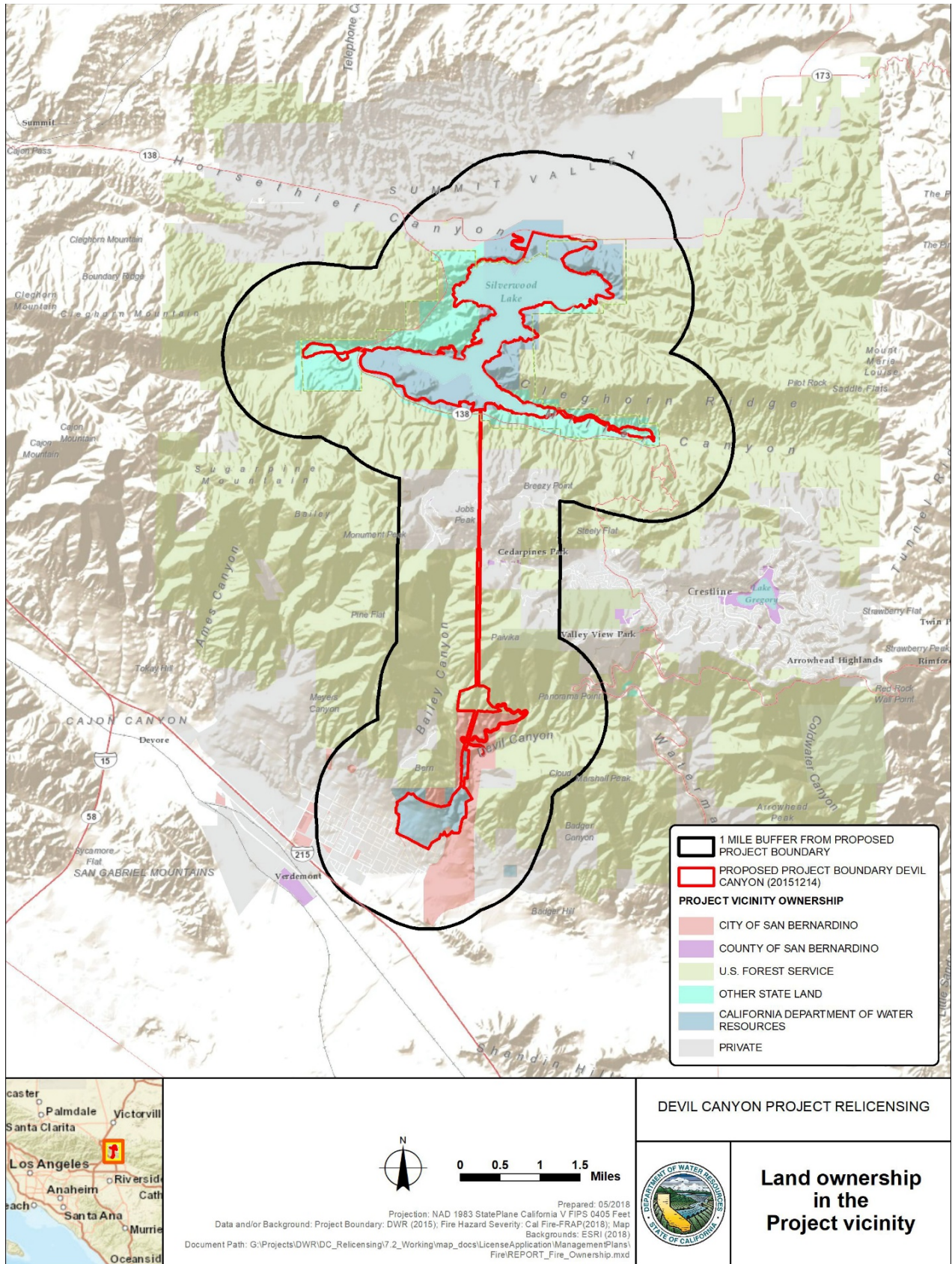


Figure 3.6-1. Land Ownership in the Vicinity of the Devil Canyon Project

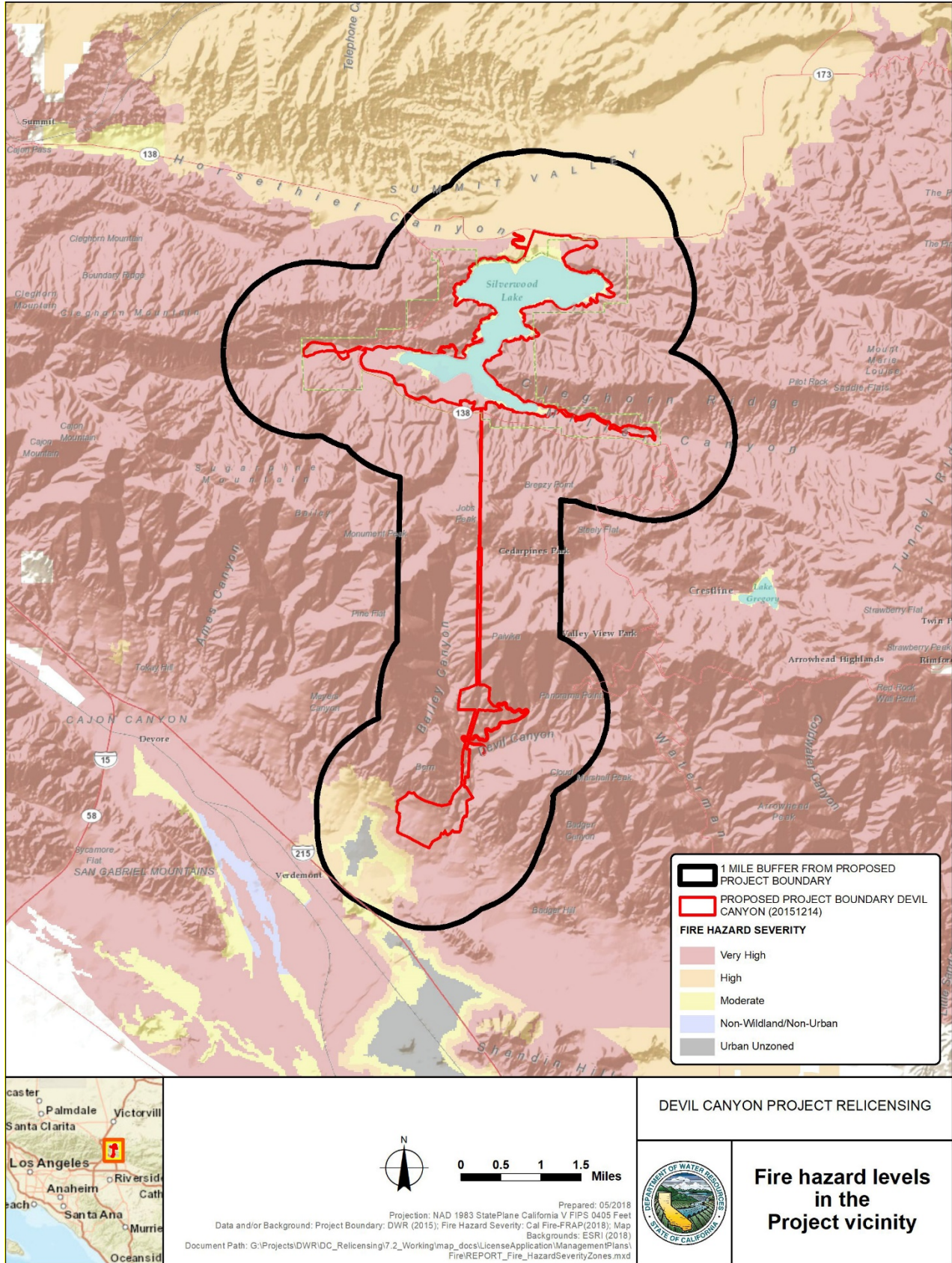


Figure 3.6-2. Fire Hazard Levels in the Vicinity of the Devil Canyon Project

4.0 FIRE RESPONSE ACTIONS

4.1 EMERGENCY RESPONSE PREPAREDNESS

Generally, DWR's Operation staff vehicles and contractor vehicles have axes, saws, shovels, and radios while in the field to facilitate DWR's emergency response preparedness and prevent or extinguish small fires. They may also have a water trailer with one of the vehicles.

4.2 REPORTING FIRES

DWR will report Project-related fires and any fire it detects within the Proposed Project boundary by calling 9-1-1.

When reporting a wildland fire, DWR personnel will provide incident information, which may include the following:

- Reporting party's name
- Radio number; office or cell phone call back number
- Fire estimated location:
 - 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 DWR's Operations 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 DWR's Operations staff are aware of any
- Additional resource needs, if DWR's Operations staff are aware of any

4.3 FIRE CONTROL/EXTINGUISHING FIRES

Fire suppression responsibility within the Proposed Project boundary is the responsibility of three agencies. Fire suppression in the Silverwood Lake SRA is

managed by CAL FIRE, suppression on NFS lands is the responsibility of the USFS, and suppression at the Devil Canyon Powerplant and associated facilities are within the jurisdiction of the San Bernardino County Fire Department (Figure 3.6-1). (State of California 2012.)

Each public agency within the Proposed 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 Proposed Project boundary, DWR would call 9-1-1, which would contact the appropriate jurisdiction. On NFS lands, the SBNF Communication Center is the central location for coordinating USFS resources. On private lands, CAL FIRE's San Bernardino Unit Emergency Command Center is the central location for coordinating resources.

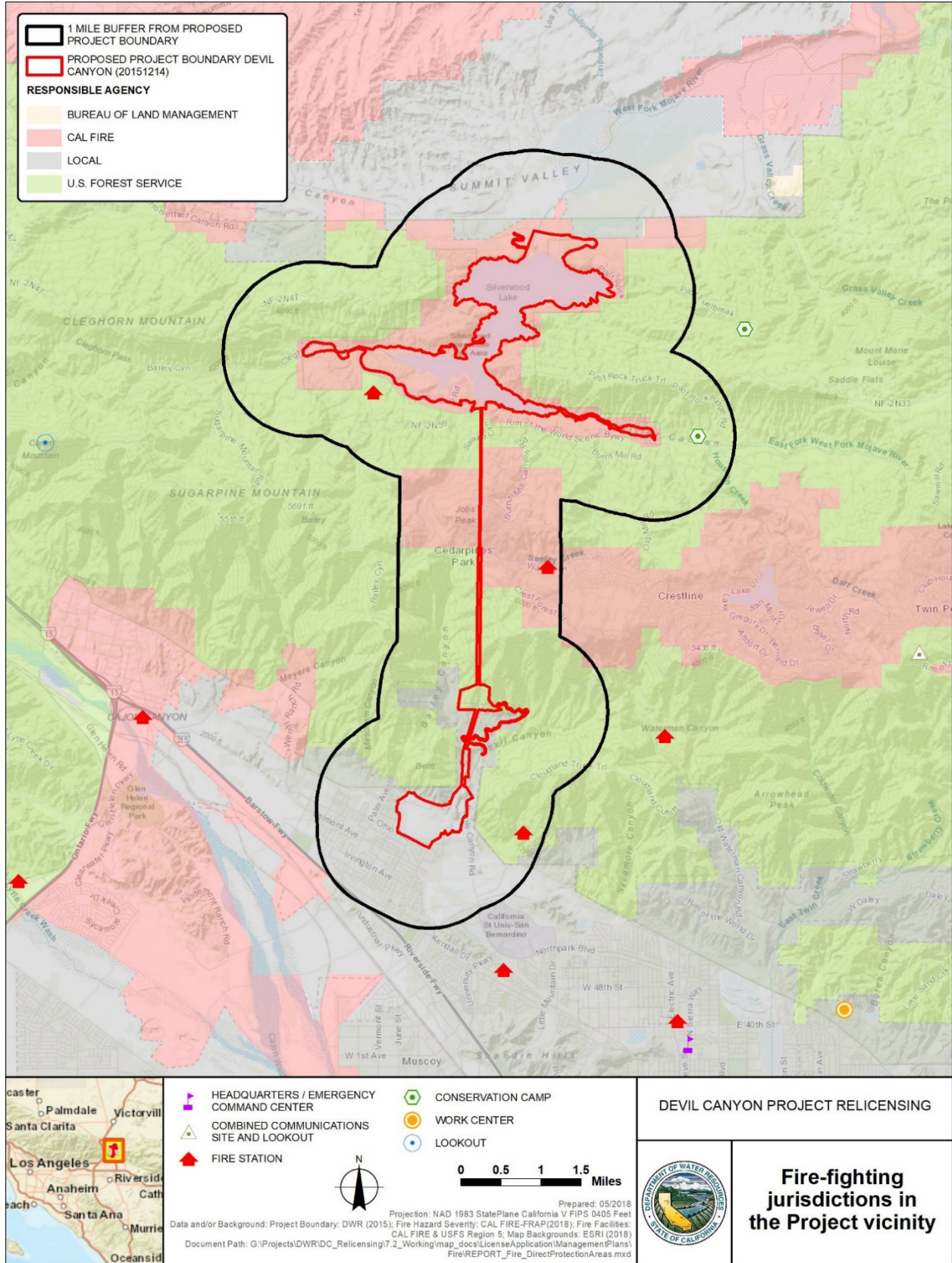


Figure 4.3-1. Firefighting Jurisdictions in the Devil Canyon Project Vicinity

4.4 ROAD ACCESS

Portions of the Proposed Project boundary are normally accessible by fire suppression crews through federal, State, City of San Bernardino, and NFS roads, and by DWR's Primary Project access roads, though DWR cannot ensure access by fire suppression crews to these areas under all conditions. A description of potential access routes is provided below.

4.4.1 Directions to Project Facilities

4.4.1.1 Devil Canyon Powerplant

Take Interstate Highway 215 to the University Parkway exit then proceed north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road to the Devil Canyon Powerplant complex, a fenced and gated area at 6900 Devils Canyon Road in San Bernardino, California. The complex is closed to the public at the entrance gate.

The routes to access each Project facility is described below. Road lengths provided below are rounded to the nearest tenth of a mile and based on Google Maps road and routing data.

4.4.1.2 San Bernardino Tunnel Outlet

Take Interstate Highway 215 to the University Parkway exit and head north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road past the Devil Canyon Powerplant complex at 6900 Devils Canyon Road, 0.9 miles to the locked gate. Beyond the locked gate, the road is named Tunnel Outlet Access Road. Continue beyond the gate for 2.1 miles to the fork/junction. Take the left fork option and travel 0.3 miles to the San Bernardino Tunnel Outlet, where the tunnel transitions to above ground penstocks.

4.4.1.3 San Bernardino Tunnel Surge Chamber

Take Interstate Highway 215 to the University Parkway exit and head north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road past the Devil Canyon Powerplant complex at 6900 Devils Canyon Road, 0.9 miles to the locked gate. Beyond the locked gate, the road is named Tunnel Outlet Access Road. Continue beyond the gate for 2.1 miles to the fork/junction. Take the right fork option and then drive another 0.4 miles along the Surge Chamber Access road to the Surge Chamber.

4.4.1.4 Devil Canyon Powerplant Penstocks, Upper Portion

The upper portion of the penstocks can be accessed at several locations along the alignment of the penstocks. This description provides directions to the uphill and downhill ends of the penstocks.

Take Interstate Highway 215 to the University Parkway exit and head north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road past the Devil Canyon Powerplant complex at 6900 Devils Canyon Road, 0.9 miles to the locked gate. Beyond the locked gate, the road is named Tunnel Outlet Access Road. Continue beyond the gate for 0.5 miles to the downhill end of the upper penstocks. To access the uphill end of the upper penstocks, continue another 1.6 miles up Tunnel Outlet Access Road to a fork/junction of the Tunnel Outlet Access Road. Take the left fork option and travel 0.3 miles to the uphill end of the upper penstocks.

4.4.1.5 Devil Canyon Powerplant Penstocks, Lower Portion

The lower portion of the penstocks can be accessed at several locations along the alignment of the penstocks. This description provides directions to the uphill and downhill ends of the penstocks.

To access the downhill end of the lower penstocks, take Interstate Highway 215 to the University Parkway exit and head north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road to the Devil Canyon Powerplant complex, a fenced and gated area at 6900 Devils Canyon Road in San Bernardino, California. The complex is closed to the public at the entrance gate. Once inside the complex, proceed west 300 feet on Memory Lane, then turn right following the access road along the east shore of the afterbay, past the powerhouse, uphill and north of the powerhouse.

To access the uphill end of the lower penstocks, take Interstate Highway 215 to the University Parkway exit and head north. From University Parkway, turn left onto Northpark Boulevard West, which becomes Devils Canyon Road. Continue on Devils Canyon Road to the Devil Canyon Powerplant complex, a fenced and gated area at 6900 Devils Canyon Road in San Bernardino, California. The complex is closed to the public at the entrance gate. Once inside the complex, proceed west 0.1 miles on Memory Lane, then turn left and proceed south 0.2 miles to the fork in the road. Take the right fork and follow this road completely around (clockwise) the lower afterbay and proceed up the hill alongside the penstocks for 2.4 miles, making sure to take the right fork at 1.8 miles, to the uphill end of the lower penstocks. Taking the right fork at 1.8 miles eliminates the need to use a penstocks undercrossing that might present clearance issues with larger vehicles.

4.4.1.6 Cedar Springs Dam and Spillway

Cedar Springs Dam and Spillway are located immediately adjacent to State Highway 173. To access the facilities, from the Highway 173 bridge over the Cedar Springs Spillway, proceed 0.1 miles east to the gated entry to the dam facility on the south side of the highway. Continue 0.3 miles uphill on the paved access road from the highway to the crest of the dam and the top of the dam spillway. Access extends across the crest of the dam to a locked gate on the east end of the dam. Beyond this locked gate is public

access to the Pilot Rock off highway vehicle parking area via Forest Service Road 2N33, which extends 0.8 miles back down to Highway 173.

4.4.1.7 Project Recreation Facilities at Silverwood Lake SRA

From the Highway 173 bridge over the Cedar Springs Spillway, proceed 2 miles west to the junction with State Highway 138. Turn left onto Highway 138 (east) and proceed 2.6 miles to the Cleghorn Road exit. Turn left and proceed under the highway onto Sawpit Canyon Road. Continue 0.5 miles to the Silverwood Lake SRA entrance station at 14000 Sawpit Canyon Road.

4.4.1.8 San Bernardino Tunnel Intake

From the Highway 173 bridge over the Cedar Springs Spillway, proceed 2 miles west to the junction with State Highway 138. Turn left onto Highway 138 (east) and proceed 2.6 miles to the Cleghorn Road exit. Turn left and proceed under the highway onto Sawpit Canyon Road. Continue 0.5 miles to the Silverwood Lake SRA entrance station at 14000 Sawpit Canyon Road. From the entrance station, continue on Sawpit Canyon road 1.2 miles to Lake Boat Launch Road. Turn right and continue 0.1 miles to the right turn leading up to the water treatment plant (restricted access at gate). Continue 0.2 miles on the access road toward the south shore of Silverwood Lake to the San Bernardino Tunnel Intake.

4.4.2 Directions from the Project Facilities

4.4.2.1 Devil Canyon Powerplant

Follow the road south along the east side of the afterbay to Memory Lane. Turn left onto Memory Lane and proceed through the facility security gate to Devils Canyon Road. Turn right and continue on Devils Canyon Road 1.5 miles into the urban area adjacent to California State University San Bernardino.

4.4.2.2 San Bernardino Tunnel Outlet

Depart the San Bernardino Tunnel Outlet and proceed 0.3 miles to the three-way intersection. Bear right and proceed down Tunnel Outlet Access Road 2.1 miles to the gate/start of Devils Canyon Road. Continue on Devils Canyon Road 2.4 miles into the urban area adjacent to California State University San Bernardino.

4.4.2.3 San Bernardino Tunnel Surge Chamber

Depart the San Bernardino Tunnel Surge Chamber and proceed 0.4 miles to the three-way intersection. Bear left and proceed down Tunnel Outlet Access Road 2.1 miles to gate and start of Devils Canyon Road. Continue on Devils Canyon Road 2.4 miles into the urban area adjacent to California State University San Bernardino.

4.4.2.4 Devil Canyon Powerplant Penstocks, Upper Portion

Directions from each end of the Upper Portion of the Penstocks are described below.

For the uphill end, depart the upper portion of the San Bernardino Tunnel Outlet and proceed 0.3 miles to the three-way intersection. Bear right and proceed down Tunnel Outlet Access Road 2.1 miles to the gate and start of Devils Canyon Road. Continue on Devils Canyon Road 2.4 miles into the urban area adjacent to California State University San Bernardino.

For the downhill end, proceed down Tunnel Outlet Access Road 0.5 miles to the gate and start of Devils Canyon Road. Continue on Devils Canyon Road 2.4 miles into the urban area adjacent to California State University San Bernardino.

4.4.2.5 Devil Canyon Powerplant Penstocks, Lower Portion

Directions from each end of the Lower Portion of the penstocks are described below.

Depart the downhill end of the lower portion of the penstocks by following the road south along the east side of the afterbay to Memory Lane. Turn left onto Memory Lane and proceed through the facility security gate to Devils Canyon Road. Turn right and continue south on Devils Canyon Road 1.5 miles into the urban area adjacent to California State University San Bernardino.

Depart the uphill end of the lower portion of the penstocks by following the road 2.4 miles south alongside the penstocks (crossing over the top of the penstocks) then looping around the lower afterbay counterclockwise to the intersection with Memory Lane. Turn left (north) onto Memory Lane and continue for 0.3 miles to the locked gate at the intersection with Devils Canyon Road. Continue south on Devils Canyon Road 1.5 miles into the urban area adjacent to California State University San Bernardino.

4.4.2.6 Cedar Springs Dam and Spillway

Cedar Springs Dam and Spillway are located immediately adjacent to State Highway 173. To depart the facilities, proceed 0.3 miles north/downhill to the gated entry to the dam facility on the south side of Highway 173. Alternately, depart the east side of the dam crest and proceed to the locked gate at Forest Service Road 2N33. Continue down 2N33 for 0.8 miles to Hwy 173.

4.4.2.7 Project Recreation Facilities at Silverwood Lake SRA

Proceed north 0.5 miles from the Silverwood Lake SRA entrance station to the onramp for Highway 138 at Cleghorn Road. To get to Highway 173, continue 2.6 miles west/north on Highway 138.

4.4.2.8 San Bernardino Tunnel Intake

Proceed 0.2 miles west on the access road towards the water treatment plant. Continue through the gate on the north side of the plant to Lake Boat Launch Road. Follow Lake Boat Launch Road 0.1 miles to Sawpit Canyon Road. Turn left onto Sawpit Canyon Road and continue 1.2 miles to the Silverwood Lake SRA entrance station. Then proceed north 0.5 miles from the Silverwood Lake SRA entrance station to the onramp for Highway 138 at Cleghorn Road. To get to Highway 173, continue 2.6 miles west/north on Highway 138.

4.5 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 no dedicated helicopter landing zones within the Proposed Project boundary or within the Project vicinity; however, three helibases are located within 30 miles of the Project: (1) the SBNF's Heaps Peak Heliport, located approximately 11 miles east of the Project; and (2) the CAL FIRE San Bernardino Unit's Prado Helitack, located approximately 27 miles southwest of the Project; and (3) the BLM's Apple Valley Helibase, located approximately 28 miles north-northeast of the Project.

4.6 FIRE SUPPRESSION EQUIPMENT AND PERSONNEL

DWR does not own fire suppression equipment suitable for combating wildland fires (e.g., fire trucks and helicopters). Fire suppression equipment owned by DWR within the Proposed Project boundary primarily consists of fire extinguishers located at Project buildings and in employee vehicles. Other fire suppression equipment owned by DWR is located at various Project facilities and consists of permanently installed carbon dioxide systems within the powerplant and a water trailer, as mentioned in Appendix A, backpack water tanks, shovels, picks and axes. This portable equipment is deployed along with DWR 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.

DWR has personnel available to provide technical information and support for USFS and CAL FIRE fire operations in and adjacent to the Project. DWR 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, DWR Operations staff and contractors are not trained or required to fight fires.

CAL FIRE's San Bernardino Unit includes the following resources located within a radius of approximately 50 miles from the Project: 11 fire stations, 25 engines (Type 3) and 1 helicopter (Type 2), based out of the Prado Helitack located approximately 27 miles southwest of the Project (CAL FIRE 2017). The San Bernardino County Fire Stations located closest to the Devil Canyon Powerhouse are stations #227 and #232,

and the stations closest to the Silverwood Lake area are stations #25 and #26; emergency contact information for these four county fire stations is provided below in Section 4.7.1.2

CAL FIRE's San Bernardino Unit maintains automatic aid agreements with all fire agencies within and adjacent to San Bernardino County (i.e., San Bernardino County Fire Department, San Bernardino National Forest, Angeles National Forest, Bureau of Land Management, National Park Service, Apple Valley Fire Department, Rancho Cucamonga Fire Department, Redlands Fire Department, and Running Springs Fire Department) (CAL FIRE 2017). The San Bernardino Unit Emergency Command Center has dispatch agreements with Arrow Bear Fire Department, Morongo Fire Department, Newberry Fire Department, and Yermo-Dagget Fire Department (CAL FIRE 2017).

The Federal Interagency Communications Center provides 24 hour dispatching, 365 days a year, and includes services such as: 100+ uniformed law enforcement officers, 7 special agents, 35 fire stations, 7 active fire lookouts, 20 fire prevention units, 70 forest protection officers, 6 hand crews, 1 fuels crew, 3 helicopters, 2 air tankers, 1 helitanker, 1 air attack, 1 law enforcement patrol plane, and 1 dozer.

4.7 KEY PERSONNEL CONTACT DIRECTORY

4.7.1 Emergency Contacts

4.7.1.1 *USFS Emergency Contacts – San Bernardino National Forest*

SBNF contacts for emergency fire-related issues:

The Federal Interagency Communication Center: (909) 383-5652

SBNF Emergency Operations Unit: (909) 383-5651, or (909) 383-5651 for night or 24-hour emergency

4.7.1.2 *CAL FIRE / San Bernardino County Fire Department Emergency Contacts*

CAL FIRE and San Bernardino County Fire Department contacts for emergency fire-related issues:

San Bernardino County Fire Department: 9-1-1

San Bernardino County - Office of Emergency Management: (909) 356-3998, and at Hesperia (760) 995-8285

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

San Bernardino Unit Emergency Command Center: secondary 9-1-1 responders

San Bernardino County

Office of the Fire Marshall
620 South E Street
San Bernardino, CA 92415
(909) 386-8400

San Bernardino County Fire Stations located closest to Devil Canyon
Powerhouse:

San Bernardino Station (Station #232)
6065 Palm Ave.
San Bernardino, CA 92407
(909) 880-2137

San Bernardino Station (Station #227)
282 W 40th St.
San Bernardino, CA 92407
(909) 384-5407

San Bernardino County Fire Stations located closest to Silverwood Lake area:

Crestline Station (Station #25)
23407 Crest Forest Dr.
Crestline, CA 92325
(909) 338-0625

Twin Peaks Station (Station #26)
737 Grandview Rd.
Twin Peaks, CA 92391
(909) 337-8326

4.7.2 Non-Emergency Contacts

4.7.2.1 USFS Non-Emergency Contacts – San Bernardino National Forest

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

SBNF Supervisor's Office
Recreation and Land Use Staff Officer
602 S. Tippecanoe Avenue
San Bernardino, CA 92408
(909) 382-2600

4.7.2.2 CAL FIRE / San Bernardino County Fire Department Non-Emergency Contacts

CAL FIRE and San Bernardino County Fire Department contacts for non-emergency Project vegetation or fire-related issues:

Fire Department (CAL FIRE San Bernardino Unit): (909) 881-6900; or at night
(909) 883-1112

4.7.2.3 State Parks Non-Emergency Contacts

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

State Parks
Silverwood Sector Office
Silverwood Sector Superintendent.
760-389-2281

4.7.2.4 DWR Non-Emergency Contacts – Devil Canyon Project

DWR contacts for non-emergency fire-related issues:

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

Alternative (661) 944-8760– Devil Canyon Facility

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5.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

5.1 CONSULTATION AND REPORTING

DWR will annually review with the SBNF activities related to fire prevention and response on NFS lands during the previous calendar year, as well as any activities related to fire resources on NFS lands planned for the current calendar year. In addition, DWR will consult with the SBNF, as needed, regarding fire resources and wildfires on NFS lands.

5.2 PLAN REVISIONS

DWR, in consultation with the SBNF, 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 SBNF. The SBNF will have 60 days after receipt of the updated plan to provide written comment and recommendations before DWR files the updated Plan with FERC for FERC's approval. DWR will include documentation of all relevant coordination and consultation with the updated Plan filed with FERC. If DWR does not adopt a particular recommendation by the SBNF, the filing will include DWR's reasons for not doing so. DWR 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 CITED

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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 delimiting, 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 delimiters, 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 delimeter, 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
	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M	P S I	G P M

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. Compressed Air Foam System: 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	<i>Project Activity Minimum Requirements and Restrictions. Restrictions at each level are cumulative.</i>
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.
Ev	<p>1. The following activities may operate all day:</p> <ul style="list-style-type: none"> 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. <p>2. Hot Saws or Masticators may operate until 1:00 PM; provided that:</p> <ul style="list-style-type: none"> 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. <p>3. All other conventional Mechanical Operations are permitted until 1:00 PM.</p> <p>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:</p> <ul style="list-style-type: none"> • Rubber Tire Skidding • Chipping on Landings • Helicopter Yarding • Fire Salvage <p>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).</p>

Level	Project Activity Minimum Requirements and Restrictions. Restrictions at each level are cumulative.
E	<p>The following activities may operate all day:</p> <ol style="list-style-type: none"> 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. <p>All other activities are prohibited.</p>

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						Days	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

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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 7

Visual Resources Management Plan

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



VISUAL RESOURCES MANAGEMENT PLAN April 2019

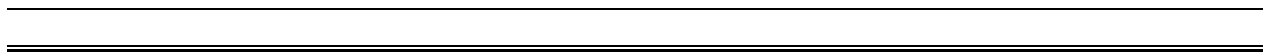


State of California
California Natural Resources Agency
DEPARTMENT OF WATER
RESOURCES
Hydropower License Planning and
Compliance Office

GAVIN C. NEWSOM
Governor
State of California

WADE CROWFORD
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Brief Project Description	1-1
1.2	Purpose of the Plan	1-5
1.3	Goals and Objectives of the Plan.....	1-5
1.4	Contents of the Plan	1-5
2.0	VISUAL RESOURCE ISSUES	2-1
2.1	Silverwood Lake, the Pacific Crest Trail, and State Highway 138.....	2-1
2.1.1	Cedar Springs Dam, Spillway and Associated Facilities	2-5
2.1.2	Project Recreation Facilities.....	2-8
2.2	Devil Canyon PowerPlant	2-11
2.2.1	Devil Canyon Penstocks, Powerplant, Surge Chamber and Roads	2-11
2.2.2	Devil Canyon Second Afterbay	2-13
3.0	PROPOSED PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES	3-1
4.0	CONSULTATION, REPORTING, AND PLAN REVISIONS	4-1
4.1	Consultation and Reporting	4-1
4.2	Plan Revisions	4-1
5.0	REFERENCES CITED	5-1

LIST OF FIGURES

Figure 1.1-1. Devil Canyon Project Vicinity	1-3
Figure 1.1-2. Devil Canyon Project Location	1-4
Figure 2.0-1. Devil Canyon Proposed Project Facilities at Silverwood Lake including the Non-project PCT	2-3
Figure 2.0-2. Devil Canyon Proposed Project Facilities in the Devil Canyon Powerplant Area	2-4
Figure 2.1-1. Cedar Springs Dam as Viewed from the PCT from the Ridgeline as the Project is First Viewable by PCT Users from the North.....	2-5
Figure 2.1-2. Fence with green slats along the PCT as Viewed from the PCT along the Ridgeline as the Project is First Viewable by PCT Users from the North.....	2-6
Figure 2.1-3. Cedar Springs Dam as viewed from the PCT along the shoulder of Highway 173 Showing the Fence with Green Slats	2-6
Figure 2.1-4. Cedar Springs Dam and Spillway as Viewed from the PCT from the Reservoir Side	2-7
Figure 2.1-5. Cedar Springs Dam and Spillway as Viewed from State Highway 138 from the Reservoir Side	2-8
Figure 2.1-6. Sawpit Canyon Boat Ramp and Marina as Viewed from the PCT	2-9
Figure 2.1-7. Sawpit Canyon Boat Ramp and Marina as Viewed from the State Highway 138 Pull Off along Miller Canyon.....	2-9
Figure 2.1-8. Sawpit Canyon Boat Ramp Parking Area and Marina as Viewed from the State Highway 138 Pull Off.....	2-10
Figure 2.1-9. Rio Group Campground as Viewed from the PCT	2-11
Figure 2.2-1. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from Ohio Street at Ashley Court	2-12
Figure 2.2-2. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from Campus Parkway	2-12
Figure 2.2-3. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from California State University San Bernardino	2-13
Figure 2.2-4. Devil Canyon Second Afterbay as Viewed from North Melvin Avenue.....	2-14
Figure 2.2-5. Devil Canyon Second Afterbay Embankment Terraces as Viewed from North Walnut Avenue.....	2-14

COMMONLY USED TERMS, ACRONYMS AND ABBREVIATIONS

Application for New License	DWR's Application for a New License for Major Project – Existing Dam for the Devil Canyon Project, FERC Project Number 14797
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
existing Project boundary	The boundary of the Project as approved by FERC in the existing license
FERC	Federal Energy Regulatory Commission
NFS	National Forest System
O&M	operations and maintenance
PCT	Pacific Crest Trail
Plan	Visual Resources Management Plan
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operations and maintenance (O&M) activities to: (1) protect resources against impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M
Primary Project Road	A road, or segment of a road, that is identified in the Project's new license as a Project facility, is used almost exclusively to access the Project, is within the FERC Project boundary, and is operated and maintained exclusively by DWR as a Project feature
Project	Devil Canyon Project, FERC Project Number 14979
proposed Project boundary	The boundary of the Project as proposed by DWR, pending approval from FERC in the new license. Includes all existing Project facilities, but adjusts the boundary to: (1) add lands to the existing Project boundary that are currently utilized with a preponderance of use related to Project O&M, and (2) remove lands from the existing Project boundary that do not have Project facilities and are not used or necessary for Project O&M. Also includes proposed changes to the existing Project boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE to

reflect FERC's preferred method of defining a project's boundary and to more accurately represent lands required for Project O&M around the Project reservoir.

SBNF	San Bernardino National Forest
SRA	State Recreation Area
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service

1.0 INTRODUCTION

In XX 2019 , the California Department of Water Resources (DWR), 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) (Traditional 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 DWR’s Devil Canyon Project, FERC Project Number 14797 (Project). DWR has included this Visual Resource Management Plan (Plan) in its XX 2019 Application for New License.

All elevation data in this Plan 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 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 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 existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 280 megawatts. Project facilities range in elevation from 3,378 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake; San Bernardino Tunnel; Devil Canyon Powerplant Penstocks and Surge Chamber; Devil Canyon Powerplant and Switchyard; Devil Canyon Afterbay and Devil Canyon Second Afterbay; Silverwood Lake-associated recreation facilities; and appurtenant facilities and features. The California Department of Parks and Recreation (DPR), on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., Crestline Lake Arrowhead Water Agency intake, and State Highway 138 – Rim of the World Scenic Byway, and the Pacific Crest National Scenic Trail [PCT]) traverse or are located in the Silverwood Lake SRA but are not Project facilities. The Project interconnects with the regional electric transmission system grid at the Devil Canyon Switchyard and therefore does not include any transmission lines. DWR generates electricity using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities, but does propose modifications to the existing Project boundary. The proposed Project boundary change would result in a reduction of the area within the existing Project boundary from 3,744 acres to 2,070 acres, of which 132 acres would be National Forest

System (NFS) lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The USFS administers the SBNF in conformance with the SBNF Land Management Plan (USFS 2005), as amended.

DWR proposes to operate the Project as it has been operated historically, with the addition of a number of Protection, Mitigation, and Enhancement (PM&E) measures, which are operations and maintenance (O&M) activities to: (1) protect resources against impacts from continued O&M of the Project; (2) mitigate any impacts from continued O&M of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project O&M. This Plan is one of those PM&E measures.

Figure 1.1-1 shows the Project Vicinity. Figure 1.1-2 shows primary Project facilities, including DWR's proposed Project boundary.

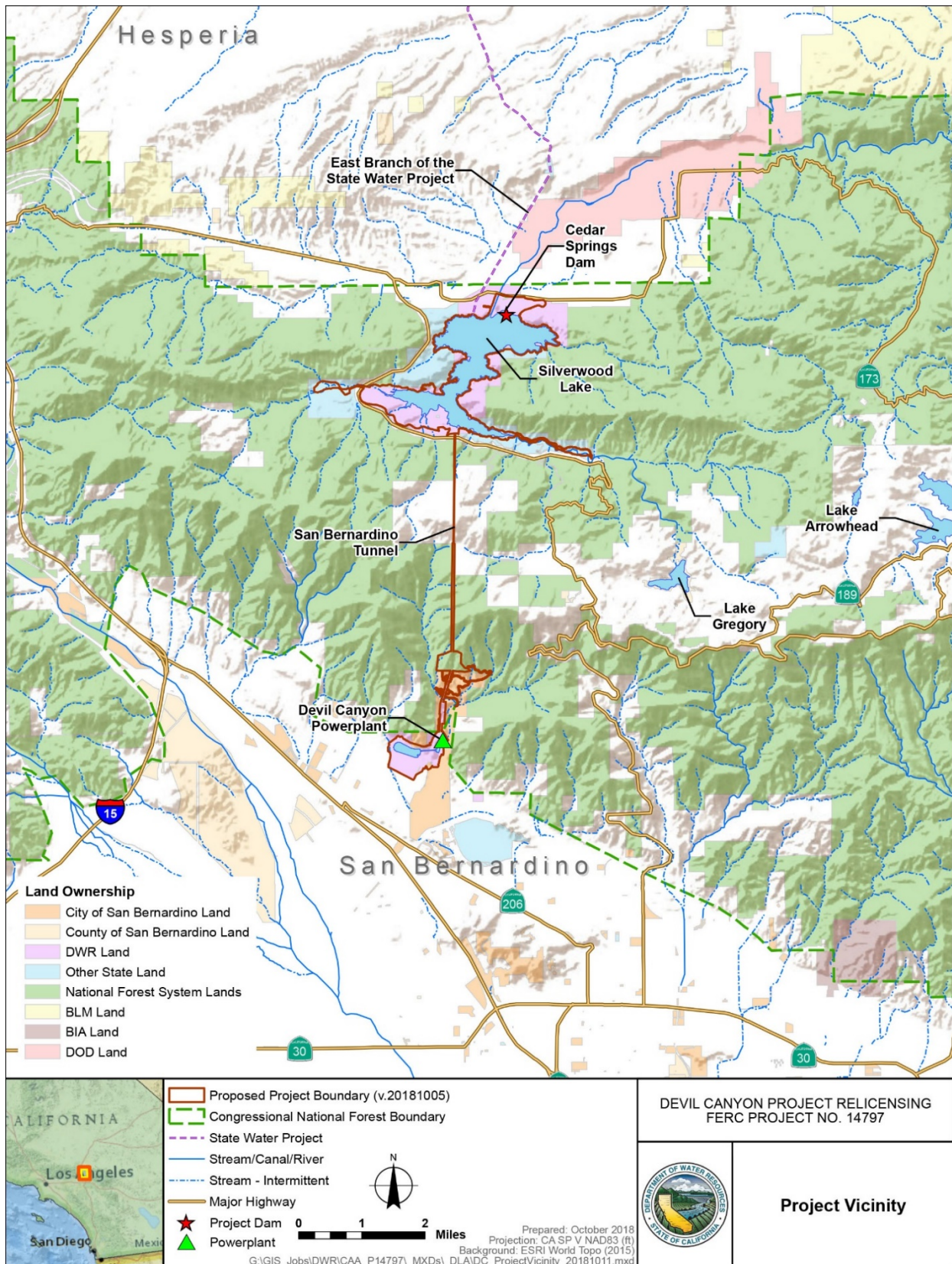


Figure 1.1-1. Devil Canyon Project Vicinity

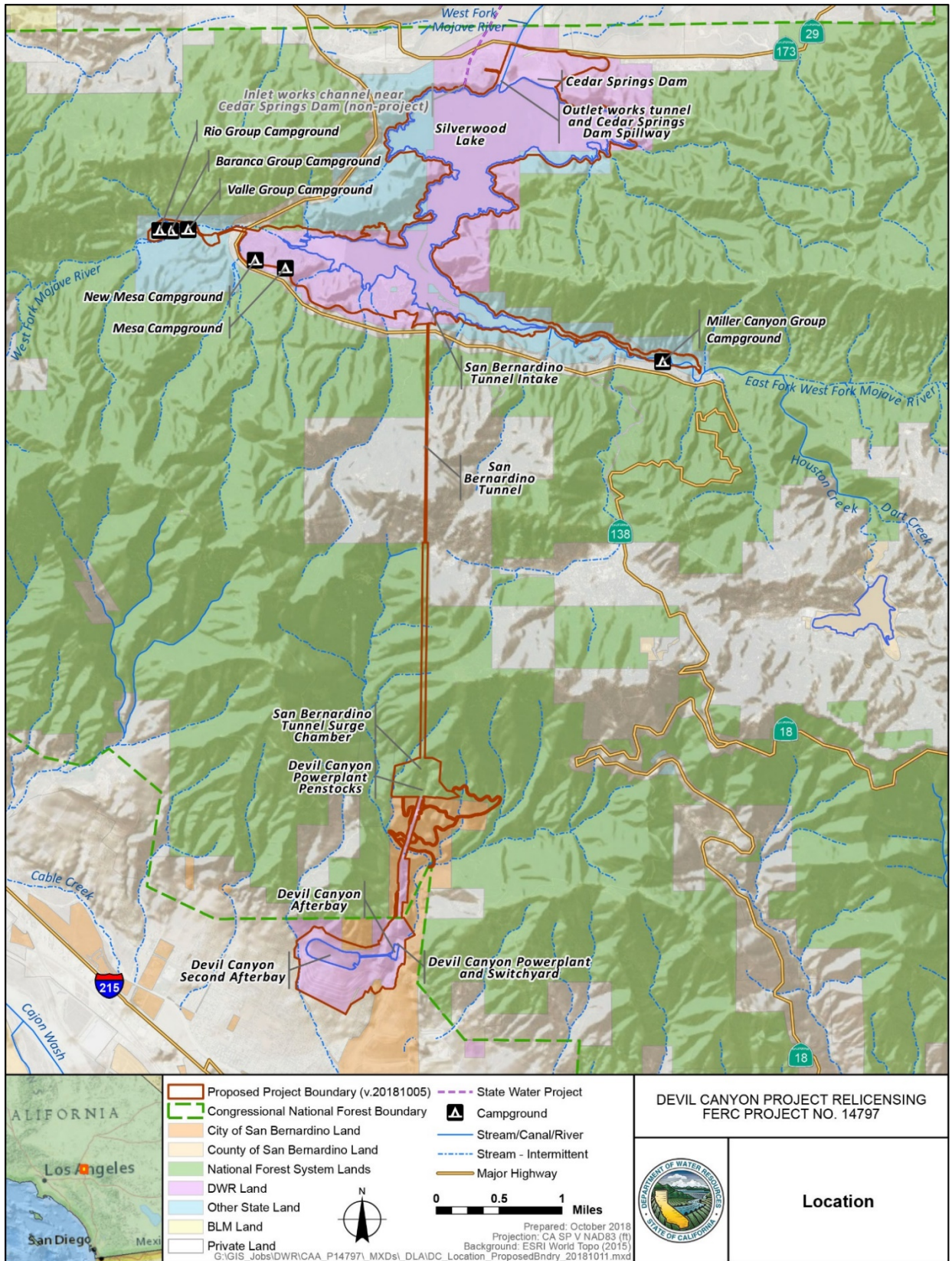


Figure 1.1-2. Devil Canyon Project Location

1.2 PURPOSE OF THE PLAN

This Plan provides guidance for the implementation of PM&E measures related to visual resources in the Project vicinity and the visual quality of Project facilities. In addition, this Plan provides a framework for addressing visual quality when there are changes to the Project. To the extent appropriate, DWR 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.

1.3 GOALS AND OBJECTIVES OF THE PLAN

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 the purpose and goal of the Plan.
- Section 2.0. Visual Resource Issues. This section identifies visual resource issues at the Project facilities.
- Section 3.0. Proposed Protection, Mitigation, and Enhancement Measures. This section includes a description of proposed PM&E measures and enhancements.
- Section 4.0. Schedule for Implementation. This section includes the schedule for implementing mitigation and enhancement measures.
- Section 5.0. References Cited. This section includes the resource documents cited in the Plan.

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2.0 VISUAL RESOURCE ISSUES

This section identifies potential issues affecting the existing visual condition of the Project facilities in the Silverwood Lake area (Figure 2.0-1) and in the Devil Canyon Powerplant area (Figure 2.0-2), which are the foundation for the development of the PM&E measures in Section 3.0.

2.1 SILVERWOOD LAKE, THE PACIFIC CREST TRAIL, AND STATE HIGHWAY 138

All of the Project facilities associated with Silverwood Lake, both recreational and operational, are located on lands owned and managed by the State of California. NFS lands surround the State of California lands, except to the north, where the ownership is private. Some non-Project facilities (e.g., the PCT) traverse or are located in the Silverwood Lake SRA, but they are not Project facilities.

The PCT crosses through Silverwood Lake SRA on State of California lands along the north and west shores of Silverwood Lake (Figure 2.0-1) and is administered by the USFS through an easement agreement with DPR. On State lands near Cedar Springs Dam, the USFS has an easement agreement with DPR for the PCT in this area. On March 26, 1980, the State of California, acting through DWR, granted the U.S., acting through the USFS, a non-exclusive agreement for use of certain State of California-owned land parcels in San Bernardino County to “locate, construct, use, maintain, relocate and repair” the PCT on lands below Cedar Springs Dam (DWR 1980), which had already been built and was already in operation. The agreement reserved DWR’s rights to continue to use the area for its purposes and specified that USFS was responsible for constructing and maintaining the PCT on those land parcels.

State Highway 138 passes along the west and south sides of the Project in the Silverwood Lake area (Figure 2.0-1). State Highway 138 is part of the 110-mile Rim of the World Scenic Byway which encompasses portions of State Highways 138, 18, and 38 (USFS 2018). A Corridor Management Plan for the portion of State Highway 138 near the Project has not been prepared. The Rim of the World Scenic Byway traverses the rim of the San Bernardino Mountains from Cajon Pass to their eastern and then southern edges offering numerous vistas and panoramas along the route. In the Project area, State Highway 138 includes one formal vista point with parking (a non-Project facility) along the west side of Silverwood Lake that provides expansive views of Silverwood Lake and the facilities near the dam. In addition, there are several roadside pull off areas along the south side of the Project area that provide limited views of Silverwood Lake and associated Project and non-Project facilities. Much of the roadside pull offs along the southern side of the reservoir lack views of the lake due to thick vegetation.

The SBNF Land Management Plan (LMP) identifies for SBNF lands a Desired Condition emphasis on preserving natural appearing views from the scenic byway and the PCT. Standard SBNF S7, in the LMP also requires that scenic values in accordance with

adopted scenic integrity objectives be protected, as well as foreground views from the footpath and designated viewpoints. Where practicable, it is also emphasized to avoid establishing unconforming land uses within the viewshed of the trail.

Silverwood Lake is a scenic asset for the area. However, it also has some hydropower-related and recreation facilities that do not blend in with the natural landscape, as described below.

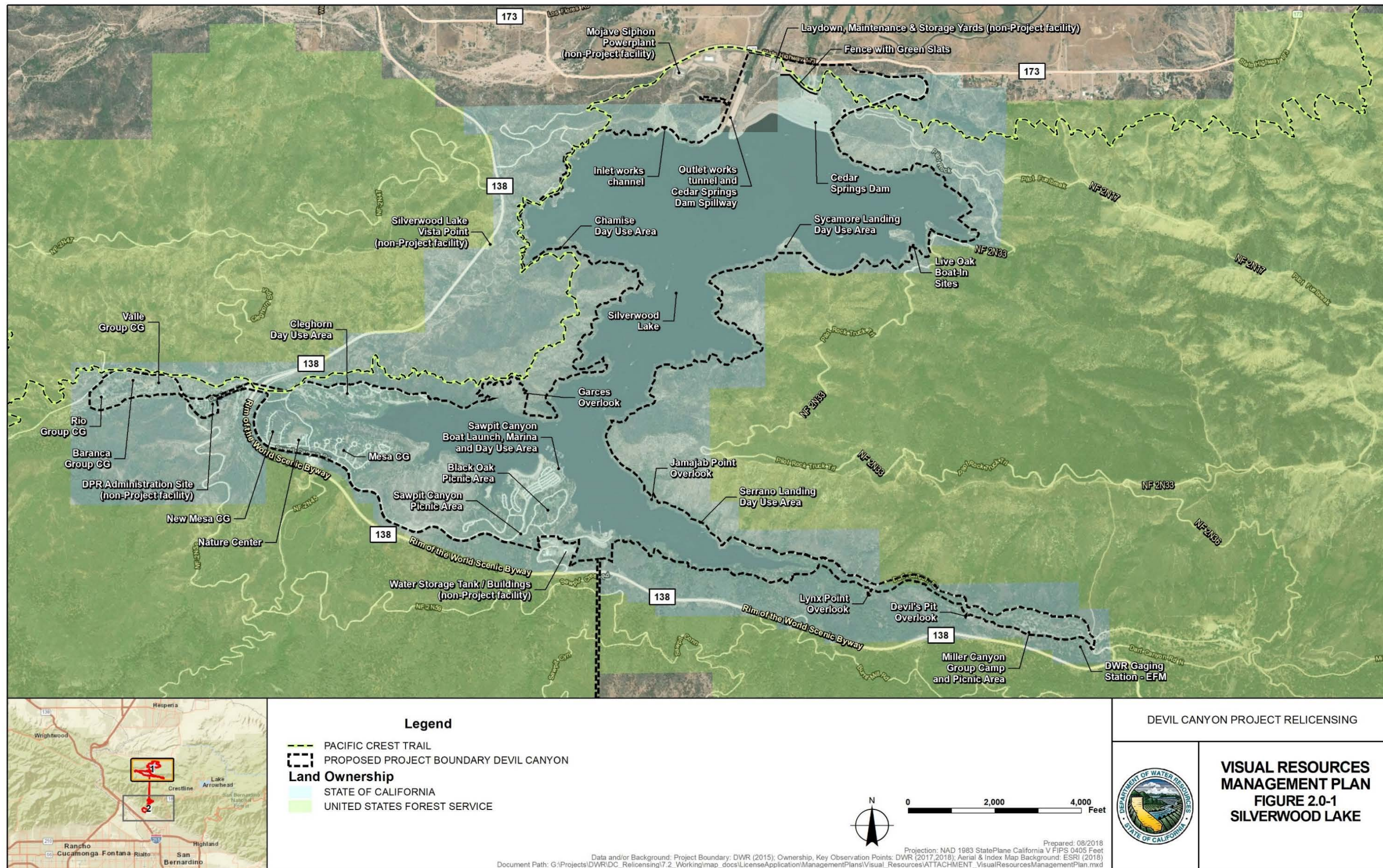


Figure 2.0-1. Devil Canyon Proposed Project Facilities at Silverwood Lake including the Non-project PCT

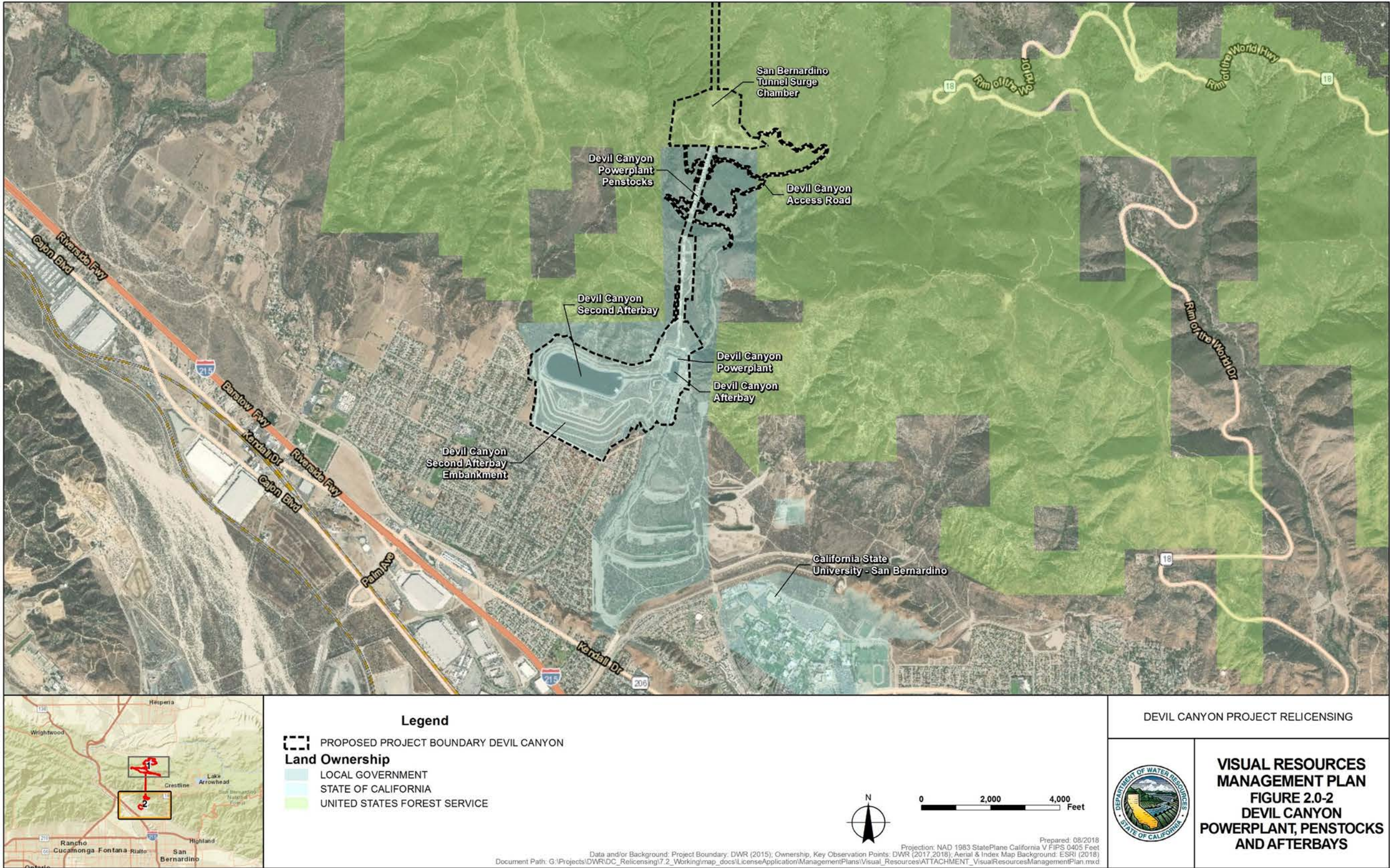


Figure 2.0-2. Devil Canyon Proposed Project Facilities in the Devil Canyon Powerplant Area

2.1.1 Cedar Springs Dam, Spillway and Associated Facilities

The Cedar Springs Dam and spillway are all on State lands. The dam and spillway, as viewed from the PCT (along an approximately 0.9-mile segment) and State Highway 173 (an eligible State Scenic Highway), all present strong visual contrast to the natural setting (Figures 2.1-1 through 2.1-3). The recently constructed Cedar Springs Dam security fence was intentionally built with a section of green slats running along the PCT to screen views of the dam from the trail just below the dam (Figures 2.1-1 through 2.1-3).

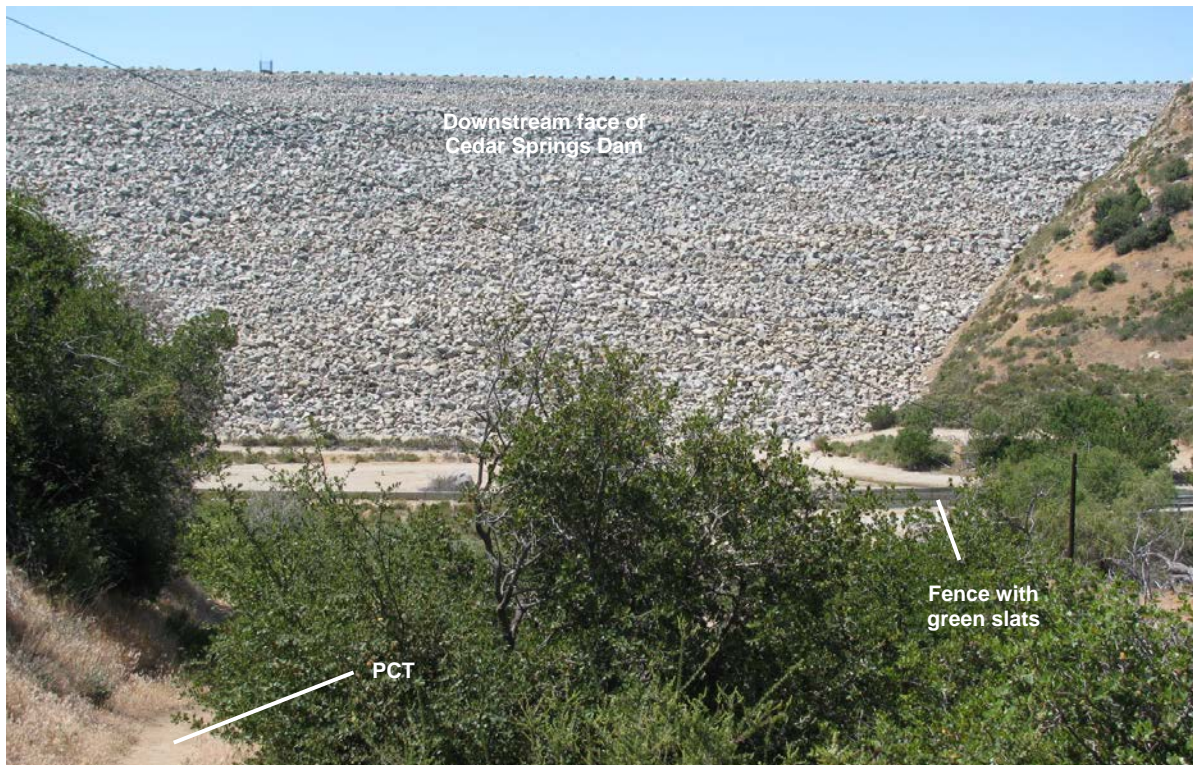


Figure 2.1-1. Cedar Springs Dam as Viewed from the PCT from the Ridgeline as the Project is First Viewable by PCT Users from the North

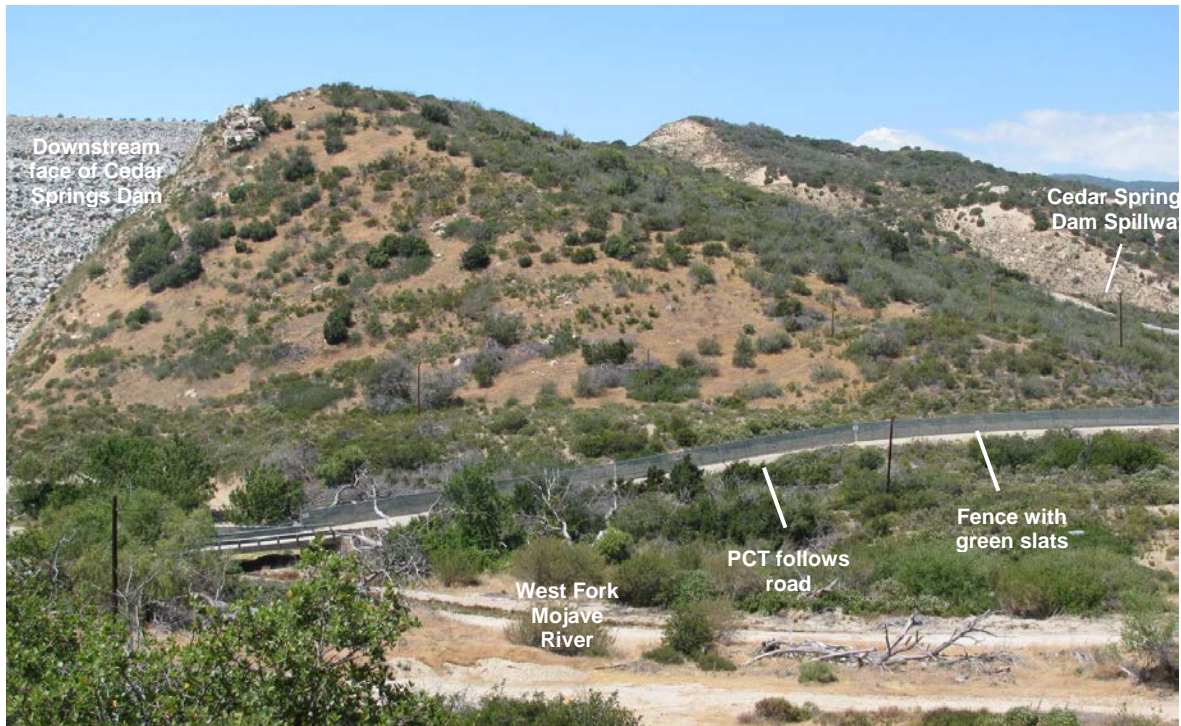


Figure 2.1-2. Fence with green slats along the PCT as Viewed from the PCT along the Ridgeline as the Project is First Viewable by PCT Users from the North

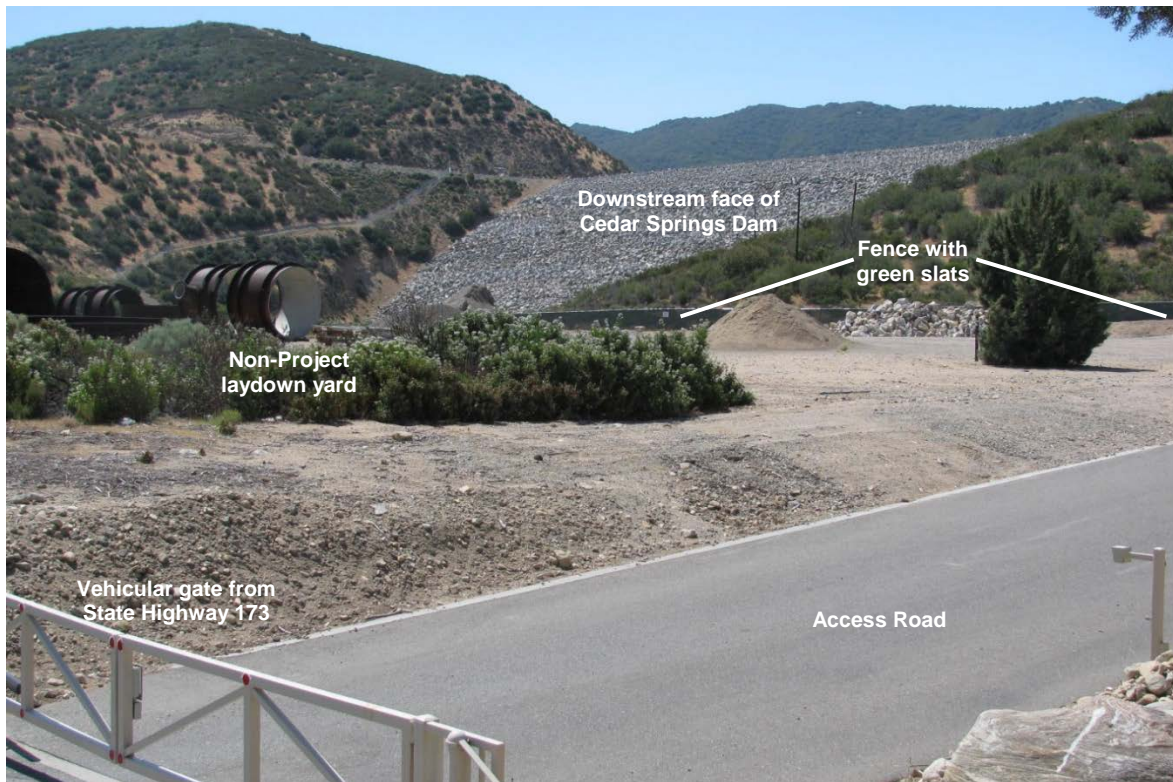


Figure 2.1-3. Cedar Springs Dam as viewed from the PCT along the shoulder of Highway 173 Showing the Fence with Green Slats

The Cedar Springs Dam and Spillway are also visible from the reservoir side of the dam along the PCT, and State Highway 138; but these facilities, including the outlet and inlet works, present less visual contrast because water covers most of the dam and spillway (Figures 2.1-4 and 2.1-5). Primary Project Roads associated with the dam and spillway can also present various levels of visual contrast, depending on the view point, but overall the contrast is light to moderate for these Project Roads, and they are seldom seen from sensitive viewpoints.

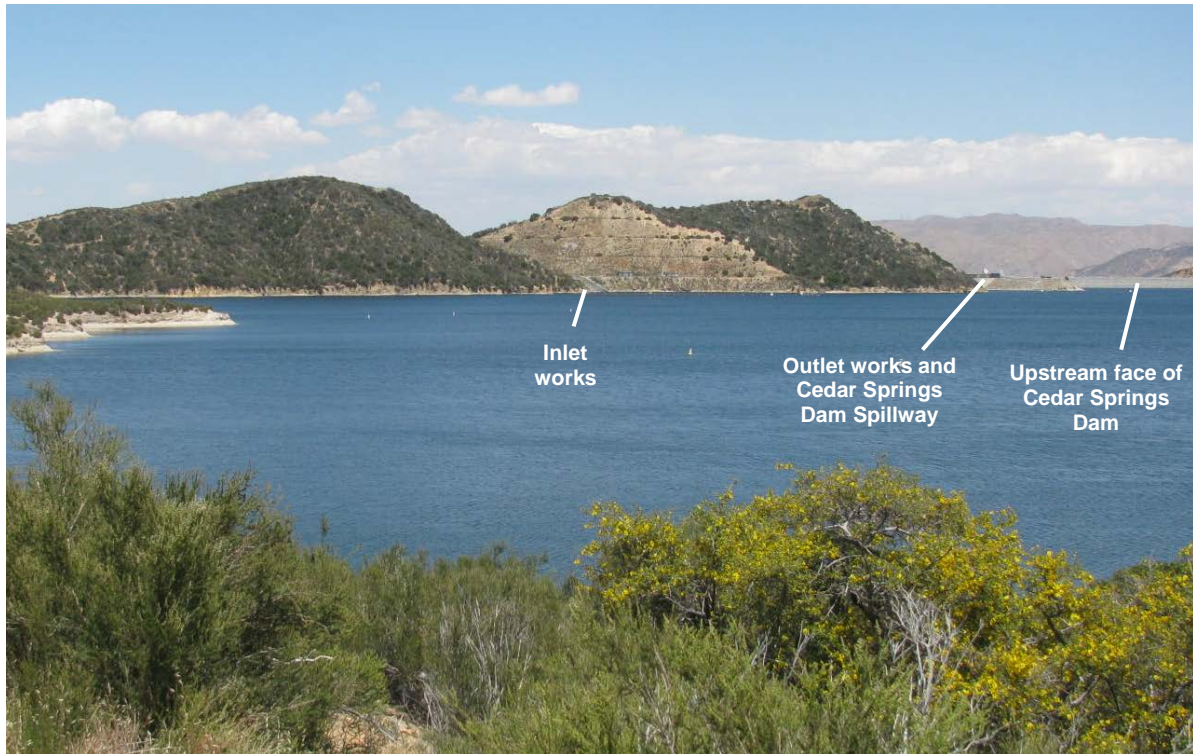


Figure 2.1-4. Cedar Springs Dam and Spillway as Viewed from the PCT from the Reservoir Side



Figure 2.1-5. Cedar Springs Dam and Spillway as Viewed from State Highway 138 from the Reservoir Side

2.1.2 Project Recreation Facilities

Overall views of Silverwood Lake SRA Project recreational facilities are primarily available from the PCT, which traverses the western shoreline of the reservoir, and from vehicle pullouts serving as vista points along State Highway 138. The Sawpit Canyon Boat Ramp and Marina are visible from State Highway 138, the PCT, and boaters on the reservoir and sent strong visual contrast (Figures 2.1-6 through 2.1-8). Note that the white water tank and buildings in the far right of Figure 2.1-6 are non-Project. Overall, the few facilities with visual contrast are typical of a reservoir-oriented setting and common to visitors to this Project and the other reservoirs in the area. Therefore, visual PM&E measures for these Project features (e.g., marina, boat docks, etc.) are not a necessity.

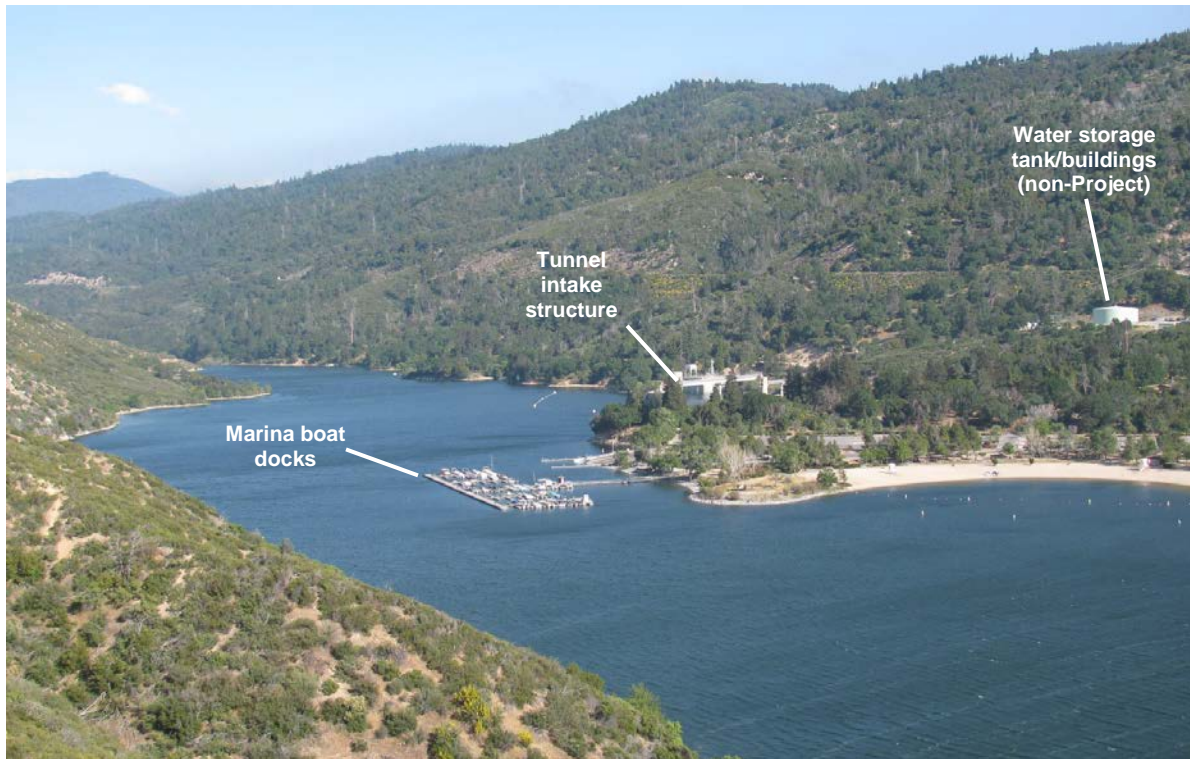


Figure 2.1-6. Sawpit Canyon Boat Ramp and Marina as Viewed from the PCT



Figure 2.1-7. Sawpit Canyon Boat Ramp and Marina as Viewed from the State Highway 138 Pull Off along Miller Canyon



Figure 2.1-8. Sawpit Canyon Boat Ramp Parking Area and Marina as Viewed from the State Highway 138 Pull Off

The group campground facilities are located in Cleghorn Canyon, west of Silverwood Lake and State Highway 138. The group campground facilities (i.e., Valle, Baranca and Rio sites) are generally well screened by vegetation as viewed in the foreground from the PCT and Cleghorn Road; and the building and structure colors match the local native soil well with only minimal contrast due to their geometric shapes (Figure 2.1-9).



Figure 2.1-9. Rio Group Campground as Viewed from the PCT

2.2 DEVIL CANYON POWERPLANT

The Devil Canyon Powerplant area includes the Devil Canyon Penstocks, Powerplant, and Afterbay facilities located on the south side of the San Bernardino Mountains at the transition from the mountains to the inland coastal plain. The mountainous areas are generally within the SBNF. However, the majority of the Project facilities are on State lands, with a small portion of the Project on NFS lands, including the upper surge chamber and very top portion of the penstocks.

2.2.1 Devil Canyon Penstocks, Powerplant, Surge Chamber and Roads

The two parallel penstocks, roads, surge chamber, and the powerplant are visible in the middleground from the south near the California State University, San Bernardino campus and from the residential communities of Verdemon and University Heights (Figures 2.2-1, 2.2-2, and 2.2-3). The penstocks and associated concrete are in strong visual contrast with the surrounding greens and browns of the landscape as they descend through Devil Canyon. The light colors, lines, and geometric shapes of the Devil Canyon Powerplant, surge chamber, and Primary Project Roads are visible from the south and create a strong visual contrast against the visual character of the mountains.



Figure 2.2-1. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from Ohio Street at Ashley Court



Figure 2.2-2. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from Campus Parkway



Figure 2.2-3. Devil Canyon Powerplant, Penstocks and Surge Chamber as Viewed from California State University San Bernardino

The part of the Project that is located on NFS lands is a short section of the uppermost penstocks, the upper surge chamber just above the start of the penstocks, and short segments of Primary Project Roads. These facilities do not meet the SBNF Land Management Plan's scenic integrity objective of "high" (i.e., the landscape should appear unaltered) (USFS 2005).

The vast majority of public viewpoints of the Project facilities in the Devil Canyon Powerplant area occur from heavy residential and commercial settings on private lands. As such, most views are bracketed by residential and commercial structures with geometric shapes and light colors similar to some of the Project facilities.

2.2.2 Devil Canyon Second Afterbay

Devil Canyon Second Afterbay, located entirely on State lands, is viewable in the foreground from the nearby residential communities (Figure 2.2-4). Devil Canyon Second Afterbay embankment terraces can only be seen from select viewpoints; the majority of the views are from the south where the terraces are not visible (Figure 2.2-5). Overall, Devil Canyon Second Afterbay and its embankment blend well with the surrounding landscape, particularly due to the native chaparral/sage scrub plant vegetation covering the embankment, which appears natural when viewed from the south in the foreground and middleground.



Figure 2.2-4. Devil Canyon Second Afterbay as Viewed from North Melvin Avenue



Figure 2.2-5. Devil Canyon Second Afterbay Embankment Terraces as Viewed from North Walnut Avenue

3.0 PROPOSED PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES

The Cedar Springs Dam, spillway and outlet structures as viewed from the PCT and the adjacent State Highway 173, present visual contrast to the natural setting, as described in Section 2.1.1. These facilities are seen in the immediate foreground from the PCT as trail users first view the Project from the north (Figures 2.1-1 and 2.1-2). Within a year of license issuance, DWR will install and maintain an interpretive sign that describes Cedar Springs Dam, its role in the Project, its history, and an overview of the SWP. The location of the sign will be near or along the trail in the vicinity of the first views of the dam. DWR, in consultation with the USFS and Pacific Crest Trail Association, will determine the final location and content for the interpretive sign. Further, when in DWR's estimation that the slats in the fencing along the PCT are in need of replacement, DWR will consult with the USFS and Pacific Crest Trail Association regarding the color of the replacement slats, and then replace the slats.

Prior to performing scheduled maintenance of Project facilities that affect the color of the facilities (e.g., painting), to the extent consistent with the function and safe operation of the facility, DWR will select colors that blend with the natural landscape. If the facility is located on NFS lands, DWR will consult with SBNF regarding the selection of the color.

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4.0 CONSULTATION, REPORTING, AND PLAN REVISIONS

4.1 CONSULTATION AND REPORTING

DWR will annually review with the SBNF any DWR activities on NFS lands that could affect visual resources as seen from NFS lands that are completed in the previous calendar year, as well as any DWR activities planned for NFS lands for the current calendar year.

4.2 PLAN REVISIONS

DWR, in consultation with the SBNF, will review, update, and/or revise this Plan as it pertains to visual resources on NFS lands. Any updates to the Plan will be prepared in coordination and consultation with the SBNF. DWR will provide SBNF 60 days to provide written comment and recommendations before DWR files the updated Plan with FERC for FERC's approval. DWR will include documentation of all relevant coordination and consultation with the updated Plan filed with FERC. If DWR does not adopt a particular recommendation by the SBNF, the filing will include DWR's reasons for not doing so. DWR will implement the Plan as approved by FERC. The Plan will not be considered revised until FERC issues its approval.

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5.0 REFERENCES CITED

California Department of Water Resources (DWR). 1980. Non-Exclusive Easement for the Pacific Crest Trail by State of California, acting through and by its Director of Water Resources, to the United States of America, acting through the U.S. Forest Service of the U.S. Department of Agriculture. March 25, 1980. Sacramento, California.

United States Department of Agriculture, Forest Service (USFS). 2018. San Bernardino National Forest Website - Rim of the World Scenic Byway. <https://www.fs.usda.gov/recarea/sbnf/recarea/?recid=74122>. Accessed: August 10, 2018.

_____. 2005. San Bernardino National Forest Land and Resource Management Plan. Department of Agriculture. San Bernardino, California. Available online: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_007719.pdf. Accessed: June 25, 2018.

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Attachment 8

Historic Properties Management Plan (Privileged)

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DEVIL CANYON PROJECT

HISTORIC PROPERTIES MANAGEMENT PLAN

FERC typically completes Section 106 by entering into a Programmatic Agreement or Memorandum of Agreement with the Advisory Council on Historic Preservation and the State Historic Preservation Officer that typically require the license applicant 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 DWR’s consideration and appropriate management of effects on historic properties throughout the term of the license, and in turn, allow FERC to meet the requirements of Section 106 for its undertakings.

The HPMP contains sensitive, confidential, and privileged information. As such, the HPMP will only be distributed to interested tribes, USFS, San Bernardino National Forest; and the State Historic Preservation Officer (SHPO) for review and comment as part of the National Historic Preservation Act, Section 106 consultation process. Following consultation with the tribes, USFS, and SHPO, the HPMP will be filed with FERC as “privileged” in the Final License Application (FLA).

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Appendix B

NRCS Custom Soil Resource Report for the Silverwood Area

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United States
Department of
Agriculture

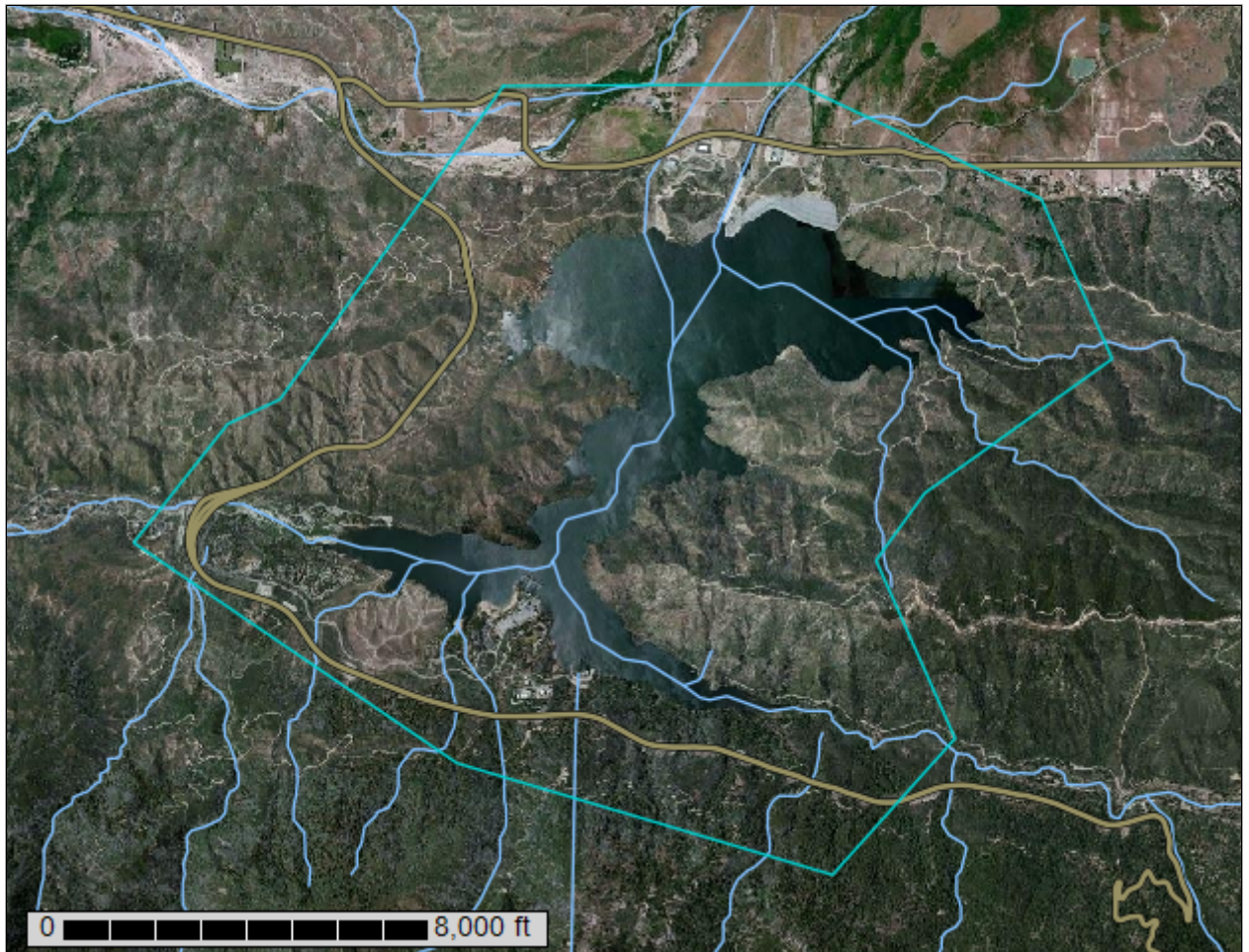
NRCS

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 San Bernardino County, California, Mojave River Area; and San Bernardino National Forest Area, California

Silverwood Lake Area



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

Preface	2
How Soil Surveys Are Made	5
Soil Map	7
Soil Map.....	8
Legend.....	9
Map Unit Legend.....	10
Map Unit Descriptions.....	11
San Bernardino County, California, Mojave River Area.....	13
102—AVAWATZ-OAK GLEN ASSOCIATION, GENTLY SLOPING*.....	13
157—RIVERWASH.....	14
178—WATER.....	15
San Bernardino National Forest Area, California.....	16
AbD—Soboba-Hanford families association, 2 to 15 percent slopes.....	16
ChFG—Typic Xerorthents, warm-Typic Haploxeralfs-Badland complex, 30 to 100 percent slopes.....	17
CmE—Modesto-Osito families association, 15 to 30 percent slopes.....	19
CmF—Osito-Modesto families association, 30 to 50 percent slopes.....	21
DaF—Pacifco-Wapi families complex, 30 to 50 percent slopes.....	22
DaG—Wapi-Pacifco families-Rock outcrop complex, 50 to 75 percent slopes.....	24
Dam—Dams.....	26
DnF—Trigo family-Lithic Xerorthents, warm complex, 30 to 50 percent slopes.....	26
DnG—Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes.....	27
MbE—Morical-Wind River families complex, 15 to 30 percent slopes.....	29
MbF—Morical-Wind River families complex, 30 to 50 percent slopes.....	30
PsD—Avawatz-Oak Glen, dry families association, 2 to 15 percent slopes.....	32
Rw—Riverwash.....	34
W—Water areas.....	34
Soil Information for All Uses	35
Soil Properties and Qualities.....	35
Soil Erosion Factors.....	35
Wind Erodibility Index (Sliverwood Lake).....	35
Wind Erodibility Index (Sliverwood Lake).....	39
References	44

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

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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.

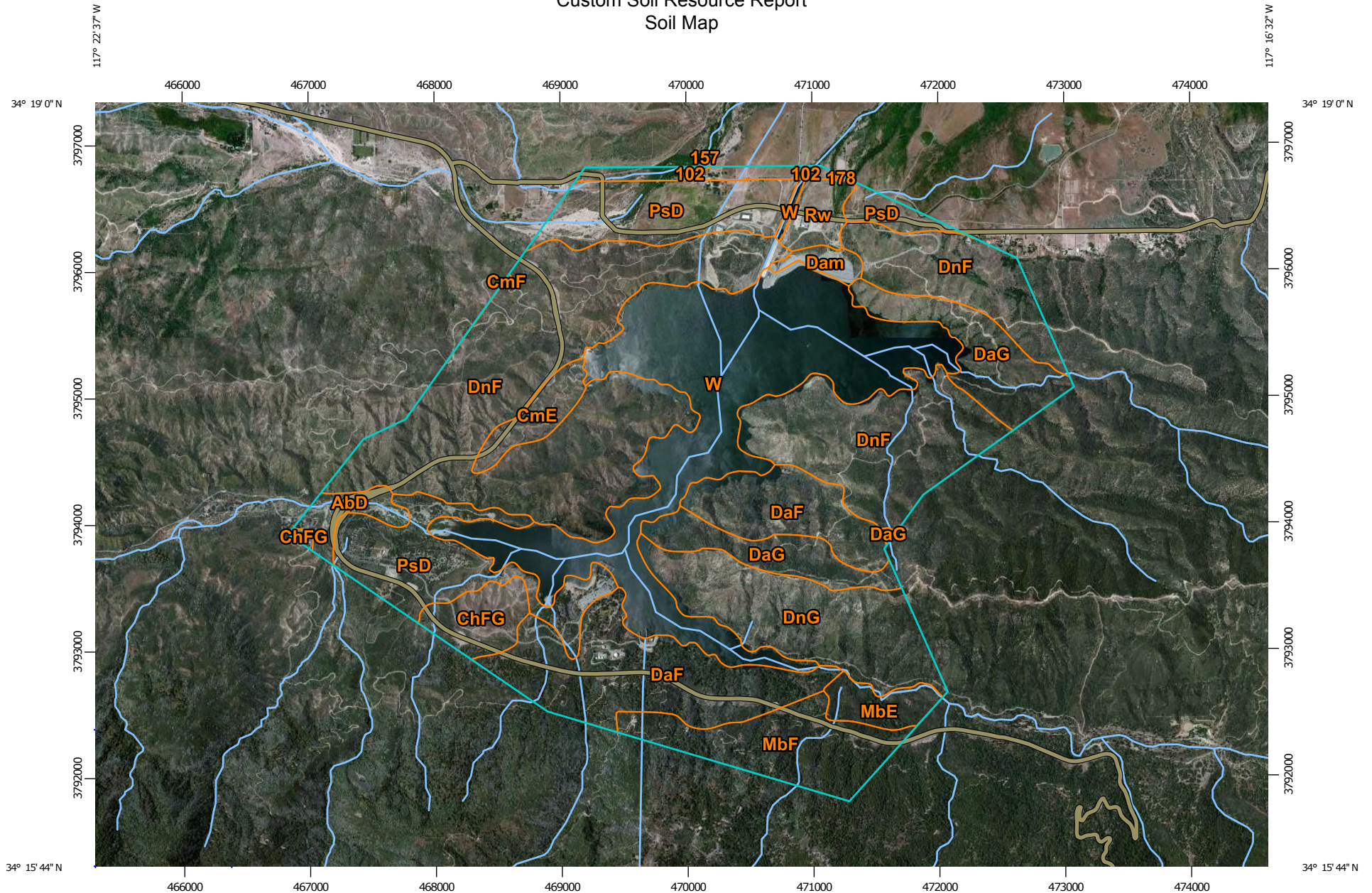
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

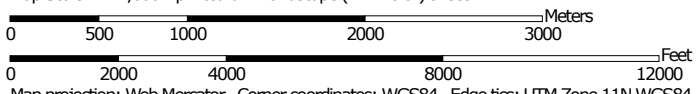
Soil Map

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: 1:42,600 if printed on A landscape (11" x 8.5") sheet.




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: San Bernardino County, California, Mojave River Area
 Survey Area Data: Version 7, Sep 8, 2014

Soil Survey Area: San Bernardino National Forest Area, California
 Survey Area Data: Version 7, Sep 30, 2014

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: May 5, 2010—Jul 3, 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

San Bernardino County, California, Mojave River Area (CA671)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
102	AVAWATZ-OAK GLEN ASSOCIATION, GENTLY SLOPING*	51.3	1.1%
157	RIVERWASH	0.7	0.0%
178	WATER	1.8	0.0%
Subtotals for Soil Survey Area		53.8	1.1%
Totals for Area of Interest		4,738.1	100.0%

San Bernardino National Forest Area, California (CA777)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbD	Soboba-Hanford families association, 2 to 15 percent slopes	54.9	1.2%
ChFG	Typic Xerorthents, warm-Typic Haploxeralfs-Badland complex, 30 to 100 percent slopes	94.2	2.0%
CmE	Modesto-Osito families association, 15 to 30 percent slopes	68.4	1.4%
CmF	Osito-Modesto families association, 30 to 50 percent slopes	1.0	0.0%
DaF	Pacifico-Wapi families complex, 30 to 50 percent slopes	546.3	11.5%
DaG	Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes	292.8	6.2%
Dam	Dams	30.3	0.6%
DnF	Trigo family-Lithic Xerorthents, warm complex, 30 to 50 percent slopes	1,499.6	31.6%
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	341.5	7.2%
MbE	Morical-Wind River families complex, 15 to 30 percent slopes	65.7	1.4%
MbF	Morical-Wind River families complex, 30 to 50 percent slopes	228.6	4.8%
PsD	Avawatz-Oak Glen, dry families association, 2 to 15 percent slopes	514.8	10.9%
Rw	Riverwash	57.4	1.2%

Custom Soil Resource Report

San Bernardino National Forest Area, California (CA777)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water areas	888.7	18.8%
Subtotals for Soil Survey Area		4,684.3	98.9%
Totals for Area of Interest		4,738.1	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.

Custom Soil Resource Report

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.

San Bernardino County, California, Mojave River Area

102—AVAWATZ-OAK GLEN ASSOCIATION, GENTLY SLOPING*

Map Unit Setting

National map unit symbol: hkr6
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 150 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Avawatz and similar soils: 50 percent
Oak glen and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Avawatz

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 15 inches: sandy loam
H2 - 15 to 60 inches: loamy sand

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
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: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: COARSE LOAMY (R020XE003CA)

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

Custom Soil Resource Report

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 22 inches: sandy loam

H2 - 22 to 60 inches: sandy loam

Properties and qualities

Slope: 2 to 9 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

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 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: COARSE LOAMY (R020XE003CA)

Minor Components

Haploxerolls

Percent of map unit: 5 percent

Landform: Fan remnants

Xerofluvents

Percent of map unit: 5 percent

157—RIVERWASH

Map Unit Setting

National map unit symbol: hksz

Elevation: 650 to 4,000 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Channels

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w

Minor Components

Villa

Percent of map unit: 5 percent

Victorville

Percent of map unit: 5 percent

178—WATER

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

San Bernardino National Forest Area, California

AbD—Soboba-Hanford families association, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: htr5
Elevation: 1,600 to 4,000 feet
Mean annual precipitation: 15 to 25 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

Soboba family and similar soils: 50 percent
Hanford family and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Soboba Family

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: very cobbly loamy sand
H2 - 8 to 24 inches: very cobbly loamy sand
H3 - 24 to 60 inches: stratified very cobbly sand to very cobbly loamy fine sand

Properties and qualities

Slope: 2 to 10 percent
Percent of area covered with surface fragments: 3.0 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 to very high (5.67 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A

Description of Hanford Family

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope

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Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 60 inches: sandy loam

Properties and qualities

Slope: 5 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
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Riverwash

Percent of map unit: 10 percent

Soboba family, nonskeletal

Percent of map unit: 10 percent

ChFG—Typic Xerorthents, warm-Typic Haploxeralfs-Badland complex, 30 to 100 percent slopes

Map Unit Setting

National map unit symbol: htrh
Elevation: 2,000 to 4,000 feet
Mean annual precipitation: 10 to 25 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 xerorthents, warm, and similar soils: 35 percent
Typic haploxeralfs and similar soils: 30 percent
Badland: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Typic Xerorthents, Warm

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 30 inches: sandy loam
H3 - 30 to 34 inches: weathered bedrock

Properties and qualities

Slope: 40 to 70 percent
Depth to restrictive feature: 20 to 34 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
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 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B

Description of Typic Haploxeralfs

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 2 inches: gravelly sandy loam
H2 - 2 to 10 inches: gravelly sandy clay loam
H3 - 10 to 22 inches: gravelly loam
H4 - 22 to 39 inches: gravelly sandy loam
H5 - 39 to 43 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 39 to 43 inches to paralithic bedrock
Natural drainage class: Well drained
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 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Description of Badland

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

CmE—Modesto-Osito families association, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: htrj
Elevation: 1,800 to 4,200 feet
Mean annual precipitation: 15 to 25 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

Modesto family and similar soils: 40 percent
Osito family and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Modesto Family

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 28 inches: sandy clay loam
H3 - 28 to 50 inches: fine sandy loam
H4 - 50 to 54 inches: weathered bedrock

Custom Soil Resource Report

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 50 to 54 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
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Description of Osito Family

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 5 inches: coarse sandy loam
H2 - 5 to 13 inches: coarse sandy loam
H3 - 13 to 17 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 13 to 17 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: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D

CmF—Osito-Modesto families association, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: htrk
Elevation: 1,800 to 4,200 feet
Mean annual precipitation: 15 to 25 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

Osito family and similar soils: 40 percent
Modesto family and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osito Family

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: coarse sandy loam
H2 - 5 to 13 inches: coarse sandy loam
H3 - 13 to 17 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 13 to 17 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: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D

Description of Modesto Family

Setting

Landform: Hills

Custom Soil Resource Report

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 28 inches: loam
H3 - 28 to 50 inches: fine sandy loam
H4 - 50 to 54 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 50 to 54 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
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

DaF—Pacífico-Wapi families complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: htrn
Elevation: 5,000 to 8,000 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Pacífico family and similar soils: 50 percent
Wapi family and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacífico Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave

Custom Soil Resource Report

Across-slope shape: Convex

Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 3 inches: loamy coarse sand

H2 - 3 to 15 inches: loamy coarse sand

H3 - 15 to 19 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 15 to 19 inches to paralithic bedrock

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D

Description of Wapi 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 7 inches: loamy sand

H2 - 7 to 10 inches: gravelly loamy sand

H3 - 10 to 15 inches: weathered bedrock

H4 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 10 to 15 inches to paralithic bedrock; 15 to 19 inches to lithic bedrock

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D

DaG—Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htrp
Elevation: 4,000 to 7,800 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Wapi family and similar soils: 35 percent
Pacifico family and similar soils: 30 percent
Rock outcrop: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapi 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 7 inches: loamy sand
H2 - 7 to 10 inches: gravelly loamy sand
H3 - 10 to 15 inches: weathered bedrock
H4 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 10 to 15 inches to paralithic bedrock; 15 to 19 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Pacifico 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 granodiorite

Typical profile

H1 - 0 to 3 inches: loamy coarse sand
H2 - 3 to 15 inches: loamy coarse sand
H3 - 15 to 19 inches: weathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 15 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.0 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: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 4 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Dam—Dams

Map Unit Composition

Dam: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

DnF—Trigo family-Lithic Xerorthents, warm complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: htry

Elevation: 1,790 to 6,400 feet

Mean annual precipitation: 10 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: 60 percent

Lithic xerorthents, warm, and similar soils: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

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 granodiorite

Typical profile

H1 - 0 to 3 inches: coarse sandy loam

H2 - 3 to 12 inches: coarse sandy loam

H3 - 12 to 16 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 12 to 16 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

Custom Soil Resource Report

Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D

Description of Lithic Xerorthents, Warm

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 18 inches: gravelly sandy loam

H2 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 18 to 22 inches to lithic bedrock

Natural drainage class: Excessively drained

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 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D

DnG—Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htrz

Elevation: 1,790 to 6,400 feet

Mean annual precipitation: 10 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: 50 percent

Lithic xerorthents, warm, and similar soils: 20 percent

Minor components: 30 percent

Custom Soil Resource Report

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

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 granodiorite

Typical profile

H1 - 0 to 3 inches: coarse sandy loam
H2 - 3 to 12 inches: coarse sandy loam
H3 - 12 to 16 inches: weathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 12 to 16 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: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Lithic Xerorthents, Warm

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 18 inches: gravelly sandy loam
H2 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 18 to 22 inches to lithic bedrock
Natural drainage class: Excessively drained
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 1.4 inches)

Custom Soil Resource Report

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: 8 percent

Unnamed, shallow fine sandy loam soils

Percent of map unit: 8 percent

Springdale family

Percent of map unit: 7 percent

Ramona family

Percent of map unit: 7 percent

MbE—Morical-Wind River families complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: htsv

Elevation: 4,500 to 6,000 feet

Mean annual precipitation: 25 to 35 inches

Mean annual air temperature: 46 to 54 degrees F

Frost-free period: 120 to 175 days

Farmland classification: Not prime farmland

Map Unit Composition

Morical family and similar soils: 50 percent

Wind river family and similar soils: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Morical Family

Setting

Landform: Mountains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: loam

H2 - 8 to 50 inches: loam

H3 - 50 to 54 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent

Custom Soil Resource Report

Depth to restrictive feature: 50 to 54 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
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Description of Wind River Family

Setting

Landform: Mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 19 inches: sandy loam
H2 - 19 to 34 inches: sandy loam
H3 - 34 to 45 inches: sandy loam
H4 - 45 to 49 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 45 to 49 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 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A

MbF—Morical-Wind River families complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: htsw

Custom Soil Resource Report

Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Morical family and similar soils: 40 percent
Wind river family and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Morical Family

Setting

Landform: Mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 50 inches: loam
H3 - 50 to 54 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 50 to 54 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
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Description of Wind River 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 granodiorite

Typical profile

H1 - 0 to 19 inches: sandy loam
H2 - 19 to 34 inches: sandy loam
H3 - 34 to 45 inches: sandy loam

Custom Soil Resource Report

H4 - 45 to 49 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 45 to 49 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 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

PsD—Avawatz-Oak Glen, dry families association, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: htsz

Elevation: 3,200 to 6,000 feet

Mean annual precipitation: 10 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

Avawatz family and similar soils: 50 percent

Oak glen family, dry, and similar soils: 25 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Avawatz Family

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: gravelly loamy coarse sand

H2 - 8 to 24 inches: gravelly coarse sand

H3 - 24 to 60 inches: stratified gravelly loamy coarse sand to loamy coarse sand

Properties and qualities

Slope: 2 to 10 percent

Custom Soil Resource Report

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 to very high (5.67 to 19.98 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 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A

Description of Oak Glen Family, Dry

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 23 inches: coarse sandy loam
H3 - 23 to 60 inches: loamy sand

Properties and qualities

Slope: 5 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
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Wilshire family

Percent of map unit: 9 percent

Riverwash

Percent of map unit: 8 percent

Hodgson family

Percent of map unit: 8 percent

Rw—Riverwash

Map Unit Setting

National map unit symbol: htt3
Elevation: 1,600 to 6,000 feet
Mean annual precipitation: 10 to 35 inches
Mean annual air temperature: 46 to 64 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 2 to 10 percent
Frequency of flooding: Frequent

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

W—Water areas

Map Unit Composition

Water: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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

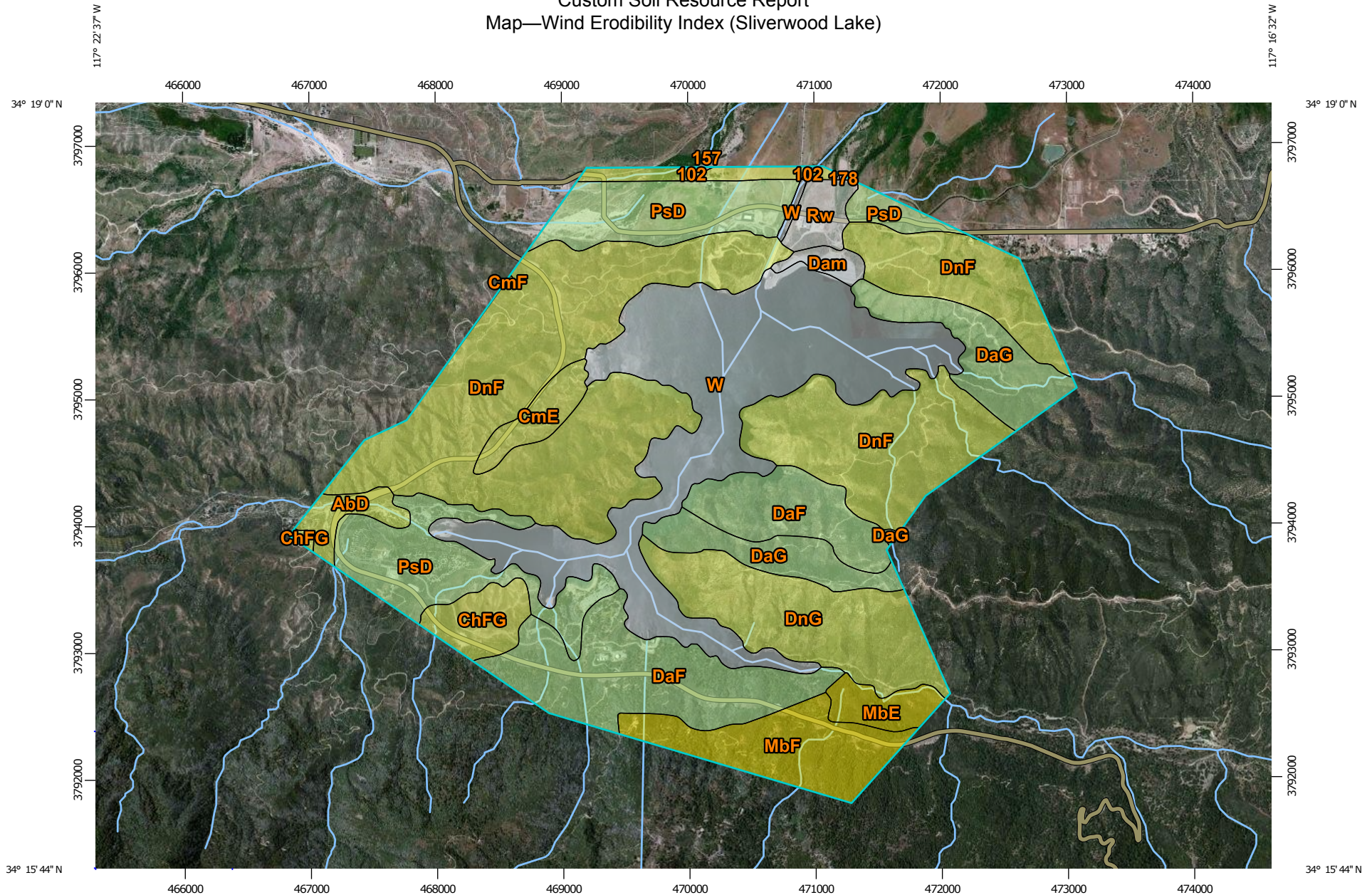
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

Wind Erodibility Index (Sliverwood Lake)

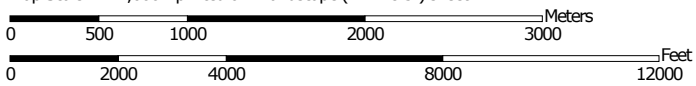
The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface 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 (Sliverwood Lake)




Map Scale: 1:42,600 if printed on A landscape (11" x 8.5") sheet.



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 Points

	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


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: San Bernardino County, California, Mojave River Area
 Survey Area Data: Version 7, Sep 8, 2014

Soil Survey Area: San Bernardino National Forest Area, California
 Survey Area Data: Version 7, Sep 30, 2014

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: May 5, 2010—Jul 3, 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 (Sliverwood Lake)

Wind Erodibility Index— Summary by Map Unit — San Bernardino County, California, Mojave River Area (CA671)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
102	AVAWATZ-OAK GLEN ASSOCIATION, GENTLY SLOPING*	86	51.3	1.1%
157	RIVERWASH		0.7	0.0%
178	WATER		1.8	0.0%
Subtotals for Soil Survey Area			53.8	1.1%
Totals for Area of Interest			4,738.1	100.0%

Wind Erodibility Index— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
AbD	Soboba-Hanford families association, 2 to 15 percent slopes	86	54.9	1.2%
ChFG	Typic Xerorthents, warm-Typic Haploxeralfs-Badland complex, 30 to 100 percent slopes	86	94.2	2.0%
CmE	Modesto-Osito families association, 15 to 30 percent slopes	86	68.4	1.4%
CmF	Osito-Modesto families association, 30 to 50 percent slopes	86	1.0	0.0%
DaF	Pacifico-Wapi families complex, 30 to 50 percent slopes	134	546.3	11.5%
DaG	Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes	134	292.8	6.2%
Dam	Dams		30.3	0.6%
DnF	Trigo family-Lithic Xerorthents, warm complex, 30 to 50 percent slopes	86	1,499.6	31.6%
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	86	341.5	7.2%
MbE	Morical-Wind River families complex, 15 to 30 percent slopes	56	65.7	1.4%
MbF	Morical-Wind River families complex, 30 to 50 percent slopes	56	228.6	4.8%

Custom Soil Resource Report

Wind Erodibility Index— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
PsD	Avawatz-Oak Glen, dry families association, 2 to 15 percent slopes	134	514.8	10.9%
Rw	Riverwash		57.4	1.2%
W	Water areas		888.7	18.8%
Subtotals for Soil Survey Area			4,684.3	98.9%
Totals for Area of Interest			4,738.1	100.0%

Rating Options—Wind Erodibility Index (Sliverwood Lake)

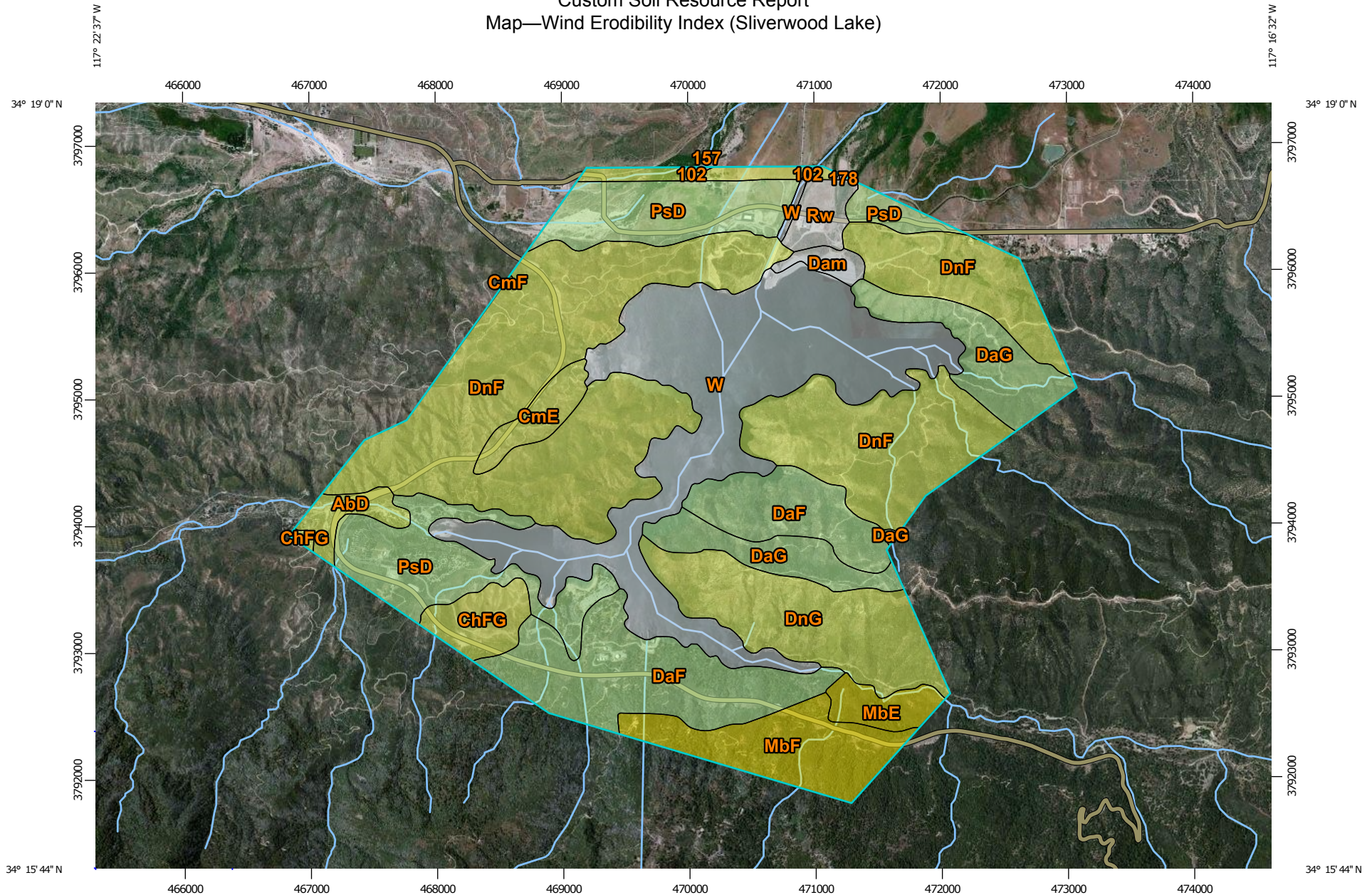
Units of Measure: tons per acre per year
Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: Higher

Wind Erodibility Index (Sliverwood Lake)

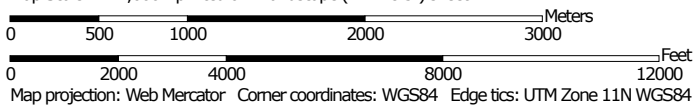
The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface 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 (Sliverwood Lake)




Map Scale: 1:42,600 if printed on A landscape (11" x 8.5") sheet.















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 Points

	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


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: San Bernardino County, California, Mojave River Area
 Survey Area Data: Version 7, Sep 8, 2014

Soil Survey Area: San Bernardino National Forest Area, California
 Survey Area Data: Version 7, Sep 30, 2014

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: May 5, 2010—Jul 3, 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 (Sliverwood Lake)

Wind Erodibility Index— Summary by Map Unit — San Bernardino County, California, Mojave River Area (CA671)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
102	AVAWATZ-OAK GLEN ASSOCIATION, GENTLY SLOPING*	86	51.3	1.1%
157	RIVERWASH		0.7	0.0%
178	WATER		1.8	0.0%
Subtotals for Soil Survey Area			53.8	1.1%
Totals for Area of Interest			4,738.1	100.0%

Wind Erodibility Index— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
AbD	Soboba-Hanford families association, 2 to 15 percent slopes	86	54.9	1.2%
ChFG	Typic Xerorthents, warm-Typic Haploxeralfs-Badland complex, 30 to 100 percent slopes	86	94.2	2.0%
CmE	Modesto-Osito families association, 15 to 30 percent slopes	86	68.4	1.4%
CmF	Osito-Modesto families association, 30 to 50 percent slopes	86	1.0	0.0%
DaF	Pacifico-Wapi families complex, 30 to 50 percent slopes	134	546.3	11.5%
DaG	Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes	134	292.8	6.2%
Dam	Dams		30.3	0.6%
DnF	Trigo family-Lithic Xerorthents, warm complex, 30 to 50 percent slopes	86	1,499.6	31.6%
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	86	341.5	7.2%
MbE	Morical-Wind River families complex, 15 to 30 percent slopes	56	65.7	1.4%
MbF	Morical-Wind River families complex, 30 to 50 percent slopes	56	228.6	4.8%

Custom Soil Resource Report

Wind Erodibility Index— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
PsD	Avawatz-Oak Glen, dry families association, 2 to 15 percent slopes	134	514.8	10.9%
Rw	Riverwash		57.4	1.2%
W	Water areas		888.7	18.8%
Subtotals for Soil Survey Area			4,684.3	98.9%
Totals for Area of Interest			4,738.1	100.0%

Rating Options—Wind Erodibility Index (Sliverwood Lake)

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 C

NRCS Custom Soil Resource Report for the Devil Canyon Area

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United States
Department of
Agriculture

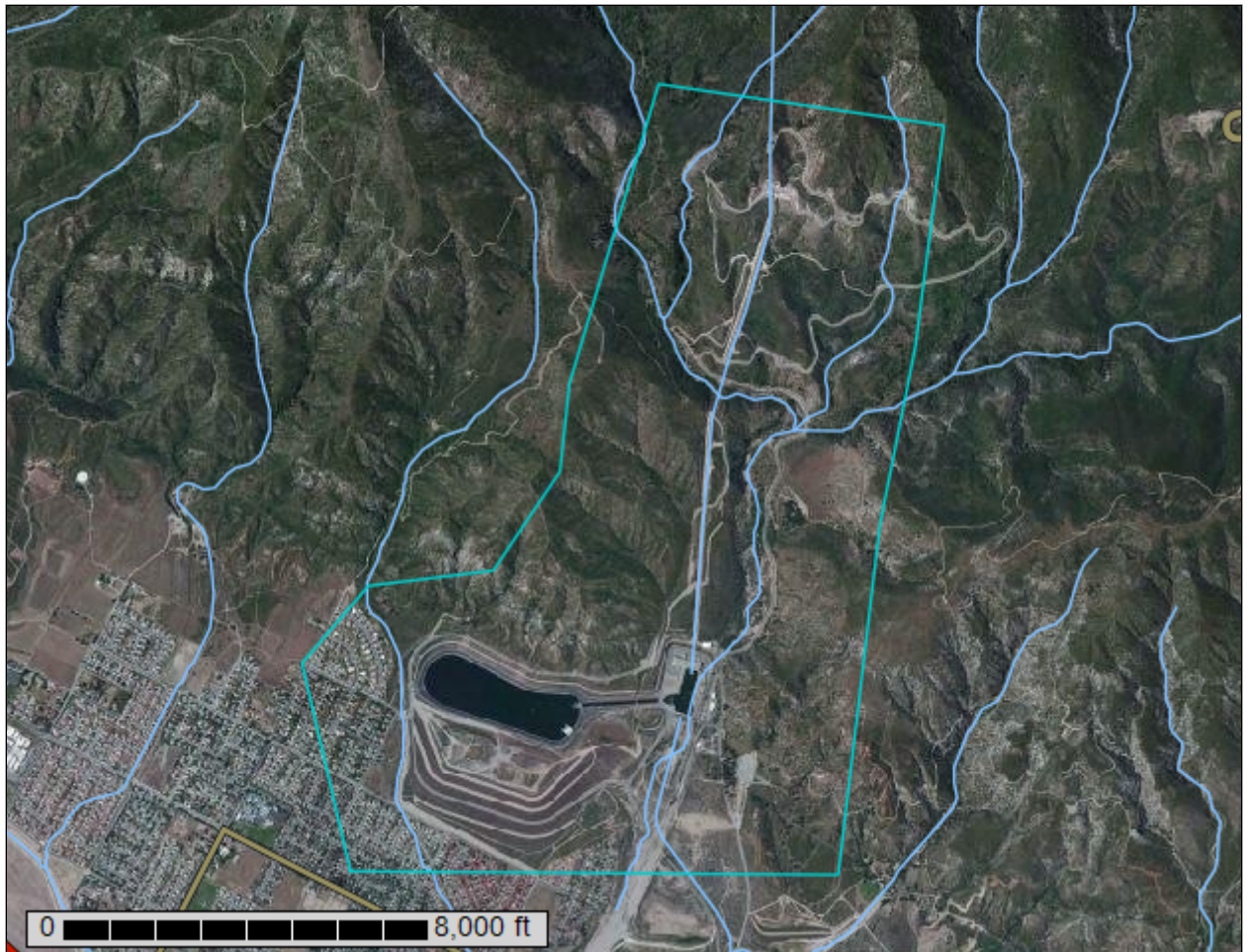
NRCS

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 San Bernardino County Southwestern Part, California, and San Bernardino National Forest Area, California

Devil Canyon



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

Preface	2
How Soil Surveys Are Made	5
Soil Map	7
Soil Map.....	8
Legend.....	9
Map Unit Legend.....	10
Map Unit Descriptions.....	11
San Bernardino County Southwestern Part, California.....	13
Cr—Cieneba-Rock outcrop complex, 30 to 50 percent slopes, MLRA 20.....	13
HaC—Hanford coarse sandy loam, 2 to 9 percent slopes.....	14
HaD—Hanford coarse sandy loam, 9 to 15 percent slopes.....	15
RmE2—Ramona sandy loam, 15 to 30 percent slopes, eroded.....	16
SoC—Soboba gravelly loamy sand, 0 to 9 percent slopes.....	17
SpC—Soboba stony loamy sand, 2 to 9 percent slopes.....	18
TvC—Tujunga gravelly loamy sand, 0 to 9 percent slopes.....	20
W—Water.....	21
San Bernardino National Forest Area, California.....	22
ChDE—Ramona family-Typic Xerorthents, warm association, 2 to 30 percent slopes.....	22
CmF—Osito-Modesto families association, 30 to 50 percent slopes.....	23
DnG—Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes.....	25
EsD—Riverwash-Soboba families association, 2 to 15 percent slopes.....	26
FLG—Springdale family-Lithic Xerorthents association,dry, 50 to 75 percent slopes.....	28
Soil Information for All Uses	30
Soil Properties and Qualities.....	30
Soil Erosion Factors.....	30
K Factor, Whole Soil (Devil Canyon).....	30
References	35

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

Custom Soil Resource Report

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.

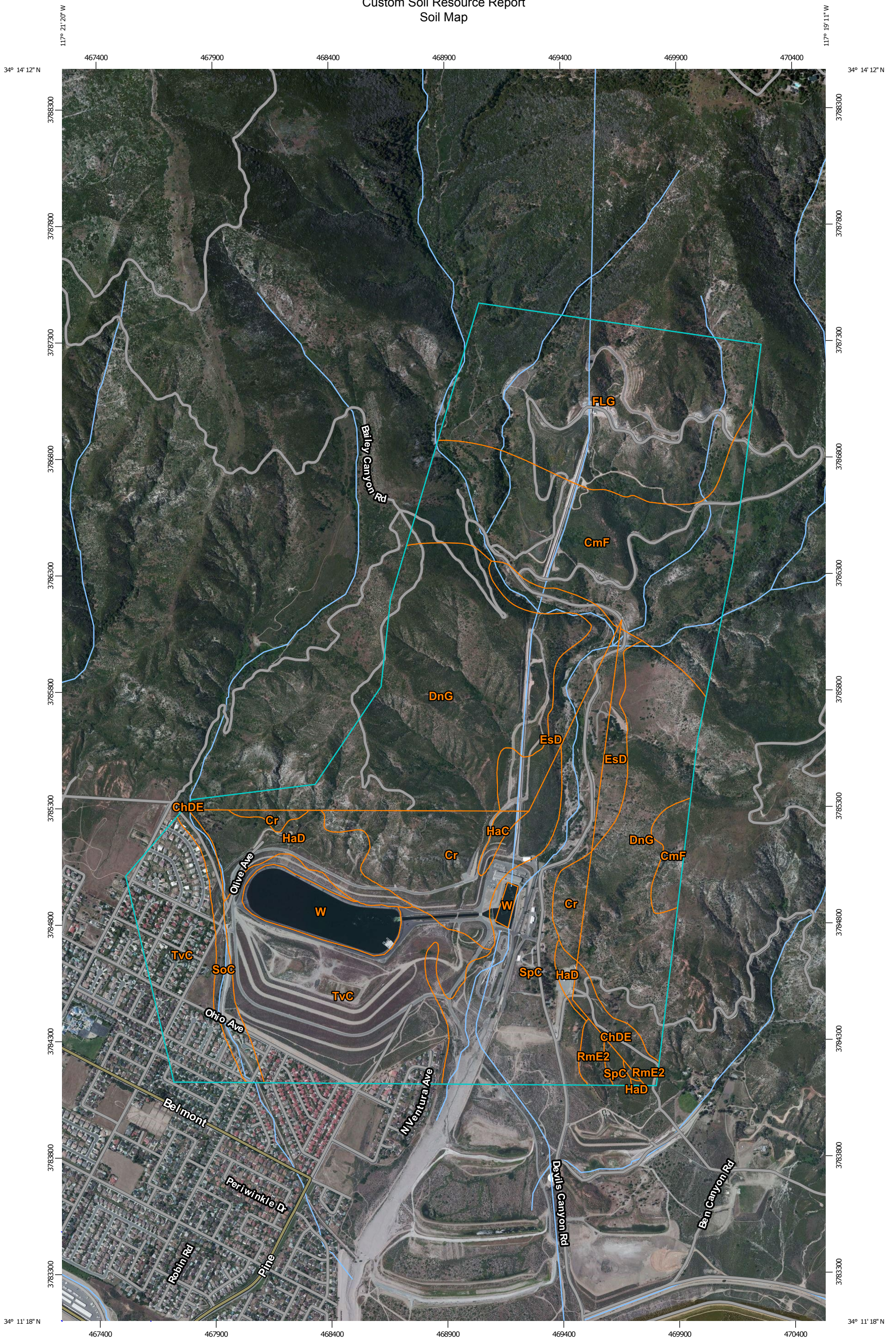
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

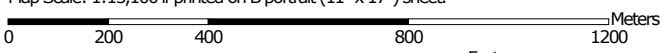
Soil Map

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: 1:15,100 if printed on B portrait (11" x 17") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Custom Soil Resource Report


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: San Bernardino County Southwestern Part, California
 Survey Area Data: Version 7, Sep 3, 2015

Soil Survey Area: San Bernardino National Forest Area, California
 Survey Area Data: Version 7, Sep 30, 2014

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: May 25, 2010—Jun 3, 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

San Bernardino County Southwestern Part, California (CA677)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cr	Cieneba-Rock outcrop complex, 30 to 50 percent slopes, MLRA 20	95.3	6.8%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	4.6	0.3%
HaD	Hanford coarse sandy loam, 9 to 15 percent slopes	47.0	3.4%
RmE2	Ramona sandy loam, 15 to 30 percent slopes, eroded	7.2	0.5%
SoC	Soboba gravelly loamy sand, 0 to 9 percent slopes	21.2	1.5%
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	136.0	9.7%
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	233.5	16.7%
W	Water	38.0	2.7%
Subtotals for Soil Survey Area		582.8	41.7%
Totals for Area of Interest		1,398.8	100.0%

San Bernardino National Forest Area, California (CA777)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ChDE	Ramona family-Typic Xerorthents, warm association, 2 to 30 percent slopes	14.2	1.0%
CmF	Osito-Modesto families association, 30 to 50 percent slopes	201.6	14.4%
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	331.3	23.7%
EsD	Riverwash-Soboba families association, 2 to 15 percent slopes	60.4	4.3%
FLG	Springdale family-Lithic Xerorthents association, dry, 50 to 75 percent slopes	208.4	14.9%
Subtotals for Soil Survey Area		816.0	58.3%
Totals for Area of Interest		1,398.8	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

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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.

San Bernardino County Southwestern Part, California

Cr—Cieneba-Rock outcrop complex, 30 to 50 percent slopes, MLRA 20

Map Unit Setting

National map unit symbol: 2tb7z
Elevation: 500 to 5,500 feet
Mean annual precipitation: 10 to 39 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 240 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 60 percent
Rock outcrop: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Mountain slopes, hillslopes
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, concave
Parent material: Residuum weathered from granite

Typical profile

A - 0 to 8 inches: sandy loam
C - 8 to 14 inches: sandy loam

Properties and qualities

Slope: 30 to 50 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 12 to 20 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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): 6e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Minor Components

Typic xerorthent, eroded

Percent of map unit: 5 percent

Typic xerorthent, moderately deep

Percent of map unit: 5 percent

HaC—Hanford coarse sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hck3

Elevation: 150 to 900 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 63 degrees F

Frost-free period: 250 to 280 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 12 inches: sandy loam

H2 - 12 to 60 inches: fine sandy loam, sandy loam, coarse sandy loam

H2 - 12 to 60 inches:

H2 - 12 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

Custom Soil Resource Report

Frequency of flooding: Rare

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 20.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Minor Components

Greenfield, sandy loam

Percent of map unit: 10 percent

Tujunga, loamy sand

Percent of map unit: 5 percent

HaD—Hanford coarse sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hck4

Elevation: 150 to 900 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 63 degrees F

Frost-free period: 250 to 280 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 12 inches: sandy loam

H2 - 12 to 60 inches: fine sandy loam, sandy loam, coarse sandy loam

H2 - 12 to 60 inches:

H2 - 12 to 60 inches:

Properties and qualities

Slope: 9 to 15 percent

Depth to restrictive feature: More than 80 inches

Custom Soil Resource Report

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 20.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Greenfield, sandy loam

Percent of map unit: 10 percent

Ramona, sandy loam

Percent of map unit: 5 percent

RmE2—Ramona sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hckl
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 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): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: sandy loam
H2 - 23 to 32 inches: loam
H3 - 32 to 54 inches: sandy clay loam, clay loam

Custom Soil Resource Report

H3 - 32 to 54 inches: sandy loam, loam

H4 - 54 to 60 inches:

H4 - 54 to 60 inches:

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: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Minor Components

Greenfield, sandy loam

Percent of map unit: 10 percent

Monserate, sandy loam

Percent of map unit: 5 percent

SoC—Soboba gravelly loamy sand, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hckt

Elevation: 30 to 4,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 61 to 63 degrees F

Frost-free period: 175 to 250 days

Farmland classification: Not prime farmland

Map Unit Composition

Soboba and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Soboba

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: gravelly loamy sand
H2 - 12 to 36 inches: very gravelly loamy sand
H3 - 36 to 60 inches: very stony sand

Properties and qualities

Slope: 0 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 to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water storage in profile: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Delhi, fine sand

Percent of map unit: 5 percent

Unnamed

Percent of map unit: 5 percent

Tujunga, gravelly loam

Percent of map unit: 3 percent

Unnamed

Percent of map unit: 2 percent
Landform: Drainageways

SpC—Soboba stony loamy sand, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hckv
Elevation: 10 to 4,200 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 210 to 350 days
Farmland classification: Not prime farmland

Custom Soil Resource Report

Map Unit Composition

Soboba and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Soboba

Setting

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

A - 0 to 10 inches: very stony loamy sand

C - 10 to 60 inches: very stony sand

Properties and qualities

Slope: 2 to 9 percent

Percent of area covered with surface fragments: 0.1 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 to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: Rare

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)

Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A

Minor Components

Hanford

Percent of map unit: 5 percent

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Tujunga, gravelly loamy coarse sand

Percent of map unit: 5 percent

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ramona

Percent of map unit: 5 percent

Landform: Alluvial fans, terraces

Landform position (three-dimensional): Tread

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear

TvC—Tujunga gravelly loamy sand, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcl2
Elevation: 10 to 1,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 250 to 350 days
Farmland classification: Not prime farmland

Map Unit Composition

Tujunga and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tujunga

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 36 inches: gravelly loamy sand
H2 - 36 to 60 inches: gravelly sand, gravelly loamy sand
H2 - 36 to 60 inches:

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat 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)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Drainageways

Soboba, gravelly loamy sand

Percent of map unit: 5 percent

Delhi, fine sand

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

San Bernardino National Forest Area, California

ChDE—Ramona family-Typic Xerorthents, warm association, 2 to 30 percent slopes

Map Unit Setting

National map unit symbol: htrg
Elevation: 2,000 to 4,000 feet
Mean annual precipitation: 15 to 25 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

Ramona family and similar soils: 60 percent
Typic xerorthents, warm, and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona Family

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 18 inches: gravelly sandy loam
H3 - 18 to 48 inches: cobbly sandy clay loam
H4 - 48 to 60 inches: gravelly sandy loam
H5 - 60 to 70 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 20 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 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Description of Typic Xerorthents, Warm

Setting

Landform: Terraces

Custom Soil Resource Report

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 30 inches: sandy loam
H3 - 30 to 34 inches: weathered bedrock

Properties and qualities

Slope: 10 to 30 percent
Depth to restrictive feature: 20 to 34 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
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 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B

CmF—Osito-Modesto families association, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: htrk
Elevation: 1,800 to 4,200 feet
Mean annual precipitation: 15 to 25 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

Osito family and similar soils: 40 percent
Modesto family and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osito Family

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone

Custom Soil Resource Report

Typical profile

H1 - 0 to 5 inches: coarse sandy loam
H2 - 5 to 13 inches: coarse sandy loam
H3 - 13 to 17 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 13 to 17 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: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D

Description of Modesto Family

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 28 inches: loam
H3 - 28 to 50 inches: fine sandy loam
H4 - 50 to 54 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 50 to 54 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
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

DnG—Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htrz
Elevation: 1,790 to 6,400 feet
Mean annual precipitation: 10 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: 50 percent
Lithic xerorthents, warm, and similar soils: 20 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trigo Family

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 granodiorite

Typical profile

H1 - 0 to 3 inches: coarse sandy loam
H2 - 3 to 12 inches: coarse sandy loam
H3 - 12 to 16 inches: weathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 12 to 16 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: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Lithic Xerorthents, Warm

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 18 inches: gravelly sandy loam
H2 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 18 to 22 inches to lithic bedrock
Natural drainage class: Excessively drained
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 1.4 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: 8 percent

Unnamed, shallow fine sandy loam soils

Percent of map unit: 8 percent

Springdale family

Percent of map unit: 7 percent

Ramona family

Percent of map unit: 7 percent

EsD—Riverwash-Soboba families association, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: hts5
Elevation: 1,600 to 4,000 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days

Custom Soil Resource Report

Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 50 percent

Soboba family and similar soils: 30 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: Linear

Across-slope shape: Linear

Parent material: Alluvium

Properties and qualities

Slope: 2 to 10 percent

Frequency of flooding: Frequent

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w

Description of Soboba Family

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 8 inches: very cobbly loamy sand

H2 - 8 to 24 inches: very cobbly sand

H3 - 24 to 60 inches: stratified very cobbly sand to very cobbly loamy fine sand

Properties and qualities

Slope: 5 to 15 percent

Percent of area covered with surface fragments: 3.0 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 to very high (5.67 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

FLG—Springdale family-Lithic Xerorthents association,dry, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htsc
Elevation: 3,000 to 7,000 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Springdale family, dry, and similar soils: 40 percent
Lithic xerorthents, dry, and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Springdale Family, Dry

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 granite

Typical profile

H1 - 0 to 5 inches: gravelly loamy coarse sand
H2 - 5 to 25 inches: very gravelly loamy sand
H3 - 25 to 45 inches: very gravelly coarse sand
H4 - 45 to 49 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 70 percent
Depth to restrictive feature: 45 to 49 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Description of Lithic Xerorthents, Dry

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 granite

Typical profile

H1 - 0 to 18 inches: very gravelly loamy sand
H2 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 60 to 75 percent
Depth to restrictive feature: 18 to 22 inches to lithic bedrock
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

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

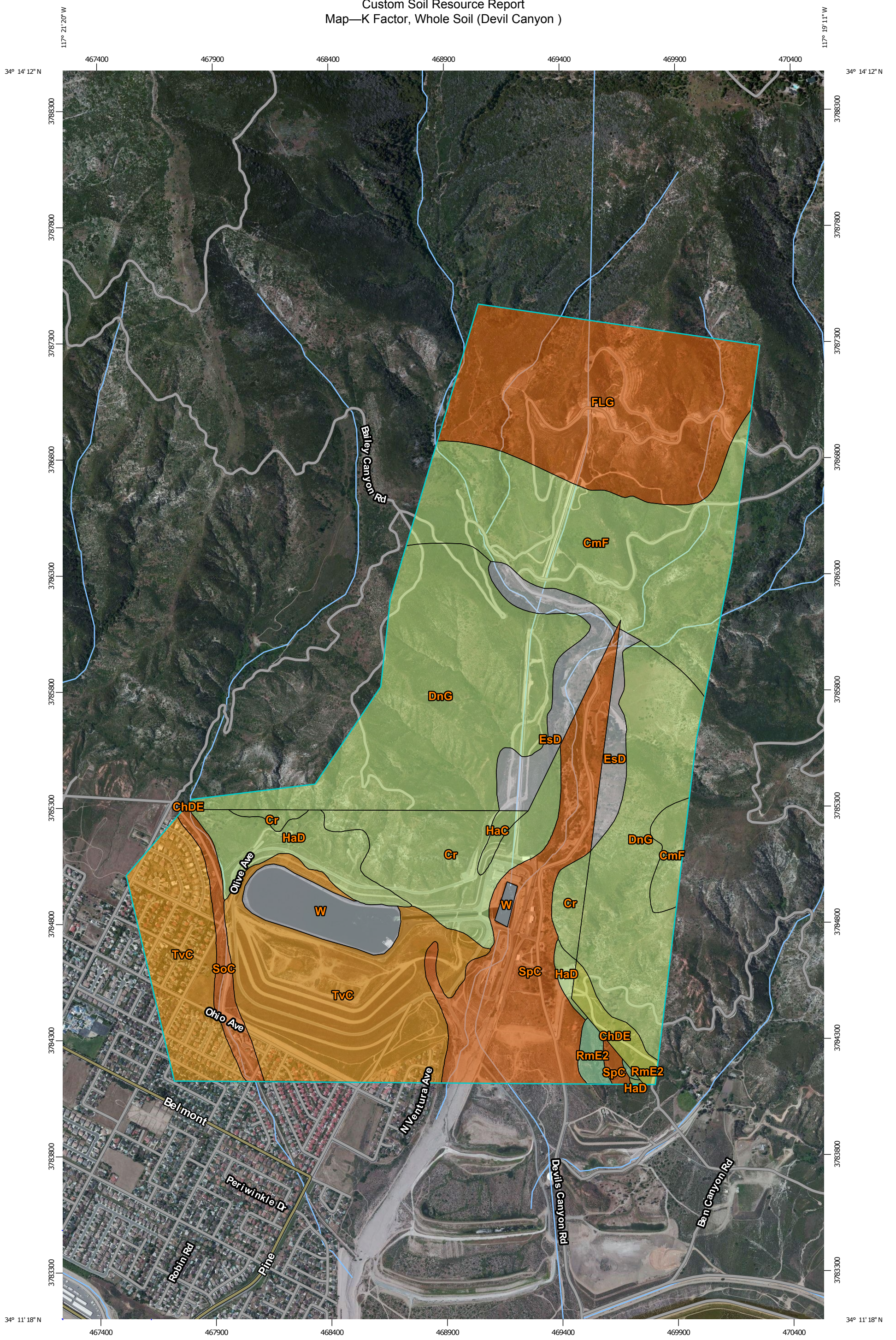
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil (Devil Canyon)

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 (Devil Canyon)



Map Scale: 1:15,100 if printed on B portrait (11" x 17") sheet.

0 200 400 800 1200 Meters


0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Custom Soil Resource Report
















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: San Bernardino County Southwestern Part, California
 Survey Area Data: Version 7, Sep 3, 2015

Soil Survey Area: San Bernardino National Forest Area, California
 Survey Area Data: Version 7, Sep 30, 2014

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: May 25, 2010—Jun 3, 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.

Custom Soil Resource Report

Table—K Factor, Whole Soil (Devil Canyon)

K Factor, Whole Soil— Summary by Map Unit — San Bernardino County Southwestern Part, California (CA677)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Cr	Cieneba-Rock outcrop complex, 30 to 50 percent slopes, MLRA 20	.24	95.3	6.8%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	.24	4.6	0.3%
HaD	Hanford coarse sandy loam, 9 to 15 percent slopes	.24	47.0	3.4%
RmE2	Ramona sandy loam, 15 to 30 percent slopes, eroded	.28	7.2	0.5%
SoC	Soboba gravelly loamy sand, 0 to 9 percent slopes	.05	21.2	1.5%
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	.05	136.0	9.7%
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	.10	233.5	16.7%
W	Water		38.0	2.7%
Subtotals for Soil Survey Area			582.8	41.7%
Totals for Area of Interest			1,398.8	100.0%

K Factor, Whole Soil— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ChDE	Ramona family-Typic Xerorthents, warm association, 2 to 30 percent slopes	.20	14.2	1.0%
CmF	Osito-Modesto families association, 30 to 50 percent slopes	.24	201.6	14.4%
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	.24	331.3	23.7%
EsD	Riverwash-Soboba families association, 2 to 15 percent slopes		60.4	4.3%
FLG	Springdale family-Lithic Xerorthents association,dry, 50 to 75 percent slopes	.05	208.4	14.9%

Custom Soil Resource Report

K Factor, Whole Soil— Summary by Map Unit — San Bernardino National Forest Area, California (CA777)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Subtotals for Soil Survey Area			816.0	58.3%
Totals for Area of Interest			1,398.8	100.0%

Rating Options—K Factor, Whole Soil (Devil Canyon)

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 D

DWR's Botanical Resources Study Comprehensive Species Inventory

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2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
ABICON	<i>Abies concolor</i>	white fir	Pinaceae - Pine Family	Native	tree	-	X	X	X	
ACEMAC	<i>Acer macrophyllum</i>	bigleaf maple	Sapindaceae - Soapberry Family	Native	tree	-		X	X	X
ACHMIL	<i>Achillea millefolium</i>	yarrow	Asteraceae - Sunflower Family	Native	perennial herb	-	X		X	
ACMAME	<i>Acmispon americanus</i>	American bird's foot trefoil	Fabaceae - Pea Family	Native	annual herb	-	X		X	X
ACMGLA	<i>Acmispon glaber</i>	deerweed	Fabaceae - Pea Family	Native	perennial herb	-	X	X		X
ACMSTR	<i>Acmispon strigosus</i>	strigose lotus	Fabaceae - Pea Family	Native	annual herb	-	X	X		X
ACOMIC	<i>Acourtia microcephala</i>	sacapaote	Asteraceae - Sunflower Family	Native	perennial herb	-	X	X		
ADEFAS	<i>Adenostoma fasciculatum</i>	chamise	Rosaceae - Rose Family	Native	shrub	-	X	X	X	X
AGEADE	<i>Ageratina adenophora</i>	Eupatory	Asteraceae - Sunflower Family	Invasive non-native (Moderate)	perennial herb	-		X		
AGORET	<i>Agoseris retrorsa</i>	spear leafed agoseris	Asteraceae - Sunflower Family	Native	perennial herb	-	X			
AGRCAP	<i>Agrostis capillaris</i>	colonial bentgrass	Poaceae - Grass Family	Non-native	perennial grass	-	X		X	
AGREXA	<i>Agrostis exarata</i>	spike bentgrass	Poaceae - Grass Family	Native	perennial grass	-	X		X	
AILALT	<i>Ailanthus altissima</i>	tree of heaven	Simaroubaceae - Quassia or Simarouba Family	Invasive non-native (Moderate)	tree	-		X		X
ALITRI	<i>Alisma triviale</i>	northern water plantain	Alismataceae - Water Plantain Family	Native	perennial herb (aquatic)	-	X		X	
ALLDIV	<i>Allophyllum divaricatum</i>	purple false gilia	Polemoniaceae - Phlox Family	Native	annual herb	-	X			
ALLINT	<i>Allophyllum integrifolium</i>	white false gilia	Polemoniaceae - Phlox Family	Native	annual herb	-	X			
ALNRHO	<i>Alnus rhombifolia</i>	white alder	Betulaceae - Birch Family	Native	tree	-		X	X	X
AMABLI	<i>Amaranthus blitoides</i>	prostrate pigweed	Amaranthaceae - Amaranth Family	Native	annual herb	-	X			
AMBACA	<i>Ambrosia acanthicarpa</i>	annual burweed	Asteraceae - Sunflower Family	Native	annual herb	-	X	X		
AMBPSI	<i>Ambrosia psilostachya</i>	western ragweed	Asteraceae - Sunflower Family	Native	perennial herb	-		X		X

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
AMB SP.	<i>Ambrosia</i> sp.	ragweed species	Asteraceae – Sunflower Family	Native or Non-Native	annual	–	X			
AMSMEN	<i>Amsinckia menziesii</i>	fiddleneck	Boraginaceae – Borage Family	Native	annual herb	–		X	X	
ANTCAU	<i>Anthriscus caucalis</i>	bur chervil	Aplaceae - Carrot Family	Non-native	annual herb/vine	–	X		X	
AQUFOR	<i>Aquilegia formosa</i>	crimson columbine	Ranunculaceae - Buttercup Family	Native	perennial herb	–	X			
ARCGLAN	<i>Arctostaphylos glandulosa</i>	Eastwood manzanita	Ericaceae - Heath Family	Native	shrub	–	X	X	X	
ARCGLAU	<i>Arctostaphylos glauca</i>	big berry manzanita	Ericaceae - Heath Family	native	tree, shrub	–	X	X	X	X
ARCPUN	<i>Arctostaphylos pungens</i>	Mexican manzanita	Ericaceae - Heath Family	Native	shrub	–	X			
ARGMUN	<i>Argemone munita</i>	chicolote, prickly poppy	Papaveraceae – Poppy Family	Native	annual/perennial herb	–	X			
ARTCAL	<i>Artemisia californica</i>	California sagebrush	Asteraceae – Sunflower Family	Native	shrub	–		X	X	X
ARTDOU	<i>Artemisia douglasiana</i>	mugwort	Asteraceae – Sunflower Family	Native	perennial herb	–	X	X	X	X
ARTDRA	<i>Artemisia dracunculus</i>	herbaceous sagewort	Asteraceae – Sunflower Family	Native	perennial herb	–	X	X		
ARTLUD	<i>Artemisia ludoviciana</i>	mugwort, silver wormwood	Asteraceae – Sunflower Family	Native	perennial herb	–	X		X	
ARTTRI	<i>Artemisia tridentata</i>	big sagebrush	Asteraceae – Sunflower Family	Native	shrub	–	X			
ASCFAS	<i>Asclepias fascicularis</i>	narrow leaf milkweed	Apocynaceae - Dogbone family	Native	perennial herb	–	X		X	
AVEBAR	<i>Avena barbata</i>	slender wild oat	Poaceae – Grass Family	Invasive non-native (Moderate)	annual/perennial grass	–	X	X	X	X
AVEFAT	<i>Avena fatua</i>	wild oat	Poaceae – Grass Family	Invasive non-native (Moderate)	annual grass	–	X		X	
BACPIL	<i>Baccharis pilularis</i>	coyote brush	Asteraceae – Sunflower Family	Native	shrub	–	X		X	
BACSAL	<i>Baccharis salicifolia</i>	mule fat	Asteraceae – Sunflower Family	Native	shrub	–	X	X	X	X
BARORT	<i>Barbarea orthoceras</i>	American rocket	Brassicaceae – Mustard Family	Native	perennial herb	–	X			
BLOCRO	<i>Bloomeria crocea</i> var. <i>crocea</i>	common goldenstar	Themidaceae - Brodiaea Family	Native	perennial herb	–	X			
BOECAL	<i>Boechera californica</i>	California rockcress	Brassicaceae – Mustard Family	Native	perennial herb	–		X		X

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
BOEPUL	<i>Boechea pulchra</i>	beautiful rockcress	Brassicaceae – Mustard Family	Native	perennial herb	–	X		X	
BOESPA	<i>Boechea sparsiflora</i>	sicklepod rockcress	Brassicaceae – Mustard Family	Native	perennial herb	–	X	X		
BRANIG	<i>Brassica nigra</i>	black mustard	Brassicaceae – Mustard Family	Invasive non-native (Moderate)	annual herb	–	X	X	X	X
BRATOU	<i>Brassica tournefortii</i>	Saharan mustard	Brassicaceae – Mustard Family	Invasive non-native (High)	annual herb	–	X			
BRICAL	<i>Brickellia californica</i>	California brickellbush	Asteraceae – Sunflower Family	Native	perennial herb	–		X		
BROELE-ELE	<i>Brodiaea elegans</i> ssp. <i>elegans</i>	harvest brodiaea	Themidaceae - Brodiaea Family	Native	perennial herb	–	X			
BROTER-KER	<i>Brodiaea terrestris</i> ssp. <i>kernensis</i>	Kern dwarf brodiaea	Themidaceae - Brodiaea Family	Native	perennial herb	–	X			
BRODIA	<i>Bromus diandrus</i>	ripgut brome	Poaceae – Grass Family	Invasive non-native (Moderate)	annual grass	–	X	X	X	X
BROHOR	<i>Bromus hordeaceus</i>	soft chess	Poaceae – Grass Family	Invasive non-native (Limited)	annual grass	–	X	X	X	
BROMAD	<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	Poaceae – Grass Family	Invasive non-native (High)	annual grass	–	X	X	X	X
BROTEC	<i>Bromus tectorum</i>	cheat grass	Poaceae – Grass Family	Invasive non-native (High)	annual grass	–	X	X	X	X
BUTCAP	<i>Butia capitata</i>	pindo palm	Arecaceae - Palm Family	Non-native	tree	–		X		
CALMEN	<i>Calandrinia menziesii</i>	red maids	Montiaceae – Montia Family	Native	annual herb	–	X			
CALCIT	<i>Callistemon citrinus</i>	crimson bottlebrush	Myrtaceae - Myrtle Family	Non-native	tree/shrub	–		X		
CALDEC	<i>Calocedrus decurrens</i>	incense cedar	Cupressaceae – Cypress Family	Native	tree	–	X		X	X
CALPLU	<i>Calochortus plummerae</i>	Plummer's mariposa lily	Liliaceae - Lily Family	Native	perennial bulbiferous	CRPR 4.2	X	X		
CALMON	<i>Calyptidium monandrum</i>	common pussypaws	Montiaceae – Montia Family	Native	annual herb	–	X			
CALOCC-FUL	<i>Calystegia occidentalis</i> ssp. <i>fulcrata</i>	chaparral false bindweed	Convolvulaceae – Morning-Glory Family	Native	perennial herb	–	X			
CAMCON	<i>Camissonia contorta</i>	contorted sun cup	Onagraceae- Evening Primrose Family	Native	annual herb	–	X			
CAMINT	<i>Camissoniopsis intermedia</i>	intermediate suncup	Onagraceae- Evening Primrose Family	Native	annual herb	–	X	X		

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CAMPAL-PAL	<i>Camissoniopsis pallida</i> ssp. <i>pallida</i>	pale suncup	Onagraceae-Evening Primrose Family	Native	annual herb	-	X			
CAMROB	<i>Camissoniopsis robusta</i>	robust suncup	Onagraceae-Evening Primrose Family	Native	annual herb	-	X			
CAPBUR-PAS	<i>Capsella bursa-pastoris</i>	Shepherd's purse	Brassicaceae - Mustard Family	Non-native	annual herb	-	X			
CARFLE	<i>Cardamine flexuosa</i>	woodland bittercress	Brassicaceae - Mustard Family	Non-native	annual/perennial herb	-	X			
CAR SP.	<i>Cardamine</i> sp.	bittercress species	Brassicaceae - Mustard Family	Native	annual/perennial herb	-	X		X	
CARPYC	<i>Carduus pycnocephalus</i>	Italian thistle	Asteraceae - Sunflower Family	Invasive non-native (Moderate)	annual herb	-	X	X	X	
CARALM	<i>Carex alma</i>	sturdy sedge	Cyperaceae - Sedge Family	Native	perennial grasslike herb	-	X		X	
CARMUL	<i>Carex multicaulis</i>	forest sedge	Cyperaceae - Sedge Family	Native	perennial grasslike herb	-	X		X	
CARPRA	<i>Carex praegracilis</i>	black creeper	Cyperaceae - Sedge Family	Native	perennial grasslike herb	-	X		X	
CARSCH	<i>Carex schottii</i>	Schott's sedge	Cyperaceae - Sedge Family	Native	perennial grasslike herb	-	X		X	
CAR SP.	<i>Carex</i> sp.	sedge species	Cyperaceae - Sedge Family		perennial grasslike herb	-	X		X	
CASCHR	<i>Castilleja chromosa</i>	desert paintbrush	Orobanchaceae - Broomrape family	Native	shrub	-	X			
CASFOL	<i>Castilleja foliolosa</i>	woolly paintbrush	Orobanchaceae - Broomrape family	Native	perennial herb	-	X			
CASLIN	<i>Castilleja linariifolia</i>	desert paintbrush	Orobanchaceae - Broomrape family	Native	perennial herb	-	X			
CASMIN	<i>Castilleja miniata</i>	Scarlet paintbrush	Orobanchaceae - Broomrape family	Native	perennial herb	-	X			
CEACRA	<i>Ceanothus crassifolius</i>	hoaryleaf ceanothus	Rhamnaceae - Buckthorn Family	Native	shrub	-		X	X	
CEAINT	<i>Ceanothus integririmus</i>	deer brush	Rhamnaceae - Buckthorn Family	Native	shrub	-		X	X	
CEALEU	<i>Ceanothus leucodermis</i>	chaparral whitethorn	Rhamnaceae - Buckthorn Family	Native	shrub	-	X	X	X	X
CEAOLI	<i>Ceanothus oliganthus</i>	hairy ceanothus	Rhamnaceae - Buckthorn Family	Native	shrub	-	X			
CEAPAL	<i>Ceanothus palmeri</i>	Palmer ceanothus	Rhamnaceae - Buckthorn Family	Native	shrub	-	X			

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CEAPAU	<i>Ceanothus pauciflorus</i> [C. greggii]	Mojave ceanothus	Rhamnaceae - Buckthorn Family	Native	shrub	-	X			
CEAPER	<i>Ceanothus perplexans</i>	cupped leaf ceanothus	Rhamnaceae - Buckthorn Family	Native	shrub	-	X			
CENBEN	<i>Centaurea benedicta</i>	blessed thistle	Asteraceae - Sunflower Family	Non-native	annual herb	-	X			
CENMEL	<i>Centaurea melitensis</i>	Tocalote	Asteraceae - Sunflower Family	Invasive non-native (Moderate)	annual herb	-	X	X	X	X
CERDEM	<i>Ceratophyllum demersum</i>	coon's tail	Ceratophyllaceae - Hornwort Family	Native	perennial herb	-	X			
CEROCC	<i>Cercis occidentalis</i>	western redbud	Fabaceae - Pea Family	Native	tree/shrub	-	X			
CERBET	<i>Cercocarpus betuloides</i>	birchleaf mountain mahogany	Rosaceae - Rose Family	Native	shrub	-	X	X		X
CHAGLA	<i>Chaenactis glabriuscula</i>	yellow pincushion	Asteraceae - Sunflower Family	Native	annual herb	-	X			
CHA SP.	<i>Chaenactis</i> sp.	pin cushion species	Asteraceae - Sunflower Family	Native	annual or perennial herb	-	X			
CHA SP.	<i>Chamaesyce</i> sp.	sandmat species	Euphorbiaceae - Spurge Family	Native or Non-Native	annual or perennial herb	-		X		
CHEALB	<i>Chenopodium album</i>	lamb's quarters	Chenopodiaceae - Goosefoot Family	Non-native	annual herb	-	X	X		X
CHECAL	<i>Chenopodium californicum</i>	California goosefoot	Chenopodiaceae - Goosefoot Family	Native	perennial herb	-	X			
CHEPRA	<i>Chenopodium pratericola</i>	desert goosefoot	Chenopodiaceae - Goosefoot Family	Native	annual herb	-	X			
CHLPOM	<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	soap plant	Agavaceae - Century Plant Family	Native	perennial herb	-	X		X	
CHO SP.	<i>Chorizanthe</i> sp.	spine flower species	Polygonaceae - Buckwheat Family	Native	annual herb	-	X		X	X
CIROCC	<i>Cirsium occidentale</i>	western thistle	Asteraceae - Sunflower Family	Native	perennial herb	-	X			
CIRVUL	<i>Cirsium vulgare</i>	bull thistle	Asteraceae - Sunflower Family	Invasive non-native (Moderate)	perennial herb	-	X	X	X	
CISINC	<i>Cistus incanus</i>	hairy rock rose	Cistaceae - Rock-rose Family	Non-native	shrub	-		X		X
CLABOT	<i>Clarkia bottae</i>	punchbowl godetia	Onagraceae - Evening Primrose Family	Native	annual herb	-	X			

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CLAHET	<i>Clarkia heterandra</i>	California gaura	Onagraceae-Evening Primrose Family	Native	annual herb	-	X			
CLAPUR-QUA	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	purple clarkia	Onagraceae-Evening Primrose Family	Native	annual herb	-	X			
CLARHO	<i>Clarkia rhomboidea</i>	diamond clarkia	Onagraceae - Evening Primrose Family	Native	annual herb	-	X			
CLAPAR	<i>Claytonia parviflora</i>	narrow leaved miner's lettuce	Montiaceae - Montia Family	Native	annual herb	-	X		X	X
CLAPER	<i>Claytonia perfoliata</i>	miner's lettuce	Montiaceae - Montia Family	Native	annual herb	-	X		X	
COLHET-AUS	<i>Collinsia heterophylla</i> var. <i>austromontana</i>	purple chinese houses	Plantaginaceae - Plantain Family	Native	annual herb	-	X			
COLPAR	<i>Collinsia parryi</i>	Parry's collinsia	Plantaginaceae - Plantain Family	Native	annual herb	-	X			
COLPAR	<i>Collinsia parviflora</i>	few flowered blue eyed mary	Scrophulariaceae - Figwort Family	Native	annual herb	-	X			
COLGRA	<i>Collomia grandiflora</i>	large-flowered collomia	Polemoniaceae - Phlox Family	Native	annual herb	-	X			
CONMAC	<i>Conium maculatum</i>	poison hemlock	Aplaceae - Carrot Family	Invasive non-native (Moderate)	perennial herb	-	X		X	
CONARV	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae - Morning-Glory Family	Non-native	perennial herb, vine	-	X		X	
CORRIG-SET	<i>Cordylanthus rigidus</i> ssp. <i>setiger</i>	bristly bird's beak	Orobanchaceae - Broomrape family	Native	annual herb (hemiparasitic)	-	X			
CORFIL-FIL	<i>Corethrogyne filaginifolia</i> var. <i>filaginifolia</i>	common sandaster	Asteraceae - Sunflower Family	Native	perennial herb	-	X		X	
CORSEL	<i>Cortaderia selloana</i>	Uruguayan pampas grass	Poaceae - Grass Family	Invasive non-native (High)	perennial grass	-	X			
CRACON	<i>Crassula connata</i>	pigmy weed	Crassulaceae - Stonecrop Family	Native	annual herb	-	X	X		
CROCAL	<i>Croton californicus</i>	California croton	Euphorbiaceae - Spurge Family	Native	perennial herb	-		X		X
CROSET	<i>Croton setiger</i>	turkey-mullein	Euphorbiaceae - Spurge Family	Native	annual herb	-	X	X		X
CRYBAR-BAR	<i>Cryptantha barbiger</i> var. <i>barbiger</i>	bearded cryptantha	Boraginaceae - Borage Family	Native	annual herb	-	X		X	
CRYDEC	<i>Cryptantha decipiens</i>	gravel cryptantha	Boraginaceae - Borage Family	Native	annual herb	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
CRYINT	<i>Cryptantha intermedia</i>	common cryptantha	Boraginaceae - Borage Family	Native	annual herb	-	X	X	X	X
CRYMUR	<i>Cryptantha muricata</i>	pointed cryptantha	Boraginaceae - Borage Family	Native	annual herb	-	X	X	X	
CUSCAL-CAL	<i>Cuscuta californica</i> var. <i>californica</i>	California witch's hair	Convolvulaceae - Morning-Glory Family	Native	annual herb, vine	-		X		
CYNECH	<i>Cynosurus echinatus</i>	annual dogtail grass	Poaceae - Grass Family	Non-native	annual grass	-	X		X	
CYPERY	<i>Cyperus erythrorhizos</i>	red rooted cyperus	Cyperaceae - Sedge Family	Native	annual grasslike herb	-	X			
DATGLO	<i>Datisca glomerata</i>	durango root	Datisceae - Datisca Family	Native	perennial herb	-	X			
DATWRI	<i>Datura wrightii</i>	jimsonweed	Solanaceae - Nightshade Family	Native	perennial herb	-	X	X		X
DAUCAR	<i>Daucus carota</i>	Queen Anne's lace	Aplacaeae - Carrot Family	Non-native	perennial herb	-	X		X	
DEL CAR	<i>Delphinium cardinale</i>	scarlet larkspur	Ranunculaceae - Buttercup Family	Native	perennial herb	-		X		X
DEL PAR-PAR	<i>Delphinium parryi</i> ssp. <i>parryi</i>	Parry's larkspur	Ranunculaceae - Buttercup Family	Native	perennial herb	-	X			
DENRIG	<i>Dendromecon rigida</i>	bush poppy	Papaveraceae - Poppy Family	Native	shrub	-	X			
DESINC	<i>Descurainia incana</i>	Mountain tansy mustard	Brassicaceae - Mustard Family	Native	perennial herb	-	X			
DESPIN	<i>Descurainia pinnata</i>	western tansy mustard	Brassicaceae - Mustard Family	Native	annual herb	-	X			
DESSOP	<i>Descurainia sophia</i>	herb sophia	Brassicaceae - Mustard Family	Invasive non-native (Limited)	annual herb	-	X			
DICFOR	<i>Dicentra formosa</i>	Pacific bleedinghearts	Papaveraceae - Poppy Family	Native	perennial herb	-	X			
DICCAP	<i>Dichelostemma capitatum</i>	blue dicks	Themidaceae - Brodiaea Family	Native	perennial herb	-	X	X	X	
DIMSIN	<i>Dimorphotheca sinuata</i>	African daisy	Asteraceae - Sunflower Family	Non-native	annual herb	-		X		
DRAVER	<i>Draba verna</i>	spring draba	Brassicaceae - Mustard Family	Native	annual herb	-	X			
DRYGLA	<i>Drymocallis glandulosa</i>	sticky cinquefoil	Rosaceae - Rose Family	Native	perennial herb	-	X			
DUDLAN	<i>Dudleya lanceolata</i>	lance-leaved dudleya	Crassulaceae - Stonecrop Family	Native	perennial herb	-	X			
DUD SP.	<i>Dudleya</i> sp.	dudleya species	Crassulaceae - Stonecrop Family	Native	perennial herb	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
ECHCRU-GAL	<i>Echinochloa crus-galli</i>	Japanese millet	Poaceae - Grass Family	Non-native	annual grass	-	X			
EHRCHR	<i>Ehrendorferia chrysantha</i>	golden eardrops	Papaveraceae - Poppy Family	Native	perennial herb	-		X		
ELAANG	<i>Elaeagnus angustifolia</i>	Russian olive	Oleaceae - Olive Family	Invasive non-native (Moderate)	tree	-		X		
ELEPAR	<i>Eleocharis parishii</i>	Parish's spike rush	Cyperaceae - Sedge Family	Native	annual/perennial grasslike herb	-	X		X	
ELEMAR	<i>Eleocharis macrostachya</i>	common spikerush	Cyperaceae - Sedge Family	Native	perennial grasslike herb	-	X		X	
ELYCON	<i>Elymus condensatus</i>	giant wild rye	Poaceae - Grass Family	Native	perennial grass	-		X		X
ELYGLA	<i>Elymus glaucus</i>	blue wildrye	Poaceae - Grass Family	Native	perennial grass	-	X	X	X	
ELYLAN	<i>Elymus lanceolatus</i>	thick spiked wheatgrass	Poaceae - Grass Family	Native	perennial grass	-	X		X	
ELYMUL	<i>Elymus multisetus</i>	big squirreltail grass	Poaceae - Grass Family	Native	perennial grass	-	X			
ELYTRI	<i>Elymus triticoides</i>	beardless wild rye	Poaceae - Grass Family	Native	perennial grass	-	X		X	
EMMPEN-PEN	<i>Emmenanthe penduliflora</i> var. <i>penduliflora</i>	whispering bells	Boraginaceae - Borage Family	Native	annual herb	-	X	X		
ENCFAR	<i>Encelia farinosa</i>	brittlebush	Asteraceae - Sunflower Family	Native	shrub	-		X		
ENC SP.	<i>Encelia</i> sp.	brittlebush species	Asteraceae - Sunflower Family	Native	shrub	-	X			
EPHVIR	<i>Ephedra viridis</i>	green ephedra	Ephedraceae - Ephedra Family	Native	shrub	-	X			
EPIBRA	<i>Epilobium brachycarpum</i>	annual fireweed	Onagraceae- Evening Primrose Family	Native	annual herb	-	X			
EPICAN	<i>Epilobium canum</i>	California fushia	Onagraceae - Evening Primrose Family	Native	perennial herb	-	X	X		X
EPICIL	<i>Epilobium ciliatum</i>	willow herb	Onagraceae - Evening Primrose Family	Native	perennial herb	-	X		X	
EQUARV	<i>Equisetum arvense</i>	common horsetail	Equisetaceae - Horsetail Family	Native	fern	-	X		X	
ERIDEN-AUS	<i>Eriastrum densifolium</i> ssp. <i>austromontanum</i>	southern mountain eriastrum	Polemoniaceae - Phlox Family	Native	perennial herb	-	X			
ERISAP	<i>Eriastrum sapphirinum</i>	sapphire eriastrum	Polemoniaceae - Phlox Family	Native	annual herb	-		X		

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
ERILIN	<i>Ericameria linearifolia</i>	interior goldenbush	Asteraceae – Sunflower Family	Native	shrub	–	X	X		
ERINAU	<i>Ericameria nauseosa</i>	rubber rabbitbrush	Asteraceae – Sunflower Family	Native	shrub	–	X	X	X	
ERIPIN	<i>Ericameria pinifolia</i>	pine bush	Asteraceae – Sunflower Family	Native	shrub	–	X	X		X
ERI SP.	<i>Ericameria</i> sp.	rabbitbrush species	Asteraceae – Sunflower Family	Native	shrub	–	X			
ERICAN	<i>Erigeron canadensis</i>	horseweed	Asteraceae – Sunflower Family	Native	annual herb	–	X			
ERIFOL-FOL	<i>Erigeron foliosus</i> var. <i>foliosus</i>	leafy fleabane	Asteraceae – Sunflower Family	Native	perennial herb/shrub	–	X			
ERITRI-TRI	<i>Eriodictyon trichocalyx</i> var. <i>trichocalyx</i>	hairy yerba santa	Boraginaceae – Borage Family	Native	shrub	–	X	X	X	X
ERIANG	<i>Eriogonum angulosum</i>	anglestem buckwheat	Polygonaceae – Buckwheat Family	Native	annual herb	–	X			
ERIDAV	<i>Eriogonum davidsonii</i>	Davidson buckwheat	Polygonaceae – Buckwheat Family	Native	annual herb	–	X			
ERIELO	<i>Eriogonum elongatum</i>	longstem buckwheat	Polygonaceae – Buckwheat Family	Native	perennial herb	–	X			
ERIFAS	<i>Eriogonum fasciculatum</i>	California buckwheat	Polygonaceae – Buckwheat Family	Native	shrub	–	X	X	X	X
ERIGRA- GRA	<i>Eriogonum gracile</i> var. <i>gracile</i>	slender wooly buckwheat	Polygonaceae – Buckwheat Family	Native	annual herb	–	X			
ERIMOL	<i>Eriogonum molestum</i>	pineland buckwheat	Polygonaceae – Buckwheat Family	Native	annual herb	–	X			
ERI SP.	<i>Eriogonum</i> sp.	annual buckwheat species	Polygonaceae – Buckwheat Family	Native	herb	–	X	X		
ERICON- CON	<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden yarrow	Asteraceae – Sunflower Family	Native	shrub	–	X	X		X
EROBOT	<i>Erodium botrys</i>	longbeak stork's bill	Geraniaceae – Geranium Family	Non-native	annual herb	–		X	X	X
EROCIC	<i>Erodium cicutarium</i>	red-stem filaree	Geraniaceae – Geranium Family	Invasive non-native (Limited)	annual herb	–	X	X	X	
EROMOS	<i>Erodium moschatum</i>	white stemmed filaree	Geraniaceae – Geranium Family	Non-native	annual herb	–		X		X
ESCCAL	<i>Eschscholzia californica</i>	California poppy	Papaveraceae – Poppy Family	Native	annual/perennial herb	–	X	X	X	
EUCCAM	<i>Eucalyptus camaldulensis</i>	red gum	Myrtaceae - Myrtle Family	Invasive non-native (Limited)	tree	–		X		
EUCGLO	<i>Eucalyptus globulus</i>	blue gum	Myrtaceae - Myrtle Family	Invasive non-native (Moderate)	tree	–		X	X	

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
EUCCHR	<i>Eucrypta chrysanthemifolia</i>	common eucrypta	Boraginaceae - Borage Family	Native	annual herb	-		X		X
EULCAL	<i>Eulobus californicus</i>	California primrose	Onagraceae - Evening Primrose Family	Native	annual herb	-		X		
EUPALB	<i>Euphorbia albomarginata</i>	rattlesnake sandmat	Euphorbiaceae - Spurge Family	Native	perennial herb	-	X			
EUTOCC	<i>Euthamia occidentalis</i>	western goldenrod	Asteraceae - Sunflower Family	Native	perennial herb	-	X			
FESARU	<i>Festuca arundinacea</i>	tall fescue	Poaceae - Grass Family	Non-native	perennial grass	-	X		X	
FESMIC	<i>Festuca microstachys</i>	small fescue	Poaceae - Grass Family	Native	annual grass	-	X			
FESMYU	<i>Festuca myuros</i>	annual fescue	Poaceae - Grass Family	Invasive non-native (Moderate)	annual grass	-	X	X	X	X
FESPER	<i>Festuca perennis</i>	rye grass	Poaceae - Grass Family	Invasive non-native (Moderate)	annual/perennial grass	-	X		X	
FESRUB	<i>Festuca rubra</i>	red fescue	Poaceae - Grass Family	Native	perennial grass	-	X			
FICCAR	<i>Ficus carica</i>	common fig	Moraceae - Mulberry Family	Invasive non-native (Moderate)	tree	-		X		
FRACAL-CUS	<i>Frangula californica</i> ssp. <i>cuspidata</i>	California coffeeberry	Rhamnaceae - Buckthorn Family	Native	shrub	-		X		X
FRACAL-URS	<i>Frangula californica</i> ssp. <i>ursina</i>	California coffeeberry	Rhamnaceae - Buckthorn Family	Native	shrub	-	X		X	
FRAUHD	<i>Fraxinus uhdei</i>	shamel ash	Oleaceae - Olive Family	Non-native	tree	-	X			
FRAVEL	<i>Fraxinus velutina</i>	Arizona ash	Oleaceae - Olive Family	Native	tree	-	X		X	
FRECAL	<i>Fremontodendron californicum</i>	California flannelbush	Malvaceae - Mallow Family	Native	shrub	-	X	X		X
GALANG	<i>Galium angustifolium</i>	Narrowleaf bedstraw	Rubiaceae - Madder Family	Native	perennial herb	-	X			
GALAPA	<i>Galium aparine</i>	common bedstraw	Rubiaceae - Madder Family	Native	annual herb	-	X			X
GALPOR-POR	<i>Galium porrigens</i> var. <i>porrigens</i>	climbing bedstraw	Rubiaceae - Madder Family	Native	vine/shrub	-	X			X
GAY SP.	<i>Gayophytum</i> sp.	groundsmoke species	Onagraceae - Evening Primrose Family	Native	annual herb	-	X			
GILCAP-ABR	<i>Gilia capitata</i> ssp. <i>abrotanifolia</i>	ball gilia	Polemoniaceae - Phlox Family	Native	annual herb	-	X			X
GILINC	<i>Gilia inconspicua</i>	shy gilia	Polemoniaceae - Phlox Family	Native	annual herb	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
HAZSQU	<i>Hazardia squarrosa</i>	saw-toothed goldenbush	Asteraceae – Sunflower Family	Native	shrub	–		X		X
HELANN	<i>Helianthus annuus</i>	common sunflower	Asteraceae – Sunflower Family	Native	perennial herb	–		X		
HELCUR	<i>Heliotropium curassavicum</i>	alkali heliotrope	Boraginaceae – Borage Family	Native	perennial herb	–		X		
HESWHI	<i>Hesperoyucca whipplei</i>	chaparral yucca	Agavaceae – Century Plant Family	Native	shrub	–	X	X	X	X
HETGRA	<i>Heterotheca grandiflora</i>	telegraph weed	Asteraceae – Sunflower Family	Native	annual / perennial herb	–	X	X		X
HORMUR	<i>Hordeum murinum</i>	Mediterranean barley	Poaceae – Grass Family	Invasive non-native (Moderate)	annual grass	–	X	X	X	
HOSCRACRA	<i>Hosackia crassifolia</i> var. <i>crassifolia</i>	Broad leaved lotus	Fabaceae – Pea Family	Native	perennial herb	–	X			
HOSOBL	<i>Hosackia oblongifolia</i>	narrow leaved lotus	Fabaceae – Pea Family	Native	perennial herb	–	X			
HYP SP.	<i>Hypericum</i> sp.	st. johnswort species	Hypericaceae- St. Johnswort Family	Native or Non-Native	annual herb or shrub	–	X		X	
HYPGLA	<i>Hypochaeris glabra</i>	smooth cat's ear	Asteraceae – Sunflower Family	Invasive non-native (Limited)	annual herb	–	X	X		
ISO. SP	<i>Isocoma</i> sp.	goldenbush species	Asteraceae – Sunflower Family	Native	shrub	–	X			
JUGCAL	<i>Juglans californica</i>	southern California black walnut	Juglandaceae - Walnut Family	Native	tree	CRPR 4.2	X	X		X
JUGREG	<i>Juglans regia</i>	English walnut	Juglandaceae - Walnut Family	Non-native	tree	–	X			
JUNBAL	<i>Juncus balticus</i>	Baltic rush	Juncaceae - Rush Family	Native	perennial grasslike herb	–	X		X	
JUNBUF	<i>Juncus bufonius</i>	common toad rush	Juncaceae - Rush Family	Native	annual grasslike herb	–	X		X	
JUNEFF	<i>Juncus effusus</i>	bog rush	Juncaceae - Rush Family	Native	perennial grasslike herb	–	X		X	
JUNMAC	<i>Juncus macrophyllus</i>	longleaf rush	Juncaceae - Rush Family	Native	annual grasslike herb	–	X		X	
JUNMEX	<i>Juncus mexicanus</i>	Mexican rush	Juncaceae - Rush Family	Native	perennial grasslike herb	–		X	X	X
JUNRUG	<i>Juncus rugulosus</i>	wrinkled rush	Juncaceae - Rush Family	Native	perennial grasslike herb	–	X		X	
JUN SP.	<i>Juncus</i> sp.	rush species	Juncaceae - Rush Family	Native	perennial grasslike herb	–	X		X	
JUNXIP	<i>Juncus xiphioides</i>	iris leaved rush	Juncaceae - Rush Family	Native	perennial grasslike herb	–	X		X	

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
JUNCAL	<i>Juniperus californica</i>	California juniper	Cupressaceae - Cypress Family	Native	shrub	-	X			
JUNI SP.	<i>Juniperus</i> sp. (planted ornamental)	juniper species	Cupressaceae - Cypress Family	Non-native	shrub	-		X		
KECCOR	<i>Keckiella cordifolia</i>	heart leaved penstemon	Plantaginaceae - Plantain Family	Native	shrub	-		X		X
KECTER-TER	<i>Keckiella ternata</i> var. <i>ternata</i>	blue-stemmed keckiella	Plantaginaceae - Plantain Family	Native	shrub	-	X	X		X
LACSER	<i>Lactuca serriola</i>	prickly lettuce	Asteraceae - Sunflower Family	Non-native	annual herb	-	X	X		
LAGRAM	<i>Lagophylla ramosissima</i>	common hareleaf	Asteraceae - Sunflower Family	Native	annual herb	-	X			
LAMAMP	<i>Lamium amplexicaule</i>	henbit	Lamiaceae - Mint Family	Non-native	annual herb	-	X		X	X
LASGRA	<i>Lasthenia gracilis</i>	needle goldfields	Asteraceae - Sunflower Family	Native	annual herb	-	X			
LATLAT	<i>Lathyrus latifolius</i>	perennial sweet pea	Fabaceae - Pea Family	Non-native	perennial herb	-	X		X	X
LATVES-VES	<i>Lathyrus vestitus</i> var. <i>vestitus</i>	common Pacific pea	Fabaceae - Pea Family	Native	perennial herb	-	X			
LEMMIN	<i>Lemna minuta</i>	least duckweed	Araceae- Arum Family	Native	perennial herb	-	X		X	
LEPOBL	<i>Lepidium (oblongum)</i>	veiny peppergrass	Brassicaceae - Mustard Family	Native	annual herb	-	X			
LEPCAM	<i>Lepidium campestre</i>	English pepper grass	Brassicaceae - Mustard Family	Non-native	annual/perennial herb	-	X			
LEPLAT	<i>Lepidium latifolium</i>	broadleaved pepperweed	Brassicaceae - Mustard Family	Invasive non-native (High)	perennial herb	-	X		X	
LEP SP.	<i>Lepidium</i> sp.	English pepperweed species	Brassicaceae - Mustard Family	Native or Non-Native	annual/perennial herb	-	X			
LEPVIR-MEN	<i>Lepidium virginicum</i> var. <i>menziesii</i>	Robinson's pepper grass	Brassicaceae - Mustard Family	Native	annual herb	-	X			
LEPSQU	<i>Lepidospartum squamatum</i>	scalebroom	Asteraceae - Sunflower Family	Native	shrub	-	X	X		
LEPCIL	<i>Leptosiphon ciliatus</i>	wiskerbrush	Polemoniaceae - Phlox Family	Native	annual herb	-	X			
LEPLIN	<i>Leptosiphon liniflorus</i>	narrowflower flaxflower	Polemoniaceae - Phlox Family	Native	annual herb	-	X			
LESGLA	<i>Lessingia glandulifera</i>	valley vinegar weed	Asteraceae - Sunflower Family	Native	annual herb	-	X			
LILHUM-OCE	<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	ocellated Humboldt lily	Liliaceae- Lily Family	Native	perennial herb (bulb)	CRPR 4.2	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
LINCAL	<i>Linanthus californicus</i>	prickly phlox	Polemoniaceae - Phlox Family	Native	shrub	-		X		X
LOGGAL	<i>Logfia gallica</i>	daggerleaf cottonrose	Asteraceae - Sunflower Family	Non-native	annual herb	-		X		
LOMCAL	<i>Lomatium californicum</i>	California lomatium	Apiaceae - Carrot Family	Native	perennial herb	-	X		X	
LOMDIS	<i>Lomatium dissectum</i>	fern leaved lomatium	Apiaceae - Carrot Family	Native	perennial herb	-	X			
LONINT	<i>Lonicera interrupta</i>	honeysuckle	Caprifoliaceae - Honeysuckle Family	Native	vine/shrub	-	X		X	
LONSUB	<i>Lonicera subspicata</i> var. <i>denudata</i>	chaparral honeysuckle	Caprifoliaceae - Honeysuckle Family	Native	shrub	-		X		X
LUPBIC	<i>Lupinus bicolor</i>	bicolored lupine	Fabaceae - Pea Family	Native	annual/perennial herb	-	X	X	X	X
LUPCON	<i>Lupinus concinnus</i>	bajada lupine	Fabaceae - Pea Family	Native	annual herb	-	X		X	
LUPHIR	<i>Lupinus hirsutissimus</i>	stinging lupine	Fabaceae - Pea Family	Native	annual herb	-		X		
LUPLAT	<i>Lupinus latifolius</i>	broad leaved lupine	Fabaceae - Pea Family	Native	perennial herb	-	X		X	
LUPSPA	<i>Lupinus sparsiflorus</i>	Coulter's lupine	Fabaceae - Pea Family	Native	annual herb	-	X			
LYSARV	<i>Lysimachia arvensis</i>	scarlet pimpernel	Myrsinaceae - Myrsine Family	Non-native	annual herb	-		X	X	
MADELE	<i>Madia elegans</i>	common madia	Asteraceae - Sunflower Family	Native	annual herb	-	X			
MADGRA	<i>Madia gracilis</i>	grassy tarweed	Asteraceae - Sunflower Family	Native	annual herb	-	X			X
MALFAS	<i>Malacothamnus fasciculatus</i> var. <i>fasciculatus</i>	chaparral mallow	Malacothamnus - Mallow Family	Native	shrub	-	X	X		X
MAL SP.	<i>Malacothrix</i> sp.	desert dandelion species	Asteraceae - Sunflower Family	Native	annual or perennial herb	-	X			
MALLAU	<i>Malosma laurina</i>	laurel sumac	Anacardiaceae - Sumac Family	Native	shrub	-		X		X
MARMAC	<i>Marah macrocarpa</i>	chilicothe	Cucurbitaceae - Gourd Family	Native	perennial herb, vine	-	X	X		X
MARVUL	<i>Marrubium vulgare</i>	white horehound	Lamiaceae - Mint Family	Invasive non-native (Limited)	perennial herb	-		X		
MATDIS	<i>Matricaria discoidea</i>	pineapple weed	Asteraceae - Sunflower Family	Native	annual herb	-	X		X	
MEDPOL	<i>Medicago polymorpha</i>	California burclover	Fabaceae - Pea Family	Invasive non-native (Limited)	annual herb	-		X	X	X

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
MELAZE	<i>Melia azedarath</i>	china berry tree	Meliaceae - Mahogany Family	Non-native	tree	-		X		
MELCAL	<i>Melica californica</i>	California melicgrass	Poaceae - Grass Family	Native	perennial grass	-	X			
MELIMP	<i>Melica imperfecta</i>	coast range melic	Poaceae - Grass Family	Native	perennial grass	-	X	X		X
MELIND	<i>Melilotus indicus</i>	sourclover	Fabaceae - Pea Family	Non-native	annual herb	-	X	X		X
MELOFF	<i>Melilotus officinalis</i>	yellow sweetclover	Fabaceae - Pea Family	Non-native	annual/biennial herb	-	X			
MEL	<i>Melilotus</i> sp.	sweet clover species	Fabaceae - Pea Family	Non-native	annual/biennial herb	-	X			
MANSPI	<i>Mentha spicata</i>	spearmint	Lamiaceae - Mint Family	Non-native	perennial herb	-	X		X	
MIMAN	<i>Mimulus androsaceus</i>	rockjasmine monkeyflower	Phrymaceae - Lopseed Family	Native	annual herb	-	X			
MIMAU-PUB	<i>Mimulus aurantiacus</i> var. <i>pubescens</i>	sticky monkeyflower	Phrymaceae - Lopseed Family	Native	shrub	-	X	X	X	X
MIMBIG-BIG	<i>Mimulus bigelovii</i> var. <i>bigelovii</i>	Bigelow's monkeyflower	Phrymaceae - Lopseed Family	Native	annual herb	-	X			
MIMCAR	<i>Mimulus cardinalis</i>	scarlet monkeyflower	Phrymaceae - Lopseed Family	Native	perennial herb	-	X	X		
MIMFLO	<i>Mimulus floribundus</i>	Many flowered monkeyflower	Phrymaceae - Lopseed Family	Native	annual herb	-	X			
MIMGUT	<i>Mimulus guttatus</i>	seep spring monkey flower	Phrymaceae - Lopseed Family	Native	annual/perennial herb (rhizomatous)	-	X	X		X
MIMPAR	<i>Mimulus parishii</i>	Parish's monkeyflower	Phrymaceae - Lopseed Family	Native	annual herb	-	X			
MIMPIL	<i>Mimulus pilosus</i>	Downy monkeyflower	Phrymaceae - Lopseed Family	Native	perennial herb	-	X			
MIM SP.	<i>Mimulus</i> sp.	monkey flower species	Phrymaceae - Lopseed Family	Native	perennial herb	-	X			
MUHERG	<i>Muhlenbergia rigens</i>	deergrass	Poaceae - Grass Family	Native	perennial grass	-	X			
MYRCLE	<i>Myriopteris clevelandii</i>	Cleveland's lip fern	Pteridaceae-Maidenhair Fern Family	Native	fern	-	X			
NASOFF	<i>Nasturtium officinale</i>	watercress	Brassicaceae - Mustard Family	Native	perennial herb (aquatic)	-	X			
NEMPED	<i>Nemophila pedunculata</i>	littlefoot nemophila	Boraginaceae - Borage Family	Native	annual herb	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
NEROLE	<i>Nerium oleander</i>	oleander	Apocynaceae - Dogbone family	Non-native	tree	-		X		
NICATT	<i>Nicotiana attenuata</i>	coyote tobacco	Solanaceae - Nightshade Family	Native	annual herb	-	X			
NICGLA	<i>Nicotiana glauca</i>	tree tobacco	Solanaceae - Nightshade Family	Invasive non-native (Moderate)	shrub	-		X		X
OENCAL-CAL	<i>Oenothera californica</i> ssp. <i>californica</i>	California evening primrose	Onagraceae- Evening Primrose Family	Native	perennial herb	-	X			
OENELA	<i>Oenothera elata</i>	evening primrose	Onagraceae - Evening Primrose Family	Native	perennial herb	-	X			
OPULIT	<i>Opuntia littoralis</i>	coast prickly pear	Cactaceae - Cactus Family	Native	shrub (stem succulent)	-		X		
OPUFIC-IND	<i>Opuntia ficus-indica</i>	mission prickly-pear	Cactaceae - Cactus Family	Non-native	shrub (stem succulent)	-		X		
OROBUL	<i>Orobanche bulbosa</i>	chaparral broomrape	Orobanchaceae - Broomrape family	Native	perennial herb (parasitic)	-	X			
OROFAS	<i>Orobanche fasciculata</i>	clustered broomrape	Orobanchaceae - Broomrape family	Native	perennial herb (parasitic)	-	X			
OSMBER	<i>Osmorhiza berteroi</i>	sweet cicely	Aplaceae - Carrot Family	Native	perennial herb	-	X		X	
PASSMI	<i>Pascopyrum smithii</i>	western wheatgrass	Poaceae - Grass Family	Native	perennial grass	-	X			
PECLIN	<i>Pectocarya linearis</i>	narrow-toothed pectocarya	Boraginaceae - Borage Family	Native	annual herb	-	X	X		
PECPEN	<i>Pectocarya penicillata</i>	sleeping combseed	Boraginaceae - Borage Family	Native	annual herb	-	X			
PECSET	<i>Pectocarya setosa</i>	round-nut pectocarya	Boraginaceae - Borage Family	Native	annual herb	-	X			
PELMUC	<i>Pellaea mucronata</i>	bird's foot fern	Pteridaceae- Maidenhair Fern Family	Native	fern	-	X	X		X
PENSET	<i>Pennisetum setaceum</i>	fountain grass	Poaceae - Grass Family	Invasive non-native (Moderate)	perennial grass	-		X		
PENCEN	<i>Penstemon centranthifolius</i>	scarlet bugler	Plantaginaceae - Plantain Family	Native	perennial herb	-	X	X		X
PENSPE	<i>Penstemon spectabilis</i>	showy penstemon	Plantaginaceae - Plantain Family	Native	perennial herb	-	X	X	X	X
PENSPE-SPE	<i>Penstemon spectabilis</i> var. <i>spectabilis</i>	showy penstemon	Plantaginaceae - Plantain Family	Native	perennial herb	-	X			
PERMAC	<i>Persicaria maculosa</i>	spotted ladythumb	Polygonaceae - Buckwheat Family	Non-native	annual herb	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
PHABRA	<i>Phacelia brachyloba</i>	short lobed phacelia	Boraginaceae - Borage Family	Native	annual herb	-	X	X		
PHACIC	<i>Phacelia cicutaria</i>	caterpillar phacelia	Boraginaceae - Borage Family	Native	annual herb	-	X	X		X
PHADIS	<i>Phacelia distans</i>	common phacelia	Boraginaceae - Borage Family	Native	annual herb	-	X	X		X
PHAMIN	<i>Phacelia minor</i>	wild canterbury bells	Boraginaceae - Borage Family	Native	annual herb	-		X		
PHA SP.	<i>Phalaris</i> sp.	canarygrass species	Poaceae - Grass Family	Native or Non-Native	annual grass	-		X	X	
PHOCAN	<i>Phoenix canariensis</i>	Canary island date palm	Arecaceae - Palm Family	Invasive non-native (Limited)	tree	-		X		
PHOLEU	<i>Phoradendron leucarpum</i>	big leaf mistletoe	Viscaceae - Mistletoe Family	Native	shrub (parasitic)	-	X		X	X
PINATT	<i>Pinus attenuata</i>	knobcone pine	Pinaceae - Pine Family	Native	tree	-	X			
PINJEF	<i>Pinus jeffreyi</i>	Jeffrey pine	Pinaceae - Pine Family	Native	tree	-	X		X	
PINMON	<i>Pinus monophylla</i>	singleleaf pinyon pine	Pinaceae - Pine Family	Native	tree	-	X			
PINPON	<i>Pinus ponderosa</i>	Ponderosa pine	Pinaceae - Pine Family	Native	tree	-	X		X	
PIT SP.	<i>Pittosporum</i> sp.	leaf box species	Pittosporaceae - Pittosporum Family	Non-native (ornamental)	shrub	-	X	X		
PLACAN	<i>Plagiobothrys canescens</i>	Valley popcornflower	Boraginaceae - Borage Family	Native	annual herb	-	?	X	X	
PLACOL-CAL	<i>Plagiobothrys collinus</i> var. <i>californicus</i>	California popcornflower	Boraginaceae - Borage Family	Native	annual herb	-	X			
PLAHIS	<i>Plagiobothrys hispidulus</i>	harsh popcorn flower	Boraginaceae - Borage Family	Native	annual herb	-	X		X	
PLALAN	<i>Plantago lanceolata</i>	English plantain	Plantaginaceae - Plantain Family	Invasive non-native (Limited)	perennial herb	-	X		X	
PLARAC	<i>Platanus racemosa</i>	western sycamore	Platanaceae - Sycamore Family	Native	tree	-	X	X	X	X
POAANN	<i>Poa annua</i>	annual bluegrass	Poaceae - Grass Family	Non-native	annual grass	-	X		X	
POABUL	<i>Poa bulbosa</i>	bulbos bluegrass	Poaceae - Grass Family	Non-native	perennial grass	-	X		X	
POAPRA	<i>Poa pratensis</i>	Kentucky bluegrass	Poaceae - Grass Family	Non-native	perennial grass	-	X		X	
POAPRA	<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky bluegrass	Poaceae - Grass Family	Invasive non-native (Limited)	perennial grass	-	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
POASEC	<i>Poa secunda</i>	pine bluegrass	Poaceae – Grass Family	Native	perennial grass	–	X		X	
POLAVI	<i>Polygonum aviculare</i>	prostrate knotweed	Polygonaceae – Buckwheat Family	Non-native	annual/perennial herb	–	X			
POLINT	<i>Polypogon interruptus</i>	ditch rabbitsfoot grass	Poaceae – Grass Family	Non-native	perennial grass	–	X			
POLMON	<i>Polypogon monspeliensis</i>	annual rabbitsfoot grass	Poaceae – Grass Family	Invasive non-native (Limited)	annual grass	–	X	X		
POLIMB	<i>Polystichum imbricans</i>	cliff sword fern	Dryopteridaceae - Wood Fern Family	Native	fern	–	X		X	
POPFRE-FRE	<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Salicaceae – Willow Family	Native	tree	–	X	X	X	
PRUARM	<i>Prunus armeniaca</i>	apricot	Rosaceae – Rose Family	Non-native	tree	–	X			
PRUILI-ILI	<i>Prunus ilicifolia</i> ssp. <i>ilicifolia</i>	holly leaf cherry	Rosaceae – Rose Family	Native	tree/shrub	–	X	X		X
PRUVIR	<i>Prunus virginiana</i> var. <i>demissa</i>	western choke cherry	Rosaceae – Rose Family	Native	tree/shrub	–	X			
PSECAL	<i>Pseudognaphalium californicum</i>	ladies' tobacco	Asteraceae – Sunflower Family	Native	annual/perennial herb	–	X			X
PSELUT	<i>Pseudognaphalium luteoalbum</i>	jersey cudweed	Asteraceae – Sunflower Family	Non-native	annual herb	–	X	X		
PSETRA	<i>Pseudognaphalium stramineum</i>	cottonbatting plant	Asteraceae – Sunflower Family	Native	perennial herb	–	X			
PSEMAC	<i>Pseudotsuga macrocarpa</i>	bigcone spruce	Pinaceae - Pine Family	Native	tree	–	X			
PTEAQU	<i>Pteridium aquilinum</i>	western brackenfern	Dennstaedtiaceae-Braken Fern Family	Native	fern	–	X		X	
QUEAGR	<i>Quercus agrifolia</i>	coast live oak	Fagaceae – Oak Family	Native	tree	–	X	X	X	X
QUEBER	<i>Quercus berberidifolia</i>	inland scrub oak	Fagaceae – Oak Family	Native	tree	–	X		X	X
QUECHR	<i>Quercus chrysolepis</i>	gold cup live oak	Fagaceae – Oak Family	Native	tree	–	X	X	X	X
QUEKEL	<i>Quercus kelloggii</i>	California black oak	Fagaceae – Oak Family	Native	tree	–	X		X	
QUEWIS-FRU	<i>Quercus wislizeni</i> var. <i>frutescens</i>	bush interior live oak	Fagaceae – Oak Family	Native	shrub	–	X	X		X
QUEWIS-WIS	<i>Quercus wislizeni</i> var. <i>wislizeni</i>	interior live oak	Fagaceae – Oak Family	Native	tree	–	X		X	X
RHACRO	<i>Rhamnus crocea</i>	spiny redberry	Rhamnaceae – Buckthorn Family	Native	shrub	–		X		

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
RHAILI	<i>Rhamnus ilicifolia</i>	hollyleaf redberry	Rhamnaceae – Buckthorn Family	Native	shrub	–	X	X		
RHUARO	<i>Rhus aromatica</i>	skunk bush	Anacardiaceae – Sumac Family	Native	shrub	–	X			
RHUOVA	<i>Rhus ovata</i>	sugar bush	Anacardiaceae – Sumac Family	Native	shrub	–	X	X	X	X
RIBIND	<i>Ribes indecorum</i>	white flowering currant	Grossulariaceae – Currant Family	Native	shrub	–	X		X	
RICCOM	<i>Ricinus communis</i>	castorbean	Euphorbiaceae – Spurge Family	Invasive non-native (Limited)	shrub	–		X		
ROBPSE	<i>Robinia pseudoacacia</i>	black locust	Fabaceae – Pea Family	Invasive non-native (Limited)	tree	–	X	X		X
RORPAL	<i>Rorippa palustris</i>	bog yellow cress	Brassicaceae – Mustard Family	Native	annual/perennial herb	–	X		X	
ROSCAL	<i>Rosa californica</i>	rose	Rosaceae – Rose Family	Native	shrub	–	X	X	X	
ROSWOO	<i>Rosa woodsii</i>	Wood's Rose	Rosaceae – Rose Family	Native	shrub	–	X		X	
ROSOFF	<i>Rosmarinus officinalis</i>	Rosemary	Lamiaceae – Mint Family	Non-native	shrub	–	X		X	
RUBURS	<i>Rubus ursinus</i>	California blackberry	Rosaceae – Rose Family	Native	vine/shrub	–	X		X	
RUMCRI	<i>Rumex crispus</i>	curly dock	Polygonaceae – Buckwheat Family	Invasive non-native (Limited)	perennial herb	–	X		X	X
RUMSAL	<i>Rumex salicifolius</i>	willow dock	Polygonaceae – Buckwheat Family	Native	perennial herb	–	X		X	
SALEXI	<i>Salix exigua</i>	narrowleaf willow	Salicaceae – Willow Family	Native	tree/shrub	–	X	X	X	
SALGOO	<i>Salix gooddingii</i>	Goodding's black willow	Salicaceae – Willow Family	Native	tree	–	X	X	X	
SALLAE	<i>Salix laevigata</i>	red willow	Salicaceae – Willow Family	Native	tree	–	X		X	
SALLASIA	<i>Salix lasiandra</i>	Pacific willow	Salicaceae – Willow Family	Native	tree	–	X	X	X	
SALLASIO	<i>Salix lasiolepis</i>	arroyo willow	Salicaceae – Willow Family	Native	tree	–	X	X	X	X
SAL AUS	<i>Salsola australis</i>	Russian thistle	Chenopodiaceae – Goosefoot Family	Invasive non-native (Limited)	annual/perennial herb	–	X	X		
SALTRA	<i>Salsola tragus</i>	Prickly Russian thistle	Chenopodiaceae – Goosefoot Family	Invasive non-native (Limited)	annual/perennial herb	–	X	X		
SALSPL-SPL	<i>Saltugilia splendens</i> ssp. <i>splendens</i>	splendid gilia	Polemoniaceae – Phlox Family	Native	annual herb	–	X			

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
SALAPI	<i>Salvia apiana</i>	white sage	Lamiaceae – Mint Family	Native	shrub	–	X	X		X
SALCOL	<i>Salvia columbariae</i>	chia sage	Lamiaceae – Mint Family	Native	annual herb	–	X	X	X	X
SALLEU	<i>Salvia leucophylla</i>	purple sage	Lamiaceae – Mint Family	Native	shrub	–		X		X
SALMEL	<i>Salvia mellifera</i>	black sage	Lamiaceae – Mint Family	Native	shrub	–		X		X
SAMNIG-CAE	<i>Sambucus nigra</i> ssp. <i>caerulea</i>	blue elderberry	Adoxaceae – Elderberry Family	Native	shrub	–	X	X	X	X
SANTUB	<i>Sanicula tuberosa</i>	tuberous sanicle	Apocynaceae - Dogbone family	Native	perennial herb	–	X			
SAPOFF	<i>Saponaria officinalis</i>	bouncing bet	Caryophyllaceae - Pink Family	Invasive non-native (Limited)	perennial herb	–	X		X	
SCHARA	<i>Schismus arabicus</i>	Arabian schismus	Poaceae – Grass Family	Invasive non-native (Limited)	annual grass	–	X	X		
SCHBAR	<i>Schismus barbatus</i>	common mediterranean grass	Poaceae – Grass Family	Invasive non-native (Limited)	annual grass	–		X	X	
SCHACU	<i>Schoenoplectus acutus</i>	common tule	Cyperaceae - Sedge Family	Native	perennial grasslike herb	–	X		X	
SCUSIP	<i>Scutellaria siphocampyloides</i>	curve flowered skullcap	Lamiaceae – Mint Family	Native	perennial herb	–	X			
SENVUL	<i>Senecio vulgaris</i>	common groundsel	Asteraceae – Sunflower Family	Non-native	annual herb	–	X	X	X	
SILGAL	<i>Silene gallica</i>	small-flower catchfly	Caryophyllaceae - Pink Family	Non-native	annual herb	–		X		
SILMAR	<i>Silybum marianum</i>	blessed milk thistle	Asteraceae – Sunflower Family	Invasive non-native (Limited)	annual/perennial herb	–		X	X	X
SISIRI	<i>Sisymbrium irio</i>	London rocket	Brassicaceae – Mustard Family	Invasive non-native (Moderate)	annual herb	–	X			
SISLOE	<i>Sisymbrium loeselii</i>	small tumbleweed mustard	Brassicaceae – Mustard Family	Non-native	annual herb	–	X			
SISORI	<i>Sisymbrium orientale</i>	Indian hedge mustard	Brassicaceae – Mustard Family	Non-native	annual/perennial herb	–		X		X
SISBEL	<i>Sisyrinchium bellum</i>	western blue-eyed grass	Iridaceae - Iris Family	Native	perennial herb	–	X			
SOLAME	<i>Solanum americanum</i>	American black nightshade	Solanaceae - Nightshade Family	Native	annual/perennial herb	–		X		
SOLDOU	<i>Solanum douglasii</i>	Douglas's nightshade	Solanaceae - Nightshade Family	Native	perennial herb	–		X		
SOLA SP.	<i>Solanum</i> sp.	nightshade species	Solanaceae - Nightshade Family	Native or Non-Native	perennial herb or shrub	–		X		

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
SOLXA	<i>Solanum xanti</i>	chaparral nightshade	Solanaceae - Nightshade Family	Native	perennial herb	-	X			X
SOLI SP.	<i>Solidago</i> sp.	goldenrod species	Asteraceae - Sunflower Family	Native	perennial herb	-	X			
SONOLE	<i>Sonchus oleraceus</i>	common sow thistle	Asteraceae - Sunflower Family	Non-native	annual herb	-	X		X	
SPAJUN	<i>Spartium junceum</i>	Spanish broom	Fabaceae - Pea Family	Invasive non-native (High)	shrub	-		X	X	X
SPHAMB	<i>Sphaeralcea ambigua</i>	desert mallow	Malvaceae - Mallow Family	Native	perennial herb	-	X			
STAALB	<i>Stachys albens</i>	white hedge nettle	Lamiaceae - Mint Family	Native	perennial herb	-	X			
STENEG	<i>Stellaria neglecta</i>	common chickweed	Caryophyllaceae - Pink Family	Non-native	annual herb	-	X		X	
STEEXI	<i>Stephanomeria exigua</i>	small wirelettuce	Asteraceae - Sunflower Family	Native	annual herb	-	X			X
STICOR	<i>Stipa coronata</i>	crested needle grass	Poaceae - Grass Family	Native	perennial grass	-	X			
STIMIL-MIL	<i>Stipa millacea</i> var. <i>millacea</i>	smilo grass	Poaceae - Grass Family	Invasive non-native (Limited)	annual grass	-		X	X	X
STI SP.	<i>Stipa</i> sp.	needlegrass species	Poaceae - Grass Family	Native	perennial grass	-	X		X	
STISPE	<i>Stipa speciosa</i>	desert needle grass	Poaceae - Grass Family	Native	perennial grass	-	X			
TAMPAR	<i>Tamarix parviflora</i>	small flower tamarisk	Tamaricaceae - Tamarisk Family	Invasive non-native (High)	tree/shrub	-		X		
TAMRAM	<i>Tamarix ramosissima</i>	saltcedar	Tamaricaceae - Tamarisk Family	Invasive non-native (High)	tree	-	X	X		
TANPAR	<i>Tanacetum parthenium</i>	feverfew	Asteraceae - Sunflower Family	Non-native	perennial herb	-	X		X	
TAROFF	<i>Taraxacum officinale</i>	common dandelion	Asteraceae - Sunflower Family	Non-native	perennial herb	-	X		X	
TETCOM	<i>Tetradymia comosa</i>	cotton thorn	Asteraceae - Sunflower Family	Native	shrub	-	X	X		X
THAFEN	<i>Thalictrum fendleri</i>	Fendler's meadow rue	Ranunculaceae - Buttercup Family	Native	perennial herb	-	X			
THYCUR	<i>Thysanocarpus curvipes</i>	fringed pod	Brassicaceae - Mustard Family	Native	annual herb	-	X			X
TOXDIV	<i>Toxicodendron diversilobum</i>	western poison oak	Anacardiaceae - Sumac Family	Native	vine/shrub	-	X	X	X	X
TRITER	<i>Tribulus terrestris</i>	puncture vine	Zygophyllaceae - Caltrop Family	Non-native	annual herb	-	X			X

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
TRILAN	<i>Trichostema lanatum</i>	woolly bluecurls	Lamiaceae – Mint Family	Native	shrub	–	X	X		X
TRILANC	<i>Trichostema lanceolatum</i>	vinegar weed	Lamiaceae – Mint Family	Native	annual herb	–	X			
TRIPAR	<i>Trichostema parishii</i>	Parish's bluecurls	Lamiaceae – Mint Family	Native	shrub	–	X			
TRICIL	<i>Trifolium ciliolatum</i>	tree clover	Fabaceae – Pea Family	Native	annual herb	–	X			
TRIGRA	<i>Trifolium gracilentum</i>	graceful clover	Fabaceae – Pea Family	Native	annual herb	–	X			
TRIHIR	<i>Trifolium hirtum</i>	rose clover	Fabaceae – Pea Family	Invasive non-native (Moderate)	annual herb	–	X	X	X	X
TRIMIC	<i>Trifolium microcephalum</i>	hairy clover	Fabaceae – Pea Family	Native	annual herb	–	X		X	
TRI SP.	<i>Trifolium sp.</i>	clover species	Fabaceae – Pea Family	Native or Non-Native	annual/perennial herb	–	X		X	
TRIWILL	<i>Trifolium willdenovii</i>	tomcat clover	Fabaceae – Pea Family	Native	annual herb	–	X			
TYPDOM	<i>Typha domingensis</i>	southern cattail	Typhaceae – Cattail Family	Native	perennial herb	–	X	X	X	X
TYPLAT	<i>Typha latifolia</i>	broad-leaved cattail	Typhaceae – Cattail Family	Native	perennial herb (aquatic)	–	X		X	
ULMPAR	<i>Ulmus parvifolia</i>	chinese elm	Ulmaceae - Elm Family	Non-native	tree	–	X		X	
ULMPUM	<i>Ulmus pumila</i>	Siberian elm	Ulmaceae - Elm Family	Non-native	tree	–	X	X		X
UMBCAL	<i>Umbellularia californica</i>	bay laurel	Lauraceae - Laurel Family	Native	tree	–	X	X	X	X
UROLIN	<i>Uropappus lindleyi</i>	silver puffs	Asteraceae – Sunflower Family	Native	annual herb	–	X	X		
URTDIO	<i>Urtica dioica</i>	stinging nettle	Urticaceae	Native	perennial herb	–	X	X	X	X
VERTHA	<i>Verbascum thapsus</i>	common mullein	Scrophulariaceae – Figwort Family	Invasive non-native (Limited)	perennial herb	–	X		X	X
VERANA-AQU	<i>Veronica anagallis-aquatica</i>	water speedwell	Plantaginaceae - Plantain Family	Non-native	perennial herb	–	X			
VER SP.	<i>Veronica sp.</i>	speedwell species	Plantaginaceae - Plantain Family	Native or Non-Native	perennial herb	–		X		
VICAME-AME	<i>Vicia americana ssp. americana</i>	American vetch	Fabaceae – Pea Family	Native	perennial herb, vine	–	X		X	X
VINMAJ	<i>Vinca major</i>	periwinkle	Apocynaceae - Dogbone family	Invasive non-native (Moderate)	perennial herb	–	X		X	

2017 Field Survey Botanical Observations

Species Code	Scientific Name	Common Name	Family	Nativity ¹	Lifeform	Status ²	Silverwood Lake	Devil Canyon Facility	Riparian-Wetland Observation	Forest Lands Observation
VIOPUR-PUR	<i>Viola purpurea</i> ssp. <i>purpurea</i>	goosefoot violet	Violaceae - Violet Family	Native	perennial herb	-	X			
VIO SP.	<i>Viola</i> sp.	violet species	Violaceae - Violet Family	Native	perennial herb	-	X			
VITGIR	<i>Vitis girdiana</i>	desert wild grape	Vitaceae - Grape Family	Native	vine/shrub	-	X	X	X	

¹California Invasive Plant Council (Cal-IPC) Ratings: 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.

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.

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.

²California Native Plant Society (CNPS) California Rare Plant Ranking (CRPR) system 4.2 = Watch List. Plants with a CRPR of 4 are of limited distribution or infrequent throughout a broader area in California, and their status should be monitored regularly. 0.2 = Threat Ranking of Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat).

Appendix E

SHPO's Concurrence Letter

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DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791



May 31, 2017

Ms. Julianne Polanco
State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, California 95816

FERC Project No. 14797 – Devil Canyon Project Relicensing

Dear Ms. Polanco:

The California Department of Water Resources (DWR), under the authority of the Federal Energy Regulatory Commission (FERC), is initiating consultation with the State Historic Preservation Officer (SHPO) regarding the undertaking referenced above, per Title 36 Code of Federal Regulations (CFR) Part 800. DWR (Licensee) is seeking a FERC license for the Devil Canyon Project under FERC Project No. 14797 (Project) using the Traditional Licensing Process. The Project hydropower facilities and lands are currently licensed under FERC Project No. 2426 that was issued on March 22, 1978 with an effective date of February 1, 1972 for a period of 50 years. The existing license has an expiration date of January 31, 2022, and thus, DWR is in the process of seeking a new license for the Devil Canyon Project, separate from the license for FERC Project No. 2426. In accordance with 36 CFR §800.2(c)(4), FERC has designated DWR as its non-federal representative for the purposes of Section 106 consultation during relicensing of the Project¹. At the present time, DWR is seeking your concurrence on the determination of the Project's Area of Potential Effects (APE).

Attached you will find the following materials in support of our present consultation effort:

Attachment 1: Project Vicinity Map

Attachment 2: United States Geological Survey (USGS) topographic quadrangles depicting the location of the undertaking and the proposed APE

¹ DWR was designated as FERC's non-federal representative for carrying out "informal consultation", pursuant to...Section 106 of the National Historic Preservation Act," in FERC's notification of DWR's filing of the Notice of Intent to File License Application, Filing of Pre-Application Document, and Approving Use of the Traditional Licensing Process, dated September 30, 2016. At the same time, FERC initiated consultation with SHPO pursuant to Section 106 of the National Historic Preservation Act and the implementing regulations of the Advisory Council on Historic Preservation at 36 CFR §800.2. FERC will be responsible for all findings and determinations made pursuant to 36 CFR §800.2(a).

Ms. Julianne Polanco
May 31, 2017
Page 2

The Project is located along a larger water storage and delivery system, the State Water Project (SWP), but it is licensed by FERC as a discrete hydropower project within the SWP system. Project facilities are located along the East Branch of the SWP in San Bernardino County, California, between the cities of Hesperia and San Bernardino (Attachment 1).

The Project APE includes all lands within the proposed Project boundary, as delineated by the known or potential locations of Project operations and maintenance (including direct and indirect disturbances) and Project facilities, features, and access roads. The proposed Project boundary includes 2,070 acres of land with approximately 132 acres of National Forest System lands managed by the United States Department of Agriculture, Forest Service, San Bernardino National Forest. The APE excludes lands overlying the San Bernardino Tunnel as DWR does not perform any Project operations and maintenance activities on these lands. There are no plans to conduct any Project-related activities outside of these boundaries.

The Project consists of the Devil Canyon Power Development, which includes Cedar Springs Dam, Silverwood Lake, San Bernardino Tunnel, Devil Canyon Powerplant and Switchyard, Devil Canyon Afterbay, Devil Canyon Second Afterbay, recreational facilities associated with Silverwood Lake, and appurtenant facilities (Attachment 2).

DWR filed with FERC its Notice of Intent (NOI) and Pre-Application Document on August 1, 2016. Email notification of the filing was sent to all potential relicensing participants on August 1, 2016 with the NOI attached and a link to the public Project website for access to both documents in electronic format for review and comment. DWR issued public notices using the FERC docket, electronic email, and local newspapers for a site visit that was held on November 2, 2016 and morning and evening meetings that occurred on November 3, 2016.

In accordance with 36 CFR §800.4(a)(1), DWR requests your concurrence on the appropriateness of the APE for the proposed undertaking. Pursuant to 36 CFR §800.4, we look forward to receipt of your response within 30 days of your receipt of this letter.

Ms. Julianne Polanco
May 31, 2017
Page 3

Thank you for your assistance with this undertaking. If you have any questions or require additional information, please contact me at (916) 557-4554 or your staff may contact Lisa Lee, Senior Environmental Scientist at (916) 557-4557.

Sincerely,



Gwen Scholl, Acting Chief
Hydropower License Planning and Compliance Office
Executive Division
California Department of Water Resources

Attachments

cc: Dr. Frank Winchell
Federal Energy Regulatory Commission
888 First Street, Northeast
Washington, DC 20426

Tribal and Agency Distribution List

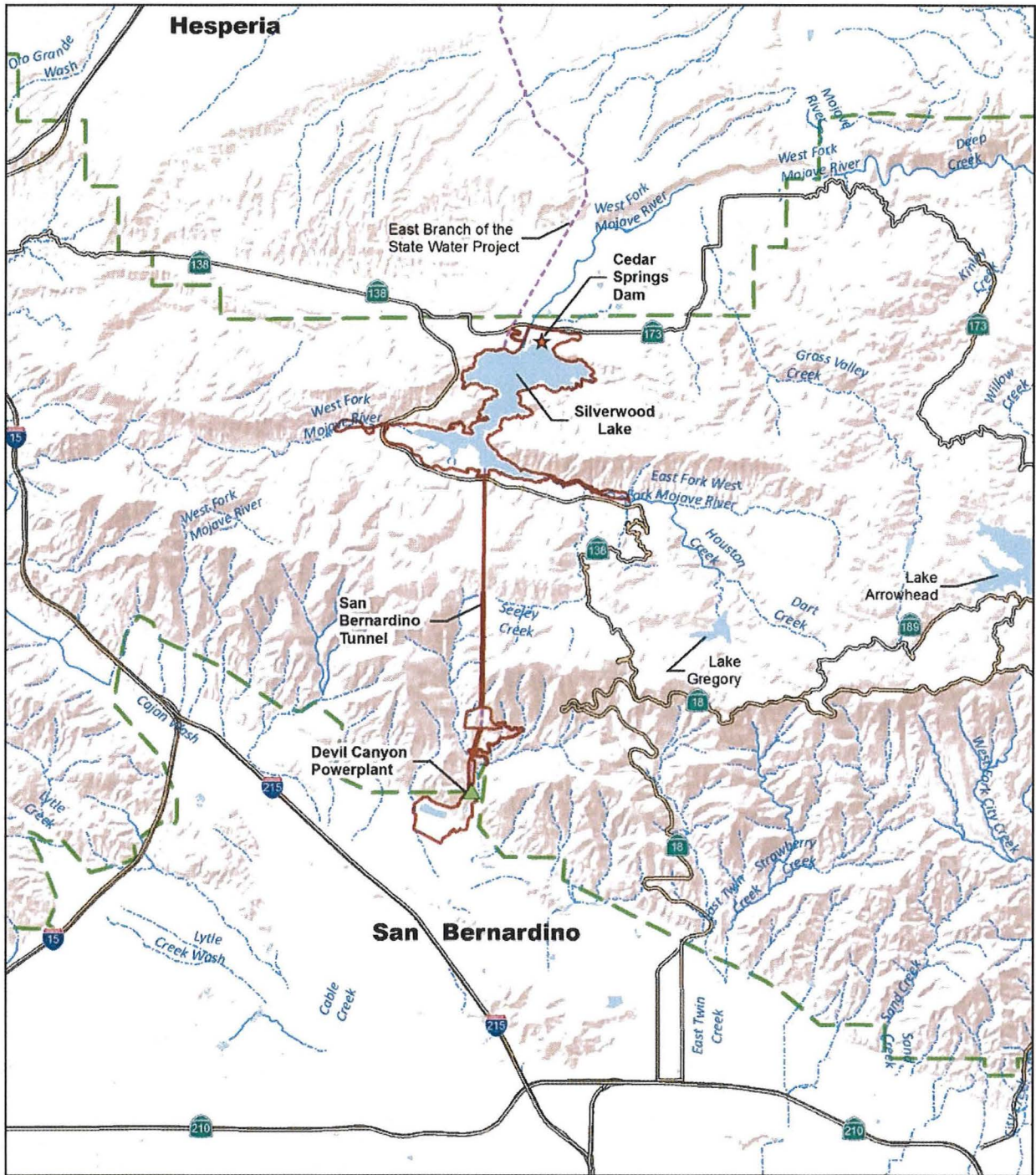
DISTRIBUTION LIST

<p>Gabrieleno Band of Mission Indians - Kizh Nation Andrew Salas, Chairperson Post Office Box 393 Covina, California 91723</p>	<p>Gabrielino/Tongva Nation Sam Dunlap, Cultural Resources Director Post Office Box 86908 Los Angeles, California 90086</p>
<p>Gabrielino/Tongva Nation Sandonne Goad, Chairperson 106 1/2 Judge John Aiso Street Los Angeles, California 90012</p>	<p>Gabrielino/Tongva San Gabriel Band of Mission Indian Anthony Morales, Chairperson Post Office Box 693 San Gabriel, California 91778</p>
<p>Morongo Band of Mission Indians Robert Martin, Chairperson 12700 Pumarra Road Banning, California 92220</p>	<p>Morongo Band of Mission Indians Ernest H. Siva, Tribal Elder 9570 Mias Canyon Road Banning, California 92220</p>
<p>Morongo Band of Mission Indians Denisa Torres, Cultural Resources Manager 12700 Pumarra Road Banning, California 92220</p>	<p>Morongo Band of Mission Indians Ray Huaute, Cultural Resource Specialist 12700 Pumarra Road Banning, California 92220</p>
<p>Morongo Band of Mission Indians Shane Helms, Planning Director 12700 Pumarra Road Banning, California 92220</p>	<p>San Manuel Band of Mission Indians Lee Clauss, Director-CRM Department 26569 Community Center Drive Highland, California 92346</p>
<p>San Manuel Band of Mission Indians Lynn Valbuena, Chairwoman 26569 Community Center Highland, California 92346</p>	<p>Serrano Nation of Mission Indians Goldie Walker, Chairwoman Post Office Box 343 Patton, California 92369</p>
<p>Tejon Indian Tribe Octavio Escobedo, Tribal Chair 1731 Hasti Drive, #108 Bakersfield, California 93309</p>	<p>San Fernando Band of Mission Indians John Valenzuela, Chairperson Post Office Box 221838 Newhall, California 91322</p>
<p>Robert G. Taylor, P.G. Forest Hydrologist San Bernardino National Forest 602 S. Tippecanoe Avenue San Bernardino, California 92408</p>	<p>Daniel Grijalva Forest Archaeologist/Tribal Liaison San Bernardino National Forest 602 S. Tippecanoe Avenue San Bernardino, California 92408</p>
<p>Office of Historic Preservation Kathleen Forrest, State Historian II 1725 23rd Street, Suite 100 Sacramento, California 95816</p>	

**Department of Water Resources
Devil Canyon Project Relicensing
FERC Project No. 14797
San Bernardino County, California**

Attachment 1

Project Vicinity Map



Legend

- Proposed Project Boundary (v.20151214)
- State Water Project
- Perennial Stream/River
- Intermittent Stream/River
- Congressional National Forest Boundary
- ★ Project Dam
- ▲ Powerplant
- Major Highway

0 0.5 1 2 3 4 Miles

Prepared: May 2016
 Projection: CA SP V NAD83 (ft)
 Data and/or Background: Watershed NHD, Terrain: USGS
 Path: PROP MGMT\2015 Projects\20150722\FERC No2426 SWP Hydropower\Relicensing\GIS\Maps\mxd\DevilsCynPad

DEVIL CANYON PROJECT RELICENSING

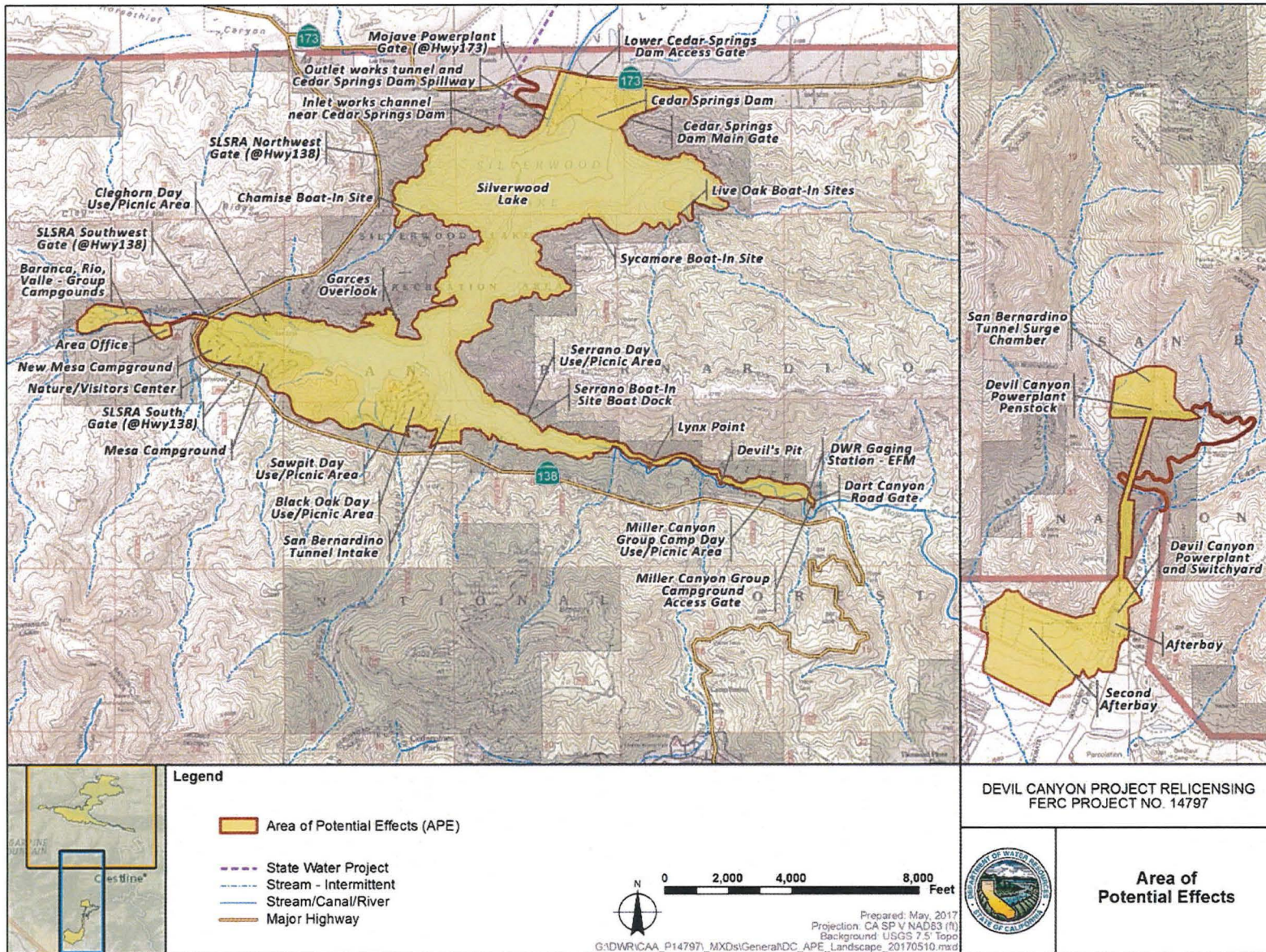
Project Vicinity

Attachment 1. Project Vicinity

**Department of Water Resources
Devil Canyon Project Relicensing
FERC Project No. 14797
San Bernardino County, California**

Attachment 2

**USGS Topographic Quadrangles Depicting the
Location of the Undertaking and the Proposed APE**



Attachment 2. Area of Potential Effects

**OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION**

1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov



July 18, 2017

In reply refer to: FERC_2017_0714_001

Gwen Scholl, Acting Chief
Hydropower License Planning and Compliance Office
California Department of Water Resources
1416 Ninth Street, P.O. Box 942836
Sacramento, CA 95816

RE: Devil Canyon Project Relicensing (FERC No. 14797), Area of Potential Effect, San Bernardino County, California

Dear Ms. Scholl:

Thank you for your letter received July 14, 2017, initiating consultation regarding the above-referenced project to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101), as amended, and its implementing regulation found at 36 CFR § 800. The California Department of Water Resources (DWR) has been delegated Section 106 consultation authority by the Federal Energy Regulatory Commission (FERC), pursuant to FERC's September 30, 2016 *Notice of Intent to File License Application, Filing of Pre-Application Document, and Approving Use of the Traditional Licensing Process* for the Devil Canyon Project (project). Included with DWR's letter was the proposed Area of Potential Effect (APE) map.

The project is located along the State Water Project (SWP), but is licensed as a discrete hydropower project by FERC. Project facilities are located along the East Branch of the SWP in San Bernardino County, between the cities of Hesperia and San Bernardino. The project consists of the Devil Canyon Power Development, including the Cedar Springs Dam, Silverwood Lake, San Bernardino Tunnel, Devil Canyon Powerplant and Switchyard, Devil Canyon Afterbay, Devil Canyon Second Afterbay, recreational facilities associated with Silverwood Lake, and appurtenant facilities. The existing 50-year FERC license for the project expires on January 21, 2022, thus DWR is in the process of seeking a new license from FERC.

As described in the consultation package the APE has been defined as all lands within the FERC boundary, as delineated by the known or potential locations of project operations and maintenance (including direct and indirect disturbances and project facilities, features, and access roads. The APE includes 2,070 acres of land with approximately 132 acres located within the San Bernardino National Forest. The APE

excludes lands overlying the San Bernardino Tunnel as DWR does not perform any Project operations and maintenance activities on these lands.

DWR, on behalf of FERC, has requested comments on the APE. After reviewing the information submitted with your letter, I offer the following:

- Please provide additional discussion of the methodology and rationale for the APE and how it is appropriate to the scale and nature of the undertaking.
- Please note that the results of the identification efforts may necessitate expansion of the APE in order to adequately identify and evaluate historic properties.
- Please provide an electronic copy of FERC's September 30, 2016 *Notice of Intent to File License Application, Filing of Pre-Application Document, and Approving Use of the Traditional Licensing Process* that includes the delegation of consultation authority to DWR.
- Please clarify why the lands above the San Bernardino Tunnel were not included in the APE, and whether the tunnel itself is included in the APE. The consultation letter states that the lands above the tunnel have been excluded because DWR does not perform any project operations and maintenance on these lands; please clarify how the tunnel is accessed currently and how it might be accessed if the tunnel portals were blocked.

Thank you for the opportunity to comment and I look forward to consulting with FERC and DWR on this undertaking. Please direct any questions or concerns that you may have to Kathleen Forrest, Historian, at 916-445-7022 or kathleen.forrest@parks.ca.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'Julianne Polanco', with a long horizontal line extending to the right.

Julianne Polanco
State Historic Preservation Officer

DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791



August 23, 2017

Ms. Julianne Polanco
State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, California 95816

FERC Project 14797 – Response to Comments on the Devil Canyon
Project Area of Potential Effects, San Bernardino County, California

Dear Ms. Polanco:

Thank you for your letter dated July 18, 2017 responding to the May 31, 2017 request by the California Department of Water Resources (DWR) for concurrence on DWR's Devil Canyon Project, Federal Energy Regulatory Commission (FERC) Project No. 14797 (Project), Area of Potential Effects (APE). DWR, under FERC's authority, is continuing consultation with the State Historic Preservation Officer (SHPO) regarding your comments, for the undertaking referenced above. Please find below the information requested in your letter.

Please provide additional discussion about the methodology and rationale for the APE and how it is appropriate to the scale and nature of the undertaking.

DWR has no plans for any new construction, expansion of Project facilities, or any other work for the Project that would require potential modifications or disturbances outside of the proposed APE. As a result, DWR designed the proposed APE to fully encompass all lands currently used by DWR to operate and maintain the Project. Therefore, the proposed APE includes all Project operation facilities (e.g., the dam, spillway, powerhouse, recreation areas, Project roads, and buildings or other built environment features and locations) under FERC's jurisdiction where DWR might have Project-related activities and/or related effects.

Please note that the results of the identification effort may necessitate expansion of the APE in order to accurately identify and evaluate historic properties.

Ms. Julianne Polanco
August 23, 2017
Page 2

DWR understands that the cultural resources and tribal resources relicensing studies may result in the identification of potential historic properties that extend outside the proposed APE. If such areas are identified by these studies, DWR will expand the APE in accordance with 36 CFR §800.4(a)(1), in consultation with the United States Forest Service - San Bernardino National Forest and the Native American Tribes as appropriate, and will seek consultation and concurrence on the expansion of the APE from your office in coordination with FERC. Under such circumstances, the APE would only be expanded to the extent necessary to evaluate National Register of Historic Places eligibility and potential Project-related effects.

Please provide an electronic copy of FERC's September 30, 2016 Notice of Intent to File License Application, Filing of Pre-Application Document, and Approving use of the Traditional Licensing Process that approves the delegation of consultation authority to DWR.

As requested, DWR is enclosing a hard copy of FERC's September 30, 2016 Notice, and will transmit an electronic copy of this Notice as an Adobe Acrobat file via email.

Please clarify why the lands above the San Bernardino Tunnel were not included in the APE, and whether the tunnel itself is included in the APE. The letter states that the tunnel has been excluded because DWR does not perform any project operations and maintenance on these lands: Please clarify how the tunnel is accessed currently, and how it might be accessed if the tunnel portals were blocked.

The physical structure of the San Bernardino Tunnel is included in the APE. Lands above the underground portions of the tunnel where DWR performs no work associated with the undertaking are not included in the APE because the undertaking has no potential to affect cultural resources that may occur on those lands. In contrast, lands where DWR may occasionally access the tunnel for periodic inspections or maintenance (i.e., at the upstream and downstream ends of the tunnel, at a few manholes above the tunnel and at a few adits to the tunnel) are included in the APE because the undertaking has a potential to affect cultural resources that may occur on those lands. If the tunnel portals were hypothetically blocked, DWR would access the tunnel from the existing manholes and adits.

Ms. Julianne Polanco
August 23, 2017
Page 3

Thank you for the opportunity to respond to your comments and for your assistance with this undertaking. We look forward to hearing from you soon regarding our request for concurrence on the appropriateness of the APE for the proposed undertaking, pursuant to 36 CFR §800.4(a)(1). If you have any questions or require additional information, please contact me at (916) 557-4554, or your staff may contact Lisa Lee, Senior Environmental Scientist, at (916) 557-4557.

Sincerely,



Gwen Scholl, Acting Chief
Hydropower License Planning and Compliance Office
Executive Division
California Department of Water Resources

Enclosure

cc: Dr. Frank Winchell
Federal Energy Regulatory Commission
888 First Street, Northeast
Washington, DC 20426

Tribal and Agency Distribution List

DISTRIBUTION LIST

Gabrieleno Band of Mission Indians - Kizh Nation Andrew Salas, Chairperson Post Office Box 393 Covina, California 91723	Gabrielino/Tongva Nation Sam Dunlap, Cultural Resources Director Post Office Box 86908 Los Angeles, California 90086
Gabrielino/Tongva Nation Sandonne Goad, Chairperson 106 1/2 Judge John Aiso Street Los Angeles, California 90012	Gabrielino/Tongva San Gabriel Band of Mission Indians Anthony Morales, Chairperson Post Office Box 693 San Gabriel, California 91778
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Serrano Nation of Mission Indians Goldie Walker, Chairwoman Post Office Box 343 Patton, California 92369	Tejon Indian Tribe Octavio Escobedo, Tribal Chair 1731 Hasti Drive, #108 Bakersfield, California 93309
San Bernardino National Forest Daniel Grijalva Forest Archaeologist/Tribal Liaison 602 S. Tippecanoe Avenue San Bernardino, California 92408	San Bernardino National Forest Robert G. Taylor, P.G. Forest Hydrologist 602 S. Tippecanoe Avenue San Bernardino, California 92408
Office of Historic Preservation Kathleen Forrest, State Historian II 1725 23rd Street, Suite 100 Sacramento, California 95816	

**OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION**

1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov



September 21, 2017

In reply refer to: FERC_2017_0714_001

Gwen Scholl, Acting Chief
Hydropower License Planning and Compliance Office
California Department of Water Resources
1416 Ninth Street, P.O. Box 942836
Sacramento, CA 95816

RE: Devil Canyon Project Relicensing (FERC No. 14797), Area of Potential Effect, San Bernardino County, California

Dear Ms. Scholl:

Thank you for your letter received August 25, 2017, continuing consultation regarding the above-referenced project to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101), as amended, and its implementing regulation found at 36 CFR § 800. The California Department of Water Resources (DWR) has been delegated Section 106 consultation authority by the Federal Energy Regulatory Commission (FERC), pursuant to FERC's September 30, 2016 *Notice of Intent to File License Application, Filing of Pre-Application Document, and Approving Use of the Traditional Licensing Process* for the Devil Canyon Project (project). The current consultation package includes DWR's response to SHPO's comments dated July 18, 2017.

The project is located along the State Water Project (SWP), but is licensed as a discrete hydropower project by FERC. Project facilities are located along the East Branch of the SWP in San Bernardino County, between the cities of Hesperia and San Bernardino. The project consists of the Devil Canyon Power Development, including the Cedar Springs Dam, Silverwood Lake, San Bernardino Tunnel, Devil Canyon Powerplant and Switchyard, Devil Canyon Afterbay, Devil Canyon Second Afterbay, recreational facilities associated with Silverwood Lake, and appurtenant facilities. The existing 50-year FERC license for the project expires on January 21, 2022, thus DWR is in the process of seeking a new license from FERC.

As described in the consultation package the APE has been defined as all lands within the FERC boundary, as delineated by the known or potential locations of project operations and maintenance (including direct and indirect disturbances and project facilities, features, and access roads. The APE includes 2,070 acres of land with approximately 132 acres located within the San Bernardino National Forest. The APE

excludes lands overlying the San Bernardino Tunnel as DWR does not perform any Project operations and maintenance activities on these lands. DWR clarified in the current consultation that the APE does include the various tunnel access points.

DWR, on behalf of FERC, has requested comments on the APE. After reviewing the information submitted with your letter, I offer the following:

- I agree that APE is sufficient for the identification of historic properties for the undertaking, per 36 CFR §800.4(a)(1).

Thank you for the opportunity to comment and I look forward to consulting with FERC and DWR on this undertaking. Please direct any questions or concerns that you may have to Kathleen Forrest, Historian, at 916-445-7022 or Kathleen.Forrest@parks.ca.gov.

Sincerely,

A handwritten signature in black ink, appearing to be 'Julianne Polanco', with a long horizontal line extending to the right.

Julianne Polanco
State Historic Preservation Officer

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
FAX: (916) 653-9824



August 20, 1997

REPLY TO: FERC940823A

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
Mail Code: DPCE HL-21.1
888 First Street, Northeast
Washington, DC 20426

Project: Archaeological Site Testing Report, Silverwood Lake - FERC 2426-113

Dear Ms Cashell:

The State Historic Preservation Officer (SHPO) has reviewed and provides the following comments on the documentation provided by the California Department of Water Resources (DWR) submitted pursuant to the Commission's responsibilities under Section 106 of the National Historic Preservation Act.

The report submitted for my review concerns the evaluation of prehistoric archaeological site CA-SBR-8913 (SL-1). I concur in the adequacy of the evaluation. While brief, it supplies me with sufficient information to concur in your determination that CA-SBR-8913 fails to meet the eligibility criteria for the National Register of Historic Places.

Please be aware that your agency may have additional Section 106 responsibilities under certain circumstances set forth in 36 CFR 800.

Your consideration of historic properties in the project planning process is appreciated. If you have any questions regarding our review of this undertaking, please call Chuck Whatford of my staff at (916) 653-2716.

Sincerely,

A handwritten signature in black ink, appearing to read "Cherilyn Widell".

Cherilyn Widell
State Historic Preservation Officer

COPY

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
 DEPARTMENT OF PARKS AND RECREATION
 P.O. BOX 942686
 SACRAMENTO 94296-0001
 (916) 653-6624
 FAX: (916) 653-9824

FILED
 OFFICE OF THE SECRETARY



94 DEC 16 PM 3:57

6 December 1994

FEDERAL ENERGY
 REGULATORY

Reply to: FERC940823A

J. Mark Robinson
 Federal Energy Regulatory Commission
 Project Compliance & Administration
 Washington, DC 20426

Subject: CALIFORNIA AQUEDUCT PROJECT/SAN BERNARDINO TUNNEL
 FERC No. 2426-063

Dear Mr. Robinson:

Thank you for requesting my review of the undertaking noted above and for including the documentation on historic resources prepared by Dr. Orlins.

The California Department of Water Resources (DWR) is seeking a FERC license to build a new water intake tower in Silverwood Lake. Archaeologist Dr. Robert Orlins conducted an archaeological record search to ascertain if any archaeological resources were recorded within the undertaking's Area of Potential Effect, now inundated by the lake. A 1967 archaeological site inventory recorded a prehistoric bedrock mortar and designated it CA-SBR-501. Considering the constraints against gathering additional information and with the information available, FERC has determined that CA-SBR-501 is ineligible for inclusion in the National Register of Historic Places. I agree.

To build the new intake tower, DWR must lower the water level of the lake. When the lake bottom is exposed, the FERC agrees to conduct an inventory to verify the existence or location of CA-SBR and ascertain its condition. Any additional features not noted in 1967, that may be in association with CA-SBR-501, will be identified and evaluated.

You have fulfilled federal agency responsibilities pursuant to 36 CFR 800, the regulations implementing Section 106 of the National Historic Preservation Act. Please note that your agency may have additional responsibilities under 36 CFR 800 under any of the following circumstances:

1. If any person requests that the Advisory Council on Historic Preservation review your findings in accordance with 36 CFR 800.6(e);
2. If this undertaking changes in ways that could affect historic properties [36 CFR 800.5(c)];

3. If previously undocumented properties are discovered during the implementation of this undertaking or if a known historic property will be affected in an unanticipated manner [36 CFR 800.11];
4. If a property that was to be avoided has been inadvertently or otherwise affected [36 CFR 800.4(c);800.5];
5. If any condition of the undertaking, such as a delay in implementation or implementation in phases over time, may justify reconsideration of the current National Register status of properties within the undertaking's Area of potential Effects [36 CFR 800.4(c)].

Thank you for considering historic properties during project planning. If you have any questions, please call staff archaeologist Nicholas Del Cioppo at (916) 653-9696.

Sincerely,



Ms. Cheryl Widell
State Historic Preservation Officer

Appendix F

Section 106 Log of Consultation

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Date	Topic	Description	Discussion/Notes	Consulting Parties
7/28/2015	Pre-PAD Relicensing Questionnaire	Licensees letter and questionnaire to potentially interested parties and stakeholders regarding the South SWP relicensing, including the Devil Canyon Project.	Licensees provided Project and relicensing information to potentially interested parties and requested completion of questionnaire attached to letter.	DWR to potentially Interested Tribes, Agencies, NGOs, and other Potential Stakeholders.
12/29/2016	Tribal Comments on PAD	Letter with Comments from SMBMI on PAD and Proposed Cultural and Tribal Resources Studies.	SMBMI provided comments and concerns regarding the inclusion of certain resources in the studies and other materials in support of the studies.	DWR, SMBMI
1/23/2017	Tribal Comments	Telephone Conversation with SMBMI	DWR provided Lee Clause (SMBMI) with a status update on the Project relicensing.	DWR, SMBMI
1/23/2017	Tribal Information	Follow-Up to 1/23/2017 Telephone Conversation	Clause emailed DWR information regarding the Serrano Territory and plants of tribal concern as discussed in the telephone call.	DWR, SMBMI
4/8/2017	Tribal Comments on Study Plans	Letter from SMBMI commenting on Cultural and Tribal Study Plan Approaches	In the Cultural Study Plan, SMBMI asks for clarification regarding definitions of "Oral Histories" and "Study Area," and had comments regarding field survey and excavation methods. SMBMI asked for clarification on references. SMBMI had comments on the Tribal Resources Study Approach regarding research processes and requested that a 60-day review be provided for a Traditional Cultural Property (TCP)-based report.	DWR, SMBMI
5/15/2017	Section 106 Kick-Off Meeting	Meeting in Victorville, CA with FERC, Relicensing Team, Tribes and San Bernardino National Forest (SBNF)	Overview of Project; relicensing steps, relicensing progress, study plans; proposed APE; relationship between FERC relicensing process, Section 106, and CEQA AB 52; next steps.	FERC, DWR, Stantec, HDR, Morongo Band of Mission Indians (MBMI), SMBMI, and SBNF

5/19/2017	Cultural Resources Permit Application	Email from HDR (Flint) to Daniel Grijolva (SBNF)	Introduction of HDR to SBNF and request for a permit application to obtain the cultural resources study permit required to work on federal lands.	HDR, SBNF
5/23/2017	Section 106 Kick-Off Meeting Follow-up	Landowners in Project FERC boundary	DWR provided SBNF with map of landowners in proposed Project Project Boundary	DWR, HDR, SBNF
5/31/2017	APE Consultation	DWR submitted consultation letter to SHPO	DWR requested SHPO concurrence on the Project APE	DWR, SHPO
5/31/2017	APE Consultation	DWR filed letter informing FERC of SHPO consultation	DWR requested SHPO concurrence on the Project APE	DWR, FERC
6/22/2017	Cultural Resources Permit	SBNF Issues Cultural Resources Permit	Daniel Grijolva (SBNF Archaeologist) issued HDR a permit to conduct cultural resources survey on SBNF	HDR, SBNF
7/18/2017	APE Consultation	SHPO letter to DWR	SHPO requested additional information regarding the APE	DWR, SHPO
8/14/2017	APE Consultation	DWR submitted consultation letter to SHPO	DWR provided requested information to the SHPO regarding the Project APE	DWR, SHPO
8/14/2017	APE Consultation	DWR filed letter informing FERC of continued SHPO consultation	DWR provided requested information to the SHPO regarding the Project APE	DWR, FERC
8/24/2017	Meet-and-Greet/ Project Site Visit	DWR, Stantec, HDR, ethnographers, and tribes meet and tour Project together	Tour begins at Silverwood lake and concludes at the SMBMI reservation, discussion of non-disclosure agreements	DWR, Stantec, HDR, Albion, SRI, Reddy Anthropology, SMBMI, and MBMI
8/25/2017	Meet-and-Greet/ Project Site Visit	DWR, Stantec, HDR, ethnographers, and tribes continue tour of Project	Second day of Project tour	DWR, Stantec, HDR, Albion, SRI, Reddy Anthropology, SMBMI, and MBMI
9/21/2017	APE Consultation	SHPO letter to DWR	SHPO concurred with the defined APE	DWR, SHPO
10/24/2017	Non-Disclosure Agreements	Comments on agreements from SMBMI	SMBMI provided comments on the draft non-disclosure agreements	DWR, SMBMI

10/30/2017	Non-Disclosure Agreements	DWR Revised Agreements in Response to Comments	DWR submitted revised agreement to SMBMI	DWR, SMBMI
8/16/2018	Tribal Resources Study	Email from SMBMI to DWR Regarding Botanical Resources	Clause informed DWR of tribal requests made to the ethnographer regarding the inclusion or exclusion of botanical resource data	DWR, SMBMI

Appendix G

NAHC 2015 Correspondence and Ongoing Tribal Consultation

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NATIVE AMERICAN HERITAGE COMMISSION

1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95891
(916) 373-3710
Fax (916) 373-5471



July 17, 2015

Monica Mackey
HDR Inc.
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833

Sent by Fax: (916) 679-8701
Number of Pages: 43

Re: Relicensing of the Devil Canyon Hydroelectric Project (FERC No. 2426), San Bernardino County.

Dear Ms. Mackey,

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3712.

Sincerely,

A handwritten signature in cursive script that reads "Katy Sanchez".

Katy Sanchez
Associate Government Program Analyst

**Native American Contact List
San Bernardino County
July 17, 2015**

San Manuel Band of Mission Indians
Lynn Valbuena, Chairwoman
26569 Community Center Serrano
Highland , CA 92346
(909) 864-8933

(909) 864-3370 Fax

San Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838 Fernandefio
Newhall , CA 91322 Tataviam
tsen2u@hotmail.com Serrano
(661) 753-9833 Office Vanyume
(760) 885-0955 Cell Kitanemuk
(760) 949-1604 Fax

Gabrieleno/Tongva San Gabriel Band of Mission Indian
Anthony Morales, Chairperson

P.O. Box 693 Gabrielino Tongva
San Gabriel , CA 91778
GTTribalcouncil@aol.com
(626) 483-3564 Cell

(626) 286-1262 Fax

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St. Gabrielino Tongva
Los Angeles , CA 90012
sgoad@gabrielino-tongva.com
(951) 807-0479

Morongo Band of Mission Indians
Denisa Torres, Cultural Resources Manager
12700 Pumarra Road Cahuilla
Banning , CA 92220 Serrano
dtorres@morongo-nsn.gov

(951) 572-6004 Fax

San Manuel Band of Mission Indians
Daniel McCarthy, M.S., Director-CRM Dept.

26569 Community Center Drive Serrano
Highland , CA 92346
dmccarthy@sanmanuel-nsn.gov
(909) 864-8933 Ext 3248

(909) 862-5152 Fax

Morongo Band of Mission Indians
Robert Martin, Chairperson

12700 Pumarra Road Cahuilla
Banning , CA 92220 Serrano
(951) 849-8807
(951) 755-5200

(951) 922-8146 Fax

Serrano Nation of Mission Indians
Goldie Walker, Chairwoman

P.O. Box 343 Serrano
Patton , CA 92369

(909) 528-9027

(909) 528-9032

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting locative Americans with regard to cultural resources for the proposed Relicensing of the Devil Canyon Hydroelectric Project (FERC No. 2426), San Bernardino County.

**Native American Contact List
San Bernardino County
July 17, 2015**

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
9570 Mias Canyon Road Serrano
Banning , CA 92220 Cahuilla
siva@dishmail.net
(951) 849-4676

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 Gabrielino
Covina , CA 91723
gabrielenoindians@yahoo.
(626) 926-4131

Gabrielino /Tongva Nation
Sam Dunlap, Cultural Resources Director
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net
(909) 262-9351

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting locative Americans with regard to cultural resources for the proposed Relicensing of the Devil Canyon Hydroelectric Project (FERC No. 2426), San Bernardino County.

Appendix H

West Fork Mojave River Reach Reconnaissance Survey

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DEVIL CANYON PROJECT RELICENSING FERC PROJECT NUMBER 14797



West Fork Mojave River Reach Reconnaissance Survey

February 2019



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

GAVIN NEWSOM
Governor
State of California

WADE CROWFOOT
Secretary for
California Natural Resources

KARLA A. NEMETH
Director
Department of Water Resources



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Executive Summary

This reconnaissance study was conducted in support of California Department of Water Resources' (DWR) relicensing of the Devil Canyon Project, Federal Energy Regulatory Commission Project Number 14797 (Project). This report presents existing, relevant, and reasonably available information and the results of a field reconnaissance survey. The field survey was conducted December 18 through December 20, 2018 on the 6.4-mile-long section of the West Fork Mojave River (WFMR) between Cedar Springs Dam and the Saddle Dike Diversion Dam at the Mojave Forks Reservoir (WFMR reach). The Project's Silverwood Lake, which is impounded by Cedar Springs Dam, is in the WFMR basin, but the Project does not use natural flow into Silverwood Lake for power generation, nor does the Project have discretion over releases from Silverwood Lake into the WFMR reach.

The existing, relevant, and reasonably available information described a reach that has flows in excess of 1,000 cubic feet per second in some years, but with all years having prolonged periods of up to 9 to 10 months with no flow, and heavy public use. Four amphibian and fish species listed under the federal Endangered Species Act (ESA) have the potential to occur in this reach including the federally endangered arroyo toad (*Anaxyrus californicus*), the federally threatened California red-legged frog (*Rana draytonii*; CRLF), the federally endangered southern mountain yellow-legged frog (*Rana muscosa*; SMYLF), and the federally endangered Mohave tui chub (*Gila bicolor* ssp. *Mohavensis*). Also, western spadefoot (*Spea hammondi*) is a special-status species that has the potential to occur in the reach. The arroyo toad has been reported to occur in the reach and is considered extant (CDFW 2018a, Thomson et al. 2016). A segment of the WFMR reach, beginning in the area on the north side of Highway 173 and northwards, is designated critical habitat for arroyo toad. The other four species (CRLF, SMYLF, Mohave tui chub, and western spadefoot) either have not recently been detected in the vicinity of the WFMR reach or are considered extirpated from the region (USFWS 2002, Moyle 2002, USFWS 2018a, CDFW 2018a).

During DWR's survey, no releases from Cedar Springs Dam were being made. The upstream half of the reach had very slow flowing water and included moderately deep pool habitat resulting from beaver dam complexes. No ESA-listed species or special status species were observed. Evidence of four aquatic invasive species – American bullfrog (*Lithobates catesbeianus*), red swamp crayfish (*Procambarus clarkii*), Asian clam (*Corbicula fluminea*), and Eurasian watermilfoil (*Myriophyllum spicatum*) – were observed. Fish species observed included unidentified minnows and mosquitofish, and vocalizing chorus frogs were heard. Riparian habitat varied from nearly void in the upstream portion of the reach to moderately dense with a lateral extent up to 100 feet in other areas. Riparian composition for the upper portion of the reach included common reed, shrubs including mule fat and willows, as well as intermittent sycamore, cottonwood and ash trees. In-channel disturbances observed included off-highway vehicle usage, cattle-grazing, and other human activities.

The downstream half of the reach was either dry during the survey or consisted of a few isolated pools with no surface flow. No ESA-listed species, special status species or fishes were observed. Evidence of Asian clam and red swamp crayfish was observed. Riparian habitat varied from near void to dense, with a lateral extent ranging from 10 feet to approximately 300 feet. Riparian composition consisted of similar species to the upper portion of the reach, with a more mature riparian corridor upstream of Deep Creek. Observed in-channel disturbances were similar to those observed in the upper portion of the reach.

TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Background.....	1-1
1.1.1	Description of the Project.....	1-1
1.1.2	Description of the River Basin.....	1-2
1.1.3	Description of the West Fork Mojave River Reach.....	1-3
2.0	METHODS.....	2-1
2.1	Desktop Analysis, LITERATURE REVIEW, and Data Gathering.....	2-1
2.2	Survey.....	2-3
2.2.1	Hydrology.....	2-3
2.2.2	Geomorphology	2-3
2.2.3	Aquatic Habitat.....	2-3
2.2.4	Amphibians and Fish	2-4
2.2.5	Water Quality	2-4
2.2.6	Riparian Vegetation	2-4
2.2.7	Aquatic Invasive Species	2-4
2.2.8	Incidental and Other Observations.....	2-4
3.0	RESULTS.....	3-1
3.1	Desktop Analysis	3-1
3.1.1	Hydrology.....	3-1
3.1.2	Geomorphology	3-5
3.1.3	Amphibians and Fish	3-6
3.1.3.1	Arroyo Toad	3-6
3.1.3.2	California Red-Legged Frog.....	3-9
3.1.3.3	Southern Mountain Yellow-legged Frog, Southern California Distinct Population Segment.....	3-10
3.1.3.4	Mohave Tui Chub.....	3-11
3.1.3.5	Western Spadefoot	3-12
3.1.4	Aquatic Invasive Species	3-13
3.1.5	Disturbance.....	3-13
3.2	Survey.....	3-13
3.2.1	West Fork Mojave River Reach Characterization	3-13
3.2.1.1	Sub-Reach 1	3-15
3.2.1.2	Sub-Reach 2	3-16
3.2.1.3	Sub-Reach 3.....	3-18
3.2.1.4	Sub-Reach 4	3-22
3.2.1.5	Sub-Reach 5	3-24
3.2.1.6	Sub-Reach 6	3-27
3.2.2	General Hydrology and Water Quality	3-30
3.2.3	Amphibians and Fish	3-32
3.2.4	Aquatic Invasive Species	3-32
3.2.4.1	Asian Clam.....	3-33
3.2.4.2	Red Swamp Crayfish	3-33
3.2.4.3	American Bullfrog.....	3-34
3.2.4.4	Eurasian Watermilfoil	3-35
3.2.5	Other Observations and Disturbance	3-36

3.2.6 Incidental Observations 3-37
4.0 REFERENCES 4-1

LIST OF FIGURES

Figure 1.1-1. WFMR Reach 1-4
Figure 2.1-1. Property Ownership Within the WFMR Reach 2-2
Figure 3.1-1. WFMR Stream Flows Between Water Year 2006 and Water Year
2017 3-2
Figure 3.1-2: Las Flores Ranch Releases from the SWP Aqueduct from Water
Year 2006 to Water Year 2018 3-4
Figure 3.1-3. WFMR Stream Gradient Profile 3-6
Figure 3.1-4. Arroyo Toad Critical Habitat and Occurrences within the WFMR
Reach 3-8
Figure 3.2-1. WFMR Sub-Reaches 1 Through 6 3-14
Figure 3.2-2. WFMR, Near the Upstream End of Sub-Reach 1: Looking
Northeast and Downstream 3-15
Figure 3.2-3. WFMR, Downstream End of Sub-Reach 1: Looking Southwest and
Upstream 3-16
Figure 3.2-4. WFMR, Middle of Sub-Reach 2: Deep Lateral Scour Pool, Looking
Southwest and Upstream..... 3-17
Figure 3.2-5. WFMR, Middle of Sub-Reach 2: Braided Low Gradient Riffle with
Moderate Riparian Density and Some Mature Trees, Looking East
and Downstream..... 3-18
Figure 3.2-6. WFMR, Upstream Half of Sub-Reach 3: Long Step-Run Riffle
Complex with Moderate to Sparse Riparian of Willow and Mule Fat,
Looking Northeast and Downstream..... 3-20
Figure 3.2-7. WFMR, Near the Midpoint of Sub-Reach 3: 605-Foot-Long Beaver
Dam Pool, Moderate to Sparse Riparian of Willow and Mule Fat
with Some Patches of Common Reed, Looking East and
Downstream..... 3-21
Figure 3.2-8. WFMR, Downstream Half of Sub-Reach 3: Step Run Near Void of
Riparian Vegetation on the North Bank and Moderate to Dense
Riparian Set Back on the South Bank, Looking East and
Downstream..... 3-22
Figure 3.2-9. WFMR, Middle of Sub-Reach 4: High Gradient Riffle Through
Braided Section with Boulder and Large Cobble, Near Void to
Moderate Riparian, Looking West and Upstream 3-23
Figure 3.2-10. WFMR, Middle of Sub-Reach 4: Step Pool-Like, Small to Large
Gravel with Sand, Void to Sparse Riparian, Looking West and
Upstream 3-24
Figure 3.2-11. WFMR, Sub-Reach 5 Confluence of Primary and Secondary
Channels Downstream of Grass Valley Creek: Run-Like in the
Foreground and Two Riffles in the Background, Small to Large
Gravel Dominant and Small Cobble Subdominant with Sand and
Gravel Within OHW, Sparse Riparian, Looking West and Upstream 3-26

Figure 3.2-12. WFMR, Run-Like Flat Water Section in Sub-Reach 5 Downstream of Arrowhead Lake Road: Sand-Dominant and Small Gravel Subdominant, Void of Riparian, Looking West and Upstream 3-27

Figure 3.2-13. WFMR, Upstream End of Sub-Reach 6: Funneling Channel, Low-Gradient Riffle-Like, Sand Dominant and Small Gravel Subdominant, Moderate Riparian Vegetation Abundance, Looking East and Downstream..... 3-29

Figure 3.2-14. WFMR, Narrow Section of Sub-Reach 6: Pool-Like Depression in the Foreground and Meandering Flat Water in the Background, Sand Dominant and Small Gravel Subdominant, Downstream of Arrowhead Lake Road, Mature Riparian Vegetation with Moderate Abundance, Looking East and Downstream 3-30

LIST OF TABLES

Table 3.2-1. Stream Water Quality 3-31

Table 3.2-2. Isolated Pool Water Quality 3-32

Table 3.2-3. Aquatic Invasive Species Observed During Survey 3-33

Table 3.2-4. Disturbance in WFMR Reach 3-37

Table 3.2-5. Other Species Observations During WFMR Reconnaissance Survey ... 3-37

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AIS	aquatic invasive species
cfs	cubic feet per second
CNDDDB	California Natural Diversity Database
CRLF	California red-legged frog
Decree	Mojave River Adjudication Decree
DO	dissolved oxygen
DPS	Distinct Population Segment
DWR	California Department of Water Resources
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FR	Federal Register
GPS	Global Positioning System
LFR	Las Flores Ranch
mg/L	milligrams per liter
MWA	Mojave Water Agency
NAS	Nonindigenous Aquatic Species, a USGS location database
OHW	ordinary high water
OHWM	ordinary high water mark
PAD	Pre-Application Document
Project	Devil Canyon Project, FERC Project Number 14797
SMYLF	Southern mountain yellow-legged frog or Sierra Madre yellow-legged frog
SRA	State Recreation Area
Sub-Reach 1	Cedar Springs Dam Spillway Tailrace
Sub-Reach 2	West Fork Mojave River above Horsethief Creek; extends from the downstream end of Sub-Reach 1 to the confluence with Horsethief Creek
Sub-Reach 3	West Fork Mojave River below Horsethief Creek; approximately 1.5-mile section of the West Fork Mojave River downstream of Horsethief Creek to just beyond the Hesperia Venture I (Las Flores

	Ranch) property boundary with US Army Corps of Engineers' property
Sub-Reach 4	West Fork Mojave River upstream of Grass Valley Creek
Sub-Reach 5	West Fork Mojave River downstream of Grass Valley Creek
Sub-Reach 6	West Fork Mojave River Mature Riparian Corridor; the last 0.5-mile of the West Fork Mojave River before reaching the confluence with Deep Creek at the Saddle Dike Diversion Dam at Mojave River Forks Reservoir
SWP	State Water Project
U.S.	United States
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WFMR	West Fork Mojave River
WFMR reach	The 6.4-mile-long section of the West Fork Mojave River between Cedar Springs Dam and the Saddle Dike Diversion Dam at the Mojave River Forks Reservoir
YSI	Yellow Springs Instruments

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1.0 INTRODUCTION

This report presents existing, relevant, and reasonably available information and the results of a field reconnaissance survey (survey) conducted on December 18, 2018 through December 20, 2018. The survey was conducted on the 6.4-mile-long section of the West Fork Mojave River (WFMR) between Cedar Springs Dam and the Saddle Dike Diversion Dam at the Mojave Forks Reservoir (WFMR reach) in support of the California Department of Water Resources' (DWR) application for a new license with Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project, FERC Project Number 14797 (Project).

1.1 BACKGROUND

1.1.1 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 (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, which is located on the East Branch of the SWP in San Bernardino County, California, has a FERC-authorized installed capacity of 276,796 kilowatts. Project facilities range in elevation from 5,377 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake, San Bernardino Tunnel, Devil Canyon Powerplant Penstocks and Surge Chamber, Devil Canyon Powerplant and Switchyard, Devil Canyon Afterbay and Devil Canyon Second Afterbay, Silverwood Lake-associated recreation facilities, and appurtenant facilities and features. The California Department of Parks and Recreation, on behalf of DWR, maintains and operates the Silverwood Lake-associated Project recreation facilities as part of the Silverwood Lake State Recreation Area (SRA). Non-Project facilities (e.g., the Pacific Crest National Scenic Trail) traverse or are located in the Silverwood Lake SRA, but are not Project facilities. The Project does not include any transmission lines or open water conduits, except for the short Cross Channel that connects the Devil Canyon Afterbay and Devil Canyon Second Afterbay. Silverwood Lake, which is formed by Cedar Springs Dam, is in the WFMR basin, but the Project does not use natural flow into Silverwood Lake for electricity generation, nor does the Project have discretion over releases from Silverwood Lake into the WFMR. Power is generated as SWP water is released from the south end of Silverwood Lake to Devil Canyon Powerplant. Water deliveries for water rights to the natural flow are released from Cedar Spring dam on the north end of Silverwood Lake.

1.1.2 Description of the River Basin

The WFMR originates at an elevation of 4,960 feet on the north side of a saddle between summits on a ridge running west-northwest of Sugarpine Mountain. The WFMR has no significant diversions or withdrawals upstream of Silverwood Lake. At its inflow into Silverwood Lake, the WFMR drains an area of 3.2 square miles.

The East Fork of the WFMR originates at an elevation of 5,500 feet in Twin Peaks, California. Prior to construction of Cedar Springs Dam, the East Fork of the WFMR was a tributary to the WMFR. However, today, the East Fork of the WFMR drains directly into Silverwood Lake and drains an area of 11.3 square miles. Upstream of Silverwood Lake, the East Fork of the WFMR receives water from Houston Creek, which has a small reservoir called Lake Gregory at its headwaters. Lake Gregory Dam was built in 1938 by the Crest Forest County Water District. Today, Lake Gregory serves primarily as a recreation destination that includes a San Bernardino County Regional Park (Lake Gregory Regional Park).

Flows from WFMR and the East Fork of the WFMR mix with SWP water in Silverwood Lake. Flow in both rivers is seasonal (intermittent), in that each river flows during certain times of the year (i.e., primarily from December through May) when smaller upstream stream courses are flowing and when groundwater provides enough water for surface river flow. Runoff from rainfall or other precipitation supplements the flow. Several unnamed tributaries enter Silverwood Lake, however, none of these tributaries are gaged. Collectively, these tributaries drain an area of 19.3 square miles.

Silverwood Lake and Cedar Springs Dam discharge into the WFMR, which flows downstream from the dam approximately 4.3 miles to where Grass Valley Creek enters the WFMR. Grass Valley Creek has a small private reservoir called Grass Valley Lake, which is located near its headwaters.

From its confluence with Grass Valley Creek, the WFMR flows another 2.1 miles to join with Deep Creek to form the Mojave River. The watershed that feeds Grass Valley Creek and the 6.4 miles of WFMR downstream from Cedar Springs Dam to Deep Creek is approximately 41 square miles. This area consists of steep mountainous terrain, with elevations that range from 3,000 to 6,000 feet, and a long, narrow valley to the west of the WFMR.

The sub-basin that is drained by Deep Creek is 135 square miles of rugged mountainous terrain, with elevations that range from 3,000 to 8,200 feet. Deep Creek collects water from several tributaries, including Coxey, Holcomb, Willow, and Little Bear creeks. The privately-owned Lake Arrowhead, formed by Lake Arrowhead Dam, is located near the headwaters of Little Bear Creek. The dam was completed in 1922 by the Arrowhead Lake Company to create Lake Arrowhead as a resort destination.

The Mojave Forks Dam, which is also known as the Mojave River Dam or West Fork Dam, is located just downstream of the WFMR and Deep Creek confluence. The dam is a U.S. Army Corps of Engineers (USACE) flood-control structure completed in 1974 to

provide flood protection to the cities located downstream on the Mojave River and can store approximately 179,400 acre-feet of water. The dam is 200 feet high and 2,223 feet long. The dam serves strictly for flood control, therefore, the reservoir is usually dry. However, the reservoir can fill quickly following heavy winter storms. Flood waters are released as quickly as possible without exceeding the capacity of downstream levees. The reservoir is generally drained within two to three days of a heavy rain event. The dam reduces the sharp peaks of flash floods in the Mojave River channel and also provides incidental groundwater recharge benefits in the Victor Valley area.

From the Mojave Forks Dam, the Mojave River flows north and east through the California cities of Hesperia, Victorville, and Barstow and through the Mojave Desert for approximately 100 miles before terminating into the Mojave River Wash on the western edge of the Mojave National Preserve. River flow of the Mojave River is intermittent and seasonal, with much of the flow subsurface except for several bedrock gorges. The Mojave River basin covers approximately 4,600 square miles.

1.1.3 Description of the West Fork Mojave River Reach

For the purpose of this report, the 6.4-mile-long reach of the WFMR between Cedar Springs Dam and the Saddle Dike Diversion Dam at the Mojave Forks Reservoir is referred to as the “WFMR reach,” and is shown in Figure 1.1-1. This portion of the WFMR has approximately 0.4 percent gradient. DWR’s review of existing information and the survey was limited to characterizing conditions within the principal flow channel of the WFMR reach, as well as characterizing the primary riparian community along this principal flow channel, as described below.

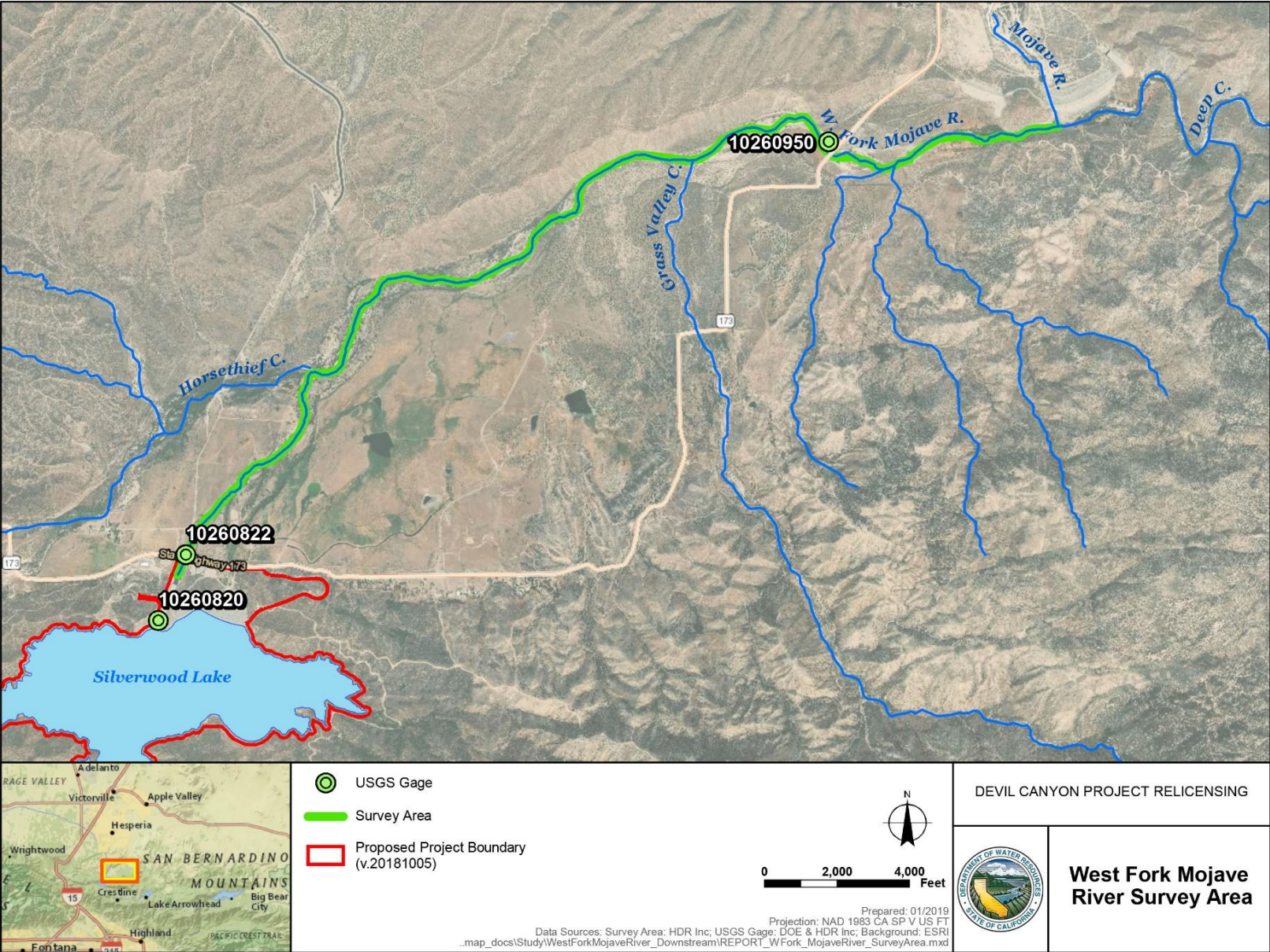


Figure 1.1-1. WFMR Reach

2.0 METHODS

This reconnaissance study was completed in two steps: (1) desktop analysis, literature review, and data gathering; and (2) field reconnaissance. These are described in detail below. Prior to conducting surveys, landowner access and permission was secured. DWR confirmed with the appropriate agencies that permits were not needed for the work. DWR implemented standard decontamination guidelines to minimize the likelihood of transmitting diseases during the fieldwork (USFWS 2005, CDFW 2013).

2.1 DESKTOP ANALYSIS, LITERATURE REVIEW, AND DATA GATHERING

Prior to the survey, existing information regarding the WFMR reach was reviewed. This included information gathered as part of DWR's Devil Canyon Project Relicensing Pre-Application Document (PAD) and Draft License Application documents, as well as Google Earth historical and contemporary imagery, National Wetland Inventory maps, U.S. Geological Survey (USGS) gage data, the Draft Desert Renewable Energy Conservation Plan Baseline Biology Report (Dudek and ICF 2012), Tapestry Project Biological Technical Report (HELIX 2014), and other sources of information pertinent to the work.

In addition, the California Natural Diversity Database (CNDDDB) (CDFW 2018a), the U.S. Fish and Wildlife Service Information and Planning and Consultation website (iPaC) (USFWS 2019a), and U.S. Fish and Wildlife Service Critical Habitat mapper (USFWS 2019b) were reviewed to determine Endangered Species Act (ESA)-listed species, special-status species and critical habitat that may occur within the vicinity of the WFMR reach. The CNDDDB was queried on December 14, 2018 (CDFW 2018a), based on a search of the USGS 7.5-minute quadrangles in which the reach is located (i.e., Silverwood Lake quadrangle), and the adjacent quadrangles (i.e., Baldy Mesa, Hesperia, Apple Valley South, Lake Arrowhead, Cajon, Harrison Mountain, San Bernardino North, and Devore) covering approximately 554 square miles. This was an area much larger than the WFMR reach, but was intended to ensure a comprehensive list of ESA-listed species and special-status species potentially occurring within the WFMR reach. Landowners within the WFMR reach were identified and potential access points were reviewed and mapped (Figure 2.1-1).

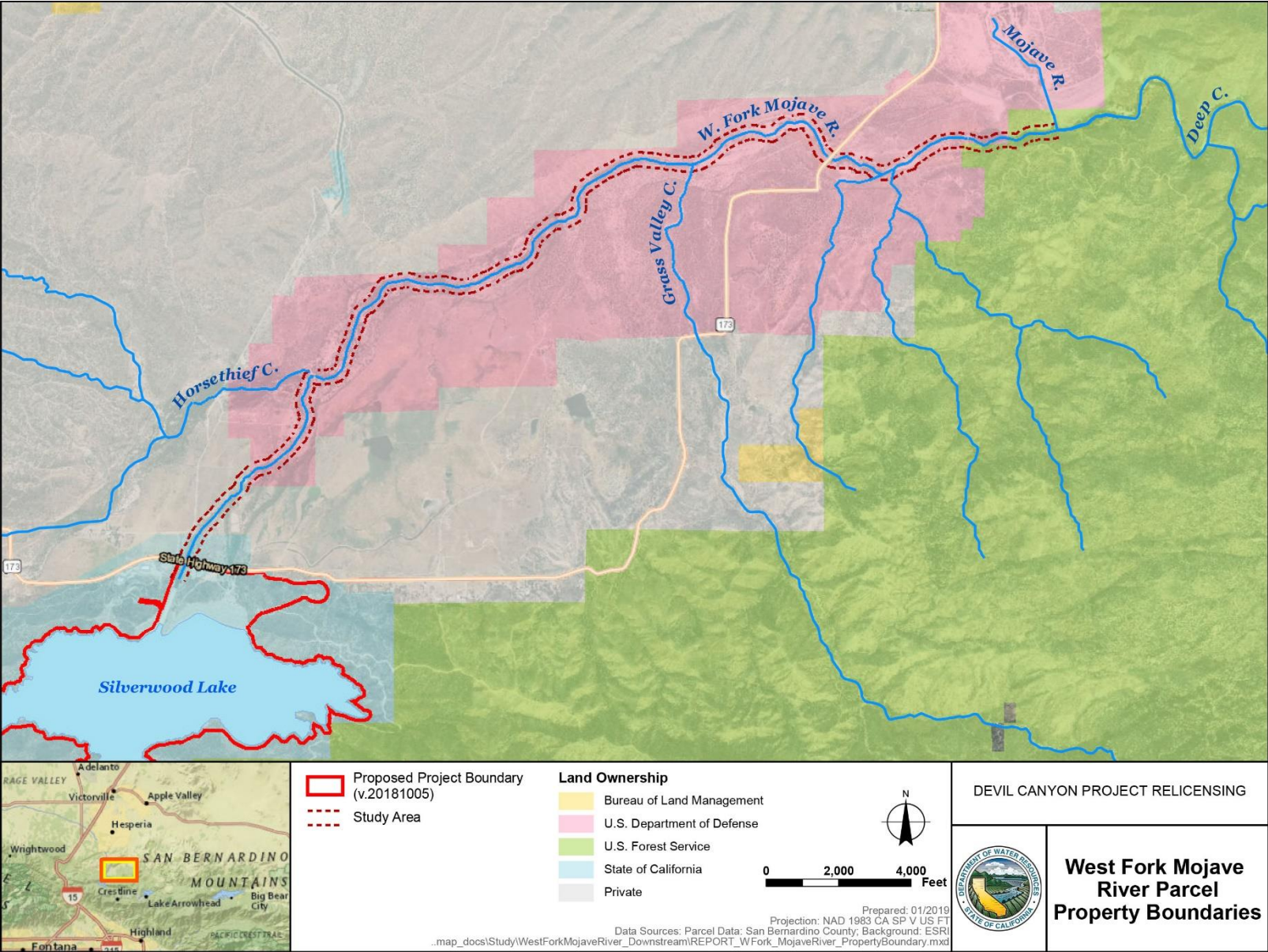


Figure 2.1-1. Property Ownership Within the WFMR Reach

2.2 SURVEY

The reconnaissance survey was conducted between December 18 and 20, 2018. The purpose of the survey was to characterize the WFMR reach. The entire reach was traversed by foot. The first two days of reconnaissance surveys were in an upstream direction. On the third day, the site was accessed from the top of the reach and surveyed in a downstream direction to the location where the previous day's survey ended.

Surveyors recorded information related to hydrology, geomorphology, aquatic and riparian habitat, fish, and amphibians. Representative photos and Global Positioning System (GPS) points were taken at locations deemed necessary and representative of site conditions (e.g., changes in habitat and wetted portions of the reach). Data collection methods for each category are described below.

2.2.1 Hydrology

During the survey, sections of the reach that were wetted were documented and the extent (e.g., length, depth, and width) of the wetted portion was visually estimated or recorded using GPS. Discharge measurements were taken in areas where the volume of flowing water was suitable for measurement. In areas where the flow was too low to measure (i.e., less than 1 cubic foot per second [cfs]), a visual estimate of flow was recorded. Locations with visible groundwater seepage were recorded with GPS.

2.2.2 Geomorphology

Several parameters were utilized to characterize the geomorphology of the reach. Within the primary flow channel, general sediment was characterized. Based on visual inspection, dominant and subdominant grain sizes were recorded within the ordinary high water (OHW) line of wetted features along the channel. Channel width was estimated based on indicators of ordinary high water mark (OHWM) and bankfull. The OHWM was determined based on the presence of certain features within the channel such as debris lines, upland vegetation lines, or topographical breaks along the bank. Bankfull was delineated by determining the elevation that flows overtopped the primary channel and flooded adjacent channels or the floodplain. Indicators of bankfull included sand or silt at the active scour mark, a break-in stream bank slope, perennial vegetation limit, rock discoloration, and exposed root hairs.

2.2.3 Aquatic Habitat

In areas of the WFMR reach that were wetted (e.g., flowing water or standing pools), the type and extent of aquatic habitat present (i.e., riffle, run, pool in flowing water, and depth and diameter of standing pools) was documented based on visual inspection. The approximate length and width of each unit was recorded. In standing pools, the length and width of each unit, as well as maximum and average depth was recorded. When relatively few standing pools were present in an area, each pool was characterized and a GPS point taken. In areas with large numbers of standing pools (e.g., beaver dam

complexes), the number of pools was estimated or counted and parameters were measured for a subsample of the pools.

2.2.4 Amphibians and Fish

DWR's primary focus during the survey was ESA-listed species and special-status species that have the potential to occur in the WFMR reach. All amphibian and fish species observed during the survey were recorded to species or nearest identifiable taxon through visual observation (e.g., young-of-year minnows were identified to the Family Cyprinidae). Representative photos were taken when possible. No samples were collected.

2.2.5 Water Quality

Water quality parameters were collected using a Yellow Springs Instruments (YSI) Model Pro2030 water quality meter. The YSI meter was field-calibrated each day prior to use. Parameters measured included dissolved oxygen (DO) in milligrams per liter (mg/L) and percentage, and water temperature in degrees Celsius (°C). Water quality measurements were collected for a subsample of standing pools, as well as at the start and end of wetted stream sections. In areas where the reach was wetted for long periods (i.e., as documented in the upper portion of the reach), measurements were taken at least once per mile. No releases from Cedar Springs Dam were being made during the course of the survey.

2.2.6 Riparian Vegetation

The riparian community was characterized along the primary flow channel. This characterization included documenting the dominant and subdominant species, abundance, and extent of riparian habitat, including the distance from flowing water. Photos were taken of plant species that were not readily identified in the field due to the seasonal timing of the survey. No samples were collected.

2.2.7 Aquatic Invasive Species

Aquatic invasive species (AIS) observed within the reach were documented and the species, location, and estimated abundance of each observed AIS was recorded. No samples were collected.

2.2.8 Incidental and Other Observations

In addition to the information described above, incidental observations made during the survey were recorded. These included observations of wildlife species and habitat (i.e., birds, bird nests, mammals, or reptile species). Other information collected during the survey included noting the location of existing man-made features (e.g., roads, bridges, residences, commercial buildings, parks, and designated trails) immediately adjacent to the reach, as well as weather conditions and other information deemed pertinent to the survey.

3.0 RESULTS

3.1 DESKTOP ANALYSIS

3.1.1 Hydrology

The WFMR basin is classified as arid or a cold desert climate. The area loses more water via evapotranspiration than falls as precipitation. Average annual precipitation is approximately 6 inches, with rare snowfalls, and the average annual evapotranspiration rate is 57 inches. Air temperatures range from approximately 100 degrees Fahrenheit (°F) in July to about 30°F in January. Excluding a small stretch with perennial flow, the Mojave River is normally dry except for periods after intense storms (USGS 2001). Stream gage data in the vicinity on the WFMR detailed a hydrograph depicting conditions similar to the general description of surface flows in the main stem Mojave River.

The WFMR reach receives inflows from five different source categories: (1) releases through the Cedar Springs Dam spillway; (2) releases through Cedar Spring's Dam's low-level outlet as scheduled by downstream water users; (3) Cedar Springs Dam seepage; (4) Las Flores Ranch (LFR) Diversion overflow; and (5) unregulated tributaries. Each of these is discussed below.

Releases through Cedar Springs Dam's low-level outlet are deliveries of natural Silverwood Lake inflow to the users identified in the Mojave River Adjudication Decree (Decree) issued by the Riverside County Superior Court in 1996. The Project has no discretion on releases of natural flow from Silverwood Lake; Mojave Water Agency (MWA) is the Watermaster for the adjudicated Mojave River Basin that is responsible for managing the release of water supplies allocated under the Decree.

Cedar Springs Dam seepage is minor and is monitored daily by DWR at seven locations on the WFMR downstream of the dam. Total seepage varies considerably over the water year, and from 1972 through 2017, ranged from 0 cfs to 2.28 cfs, with a long-term average daily seepage of 0.24 cfs.

USGS gage 10260820 (WFMR below Silverwood Lake, near Hesperia, California) measures flow at the upstream end of the WFMR reach, which includes a combination of spills, low-level outlet releases, and seepage from Cedar Springs Dam. Figure 3.1-1 shows that from water years 2006 through 2017, flows in excess of 1,000 cfs occurred in some years, with all years having prolonged periods (up to 9 to 10 months) with no flows other than seepage.

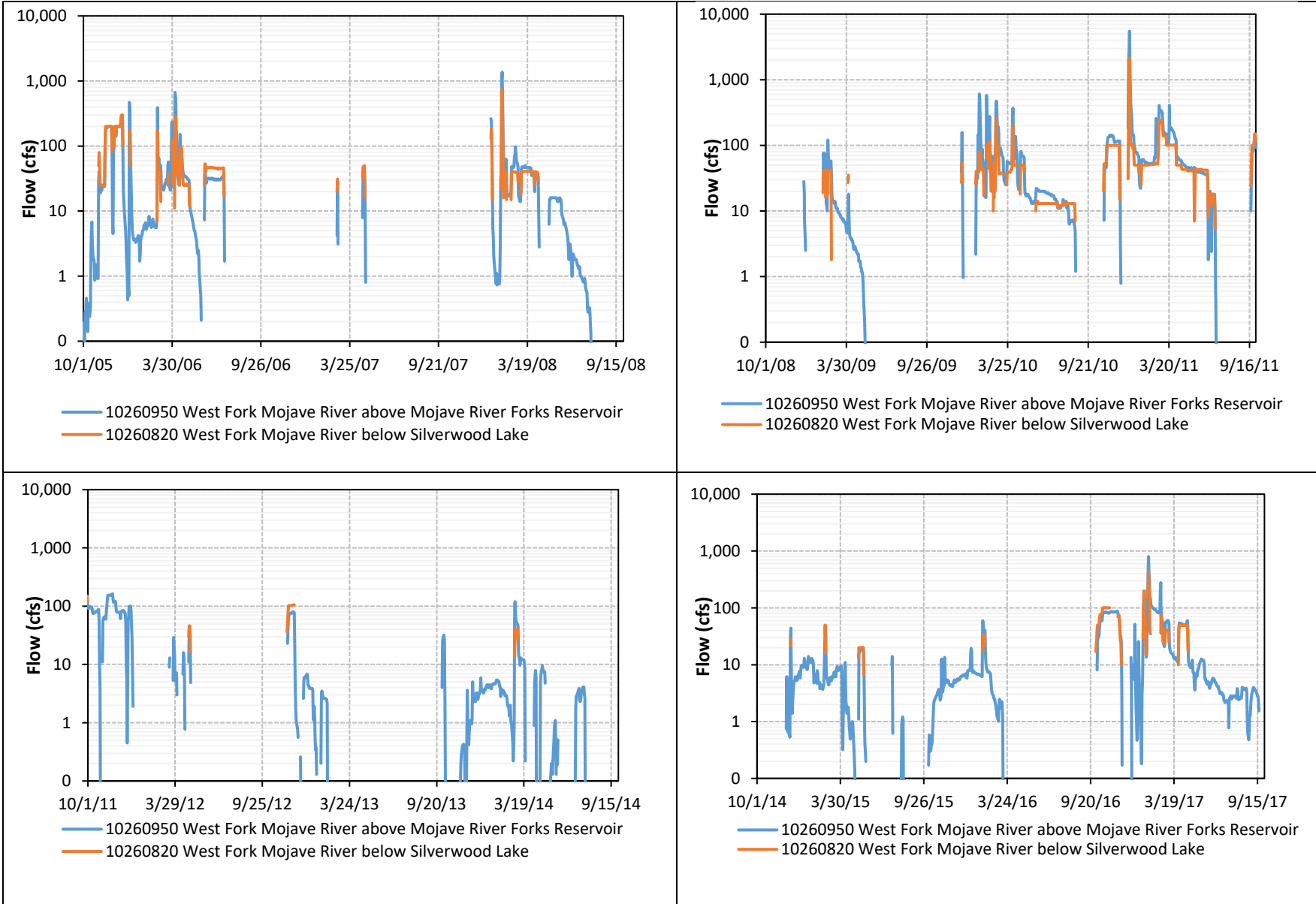


Figure 3.1-1. WFMR Stream Flows Between Water Year 2006 and Water Year 2017

The Decree also allocates natural inflow to LFR. The Decree confirms that LFR holds a senior water right for diversion from the WFMR dating back to the late 1800's. The original LFR diversion was lost with the construction of Cedar Springs Dam and the creation of Silverwood Lake. LFR now receives its water from SWP water supplies in exchange for WFMR supplies upstream of Silverwood Lake. LFR diversions come off the Mojave Siphon and are measured by USGS Gage 10260822 (Las Flores Ranch Release from the East Branch Aqueduct, near Hesperia, California). Review of gage data from 2010 through 2018 details variable water delivery to LFR (Figure 3.1-2). Flows diverted off of the Mojave Siphon can return to the WFMR via the diversion bypass canal off of the LFR diversion control structure, via a combination of ranch canals and ranch runoff channels that deliver water to numerous cattle watering ponds, and likely via some amount of groundwater seepage as these LFR water features recharge the sub-basin. From review of aerial imagery, under wet conditions and with ample water deliveries, these ranch runoff channels eventually converge and deliver overflows back to the WFMR. In some years (e.g., 2010), up to 18 and 19 cfs was delivered for a sustained amount of time; in other years, just over 10 cfs was delivered through the entire year. In 2011 and 2012, a negligible amount of water was delivered due to outages of the LFR diversion at the Mojave Siphon for necessary repairs. This also occurred for 3 months in 2013. During these times, DWR stored LFR's supplies in Silverwood Lake per the 1980 agreement and released the water to LFR in 2013 and 2014. In addition to deliveries from the diversion, the LFR has received wastewater disposal discharges from Crestline Sanitation District (CSD) since 1973 (CSD 2018). Disinfected secondary-23 recycled water¹ from CSD is used for flood irrigation on the LFR and provides groundwater recharge.

¹ Disinfected secondary-23 recycled water means recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number of 23 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

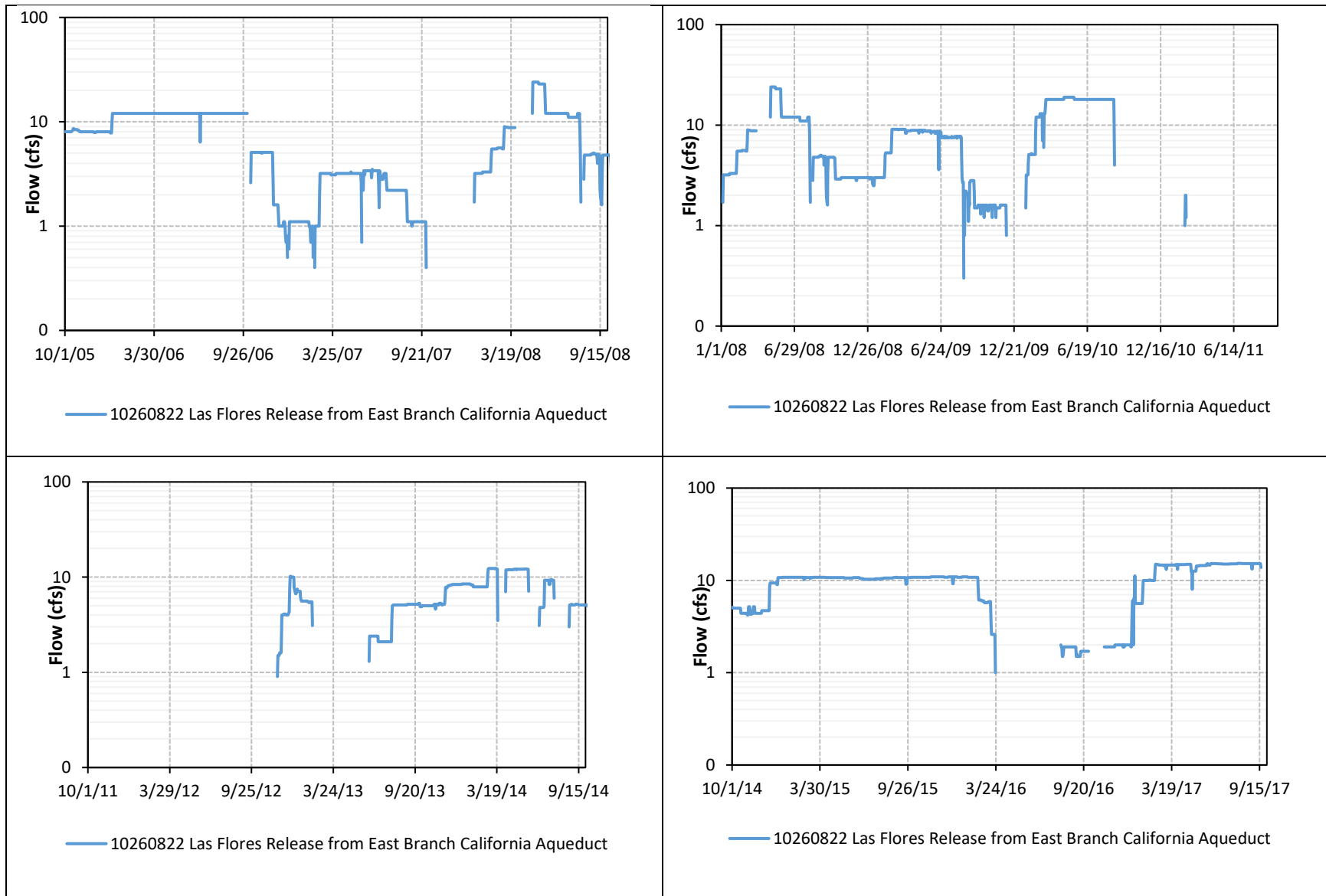


Figure 3.1-2: Las Flores Ranch Releases from the SWP Aqueduct from Water Year 2006 to Water Year 2018

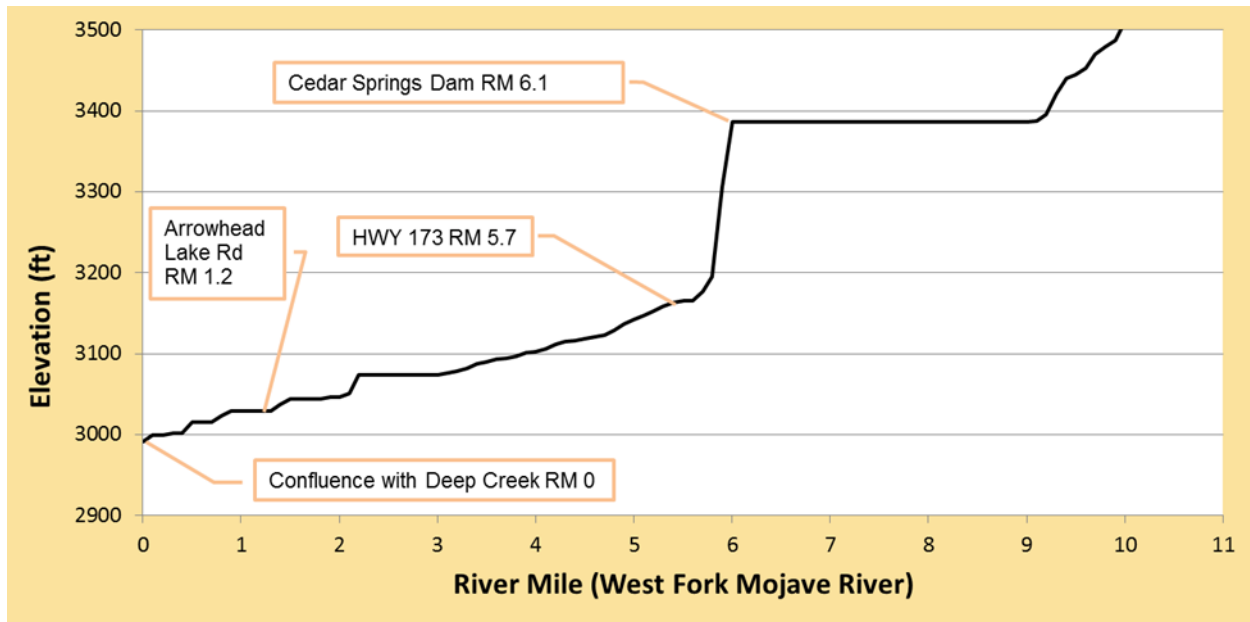
Several tributaries to the WFMR downstream of Silverwood Lake were identified through the data gathering process. Grass Valley Creek is a primary tributary toward the middle of the reach. A review of USGS Geographic Information System data identified a second primary tributary upstream from the confluence of Grass Valley Creek and the WFMR: Horsethief Creek. Horsethief Creek drains a long narrow canyon that combines with the WFMR from the west.

Publically available aerial imagery was reviewed to assess the influence of all tributaries within the WFMR reach. Aerial images detailed flow in Grass Valley Creek and Horsethief Creek in multiple years. In Horsethief Creek, water was observed in the stream channel in all available images. Several other smaller tributaries were identified downstream of Grass Valley Creek. Geomorphologic features observed in aerial imagery indicate that the three small and unnamed tributaries downstream of Grass Valley Creek appear to contribute flow during runoff events; and in 2006 and 2009, a small amount of water was present in the imagery. During the aerial image assessment, features related to the LFR diversion were also observed conveying flow back to the WFMR. These LFR features included flow from LFR diversion bypass canal and ranch runoff channels draining overflowing cattle watering ponds.

Figure 3.1-1 shows flows measured at USGS gage 10260950 (WFMR above Mojave River Forks Reservoir, near Hesperia, California) at the downstream end of the WFMR reach. The gage measures releases from Cedar Springs Dam that do not go sub-surface before they reach the gage, as well as accretion and other flows entering the reach. Like USGS gage 10260820 at the upstream end of the reach, the USGS gage at the downstream end shows rare high flows with prolonged periods of no flow.

3.1.2 Geomorphology

Stream gradient profile information from the PAD was used to assess general geomorphological conditions. The stream is low-gradient through the reach at an average of approximately 0.4 percent from the confluence with Deep Creek to the bottom of the Cedar Springs Dam spillway. A small step of increased gradient is observable upstream of river mile 2.0 in the vicinity of the WFMR confluence with Grass Valley Creek (Figure 3.1-3).



Key:
 ft. = feet
 HWY = Highway
 Rd = Road
 RM = river mile

Figure 3.1-3. WFMR Stream Gradient Profile

3.1.3 Amphibians and Fish

Based on the results of the database queries and literature review and information searches described above, four ESA-listed species including the federally endangered arroyo toad (*Anaxyrus californicus*), the federally threatened California red-legged frog (*Rana draytonii*; CRLF), the Southern California Distinct Population Segment (DPS) of the federally endangered southern mountain yellow-legged frog (*Rana muscosa*; SMYLF), and the federally endangered Mohave tui chub (*Gila bicolor ssp. Mohavensis*), and a special-status species, the Western Spadefoot (*Spea hammondi*), have records of occurrence within the vicinity of the WFMR reach. Each of these is described separately below.

3.1.3.1 **Arroyo Toad**

The arroyo toad was listed as endangered on December 16, 1994 (59 Federal Register [FR] 64859). Critical habitat was designated on February 7, 2001 (66 FR 9414), with revisions on April 13, 2005 (70 FR 19562), and on February 9, 2011 (76 FR 7246). The Recovery Plan was issued on July 24, 1999 (USFWS 1999), and the results of a five-year review on August 17, 2009 (USFWS 2009a). On March 27, 2014, USFWS proposed to reclassify arroyo toad as threatened (79 FR 17106); however, USFWS later decided to withdraw its proposed rule on December 23, 2015, because the same types of threats that resulted in the original listing of the toad still existed and new threats were identified (80 FR 79805). No recovery actions specific to the Project boundary or the nearby area were identified in the Recovery Plan or five-year review.

Historically, arroyo toad populations occurred from Monterey County to Baja California, Mexico, mostly in coastal drainages, but also along inland draining streams (i.e., desert slopes) of the Transverse and Peninsular ranges south of the Santa Clara River in Los Angeles County (USFWS 2009a). Known extant populations of arroyo toad occur within about 75 percent of the original range (USFWS 2009a), concentrated at elevations from about 975 to 3,250 feet (Sweet and Sullivan 2005).

Critical habitat for arroyo toad has been designated in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego counties. The Desert Slope Recovery Unit includes critical habitat Sub-Unit 22a, located approximately 0.4 miles downstream of Silverwood Lake, including parts of Horsethief Creek, Deep Creek, and the WFMR (USFWS 2018b). Sub-Unit 22c, originally included in the October 13, 2009 revised critical habitat rule (74 FR 52612) to cover the WFMR upstream of Silverwood Lake, was removed in the final revised rule because habitat in the WFMR upstream of Silverwood Lake lacks essential habitat elements and does not meet the definition of critical habitat for the arroyo toad (76 FR 7245).

There are 16 CNDDDB records of arroyo toad in the vicinity of the WFMR reach on Silverwood Lake, Lake Arrowhead, and Cajon quadrangles (CDFW 2018a). These occurrences are associated with populations on the WFMR reach and its tributaries, Horsethief Creek, Deep Creek and tributaries (Kinley Creek and Grass Valley Creek), and Cajon Creek. Occurrence number 28 included at least 6 adults in 1995, 1 adult and 3 tadpoles in 2001, and 1 adult in 2008 found within Sub-Reach 6. Occurrence number 92 includes 1 individual killed on Highway 173 adjacent to Sub-Reach 5 in 2001, over 30 adults vocalizing, 12 individuals, 3 larvae and 2 egg masses in 2005, and 16 adults and 2 larvae in 2006. All of the individuals included in occurrence number 92 were within Sub-Reach 5. Occurrence number 94 includes multiple individuals collected between 1966 and 2006, within the floodplain area around Horsethief Creek and Sub-Reach 2 and Sub-Reach 3 of the WFMR reach (Figure 3.1-4).

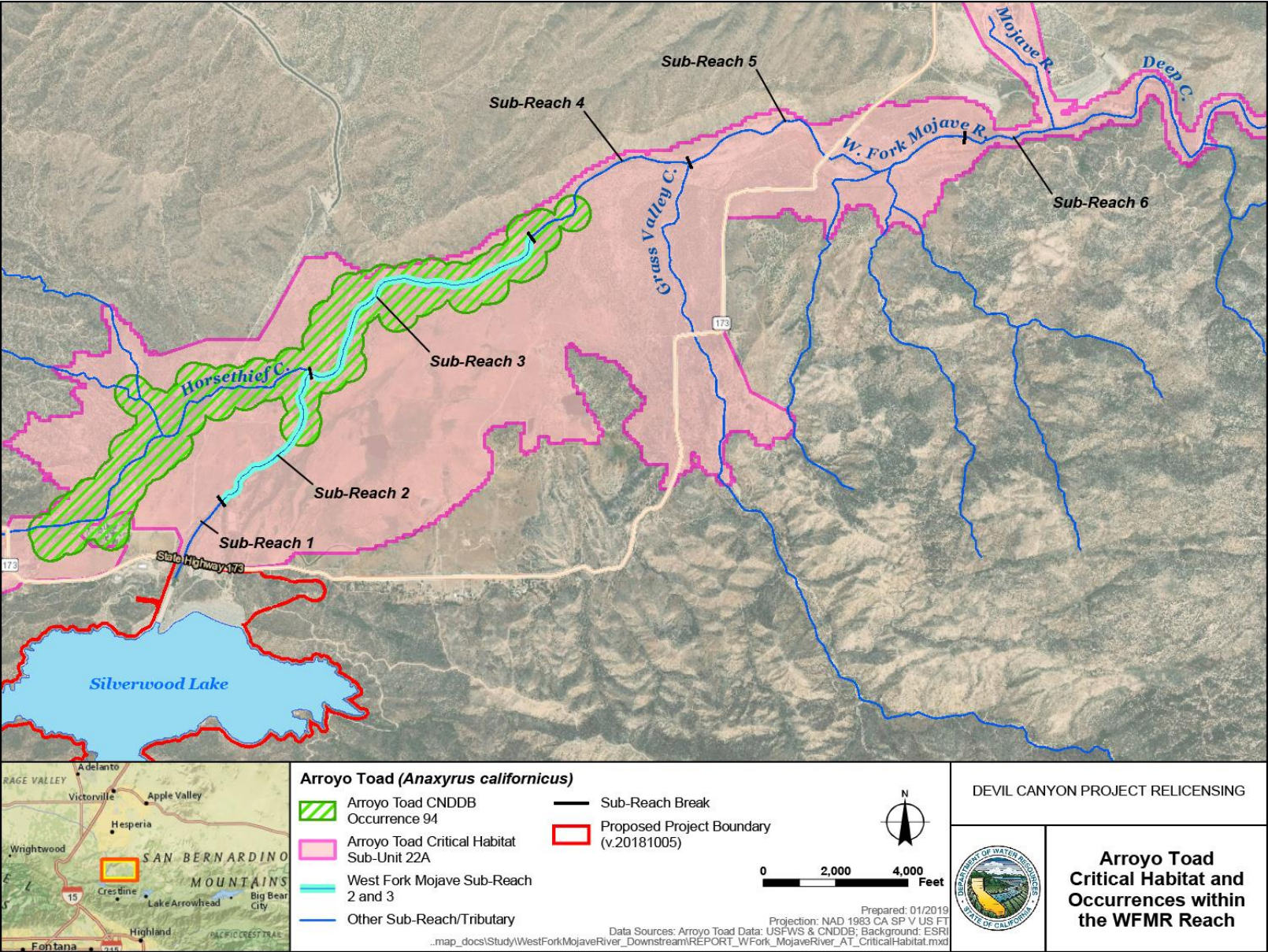


Figure 3.1-4. Arroyo Toad Critical Habitat and Occurrences within the WFMJR Reach

The arroyo toad was formerly common in the area where Silverwood Lake was created, at Cedar Springs and Miller Canyon, and was also common in Deep Creek and Forks of the Mojave downstream to Victorville, before the USACE's Mojave River Forks Dam was constructed (Jennings and Hayes 1994). CDFW's California Wildlife Habitat Relationships (CWHR) system identifies a general habitat association of arroyo toad to two habitat types, Mixed Chaparral and Valley Foothill Riparian, as occurring within the vicinity of the WFMR reach (CDFW 2018b). Hitchcock and Fisher (2004) reported finding only one adult arroyo toad observed twice in the Silverwood Lake SRA 500 to 1,000 feet upstream of Silverwood Lake on the WFMR in 2003 and 2004, but described a "large, healthy population" at Little Horsethief Canyon, a tributary of the WFMR reach.

This species is documented within the WFMR reach (CDFW 2018a, Thomson et al. 2016) and is considered extant (CDFW 2018a). In addition, the WFMR reach north of the Highway 173 bridge is part of the designated critical habitat for this species.

3.1.3.2 California Red-Legged Frog

CRLF was listed as a threatened species on May 23, 1996 (61 FR 25813), and final critical habitat was designated on March 13, 2001 (66 FR 14626), with revisions on April 13, 2006 (71 FR 19244) and on March 17, 2010 (75 FR 12816). The Recovery Plan was issued on May 28, 2002 (USFWS 2002). A five-year review was initiated on May 25, 2011 (76 FR 30377). No recovery actions specific to the Project boundary or nearby area are identified in the Recovery Plan.

The historical range of CRLF extends through the Pacific slope drainages from Shasta County, California, to Baja California, Mexico, including the Coast Ranges and the west slope of the Sierra Nevada Range at elevations below 4,000 feet. The current range of this species is greatly reduced, with most remaining populations occurring along the coast from Marin County to Ventura County. Fellers (2005) indicated only two known extant populations in southern California: one in Riverside County on the Santa Rosa Plateau (Shaffer et al. 2004) and the other in Ventura County, both with few documented adults. Jennings and Hayes (1994) regarded populations of CRLF documented by museum records in San Bernardino County to be extinct. "Core areas" identified in the Recovery Plan (USFWS 2002) as watersheds where recovery efforts for CRLF should be focused included Core Area 30 (Forks of the Mojave), encompassing the upper Mojave River drainage, which is described as unoccupied (i.e., CRLF extirpated), but with potential for reestablishment of the species.

Designated CRLF critical habitat units include one unit in Los Angeles County (LOS-1, San Francisquito Creek) and three in Ventura County: VEN-1 (San Antonio Creek), VEN-2 (Piru Creek), and VEN-3 (Upper Las Virgenes Creek). There is no designated critical habitat in San Bernardino County.

The CNDDDB has two records of CRLF in the vicinity of the WFMR reach (CDFW 2018a). An old historical location (date unknown, occurrence number 14) is reported from the Mojave River Public Camp, about 3 miles northeast of where Silverwood Lake was later constructed (Silverwood Lake and Lake Arrowhead quadrangles). An

unknown number of CRLF were observed on West Fork City Creek (Harrison Mountain quadrangle) during a fish survey in 1982. Both occurrences are described in the CNDDDB report as “presumed extant,” and there are no recent sightings in either area (USFWS 2002). A population also occurred near Victorville further downstream on the Mojave River (USFWS 2002). The CWHR identifies a general habitat association of CRLF to the following habitat types occurring within the vicinity of the WFMR reach: Annual Grassland, Coastal Scrub, Mixed Chaparral, Montane Hardwood-Conifer, Montane Hardwood, and Valley Foothill Riparian (CDFW 2018b).

Information on occurrence number 14 is lacking. It is an historical observation described only as being at Mojave River Public Camp. Mojave River Public Camp is located adjacent to Grass Valley Creek and across Highway 173 from Sub-Reach 5. While this occurrence is listed as extant, no other occurrences of CRLF are described from the WFMR or its immediate vicinity, and it is likely that CRLF is extirpated from the region. USFWS (2002) states that CRLF is believed to be extirpated from the southern Transverse and Peninsular ranges. The WFMR reach is not within designated critical habitat for this species.

3.1.3.3 Southern Mountain Yellow-legged Frog, Southern California Distinct Population Segment

The Southern California DPS of mountain yellow-legged frog was listed as endangered on July 2, 2002 (67 FR 44382). At the time of the listing, all mountain yellow-legged frogs were considered a single species, *Rana muscosa*. Subsequently, Vredenburg et al. (2007) determined that separation into at least two species was warranted. The SMYLF (sometimes referred to as Sierra Madre yellow-legged frog), which retained the scientific name, *R. muscosa*, comprises the original Southern California DPS, as well as populations of this species complex in the Sierra Nevada mountain range, within and south of the South Fork Kings River. Populations in the Sierra Nevada, north of the South Fork Kings River, are classified as *R. sierrae* (Sierra Nevada yellow-legged frog). Critical habitat for SMYLF Southern California DPS was designated on September 14, 2006 (71 FR 54344) and the draft Recovery Plan was issued July 19, 2018 (USFWS 2018c). USFWS issued the results of a five-year review on July 13, 2012. No recovery actions specific to the Project or the WFMR reach area are identified in the Recovery Plan or five-year review.

In southern California, the SMYLF occurred historically in the San Jacinto, San Bernardino, San Gabriel, and Palomar Mountains at elevations ranging from 1,200 feet to 7,500 feet. Populations occurred in shaded streams on coastal slopes, as well as inland (desert) slopes, characterized by cool water fed by springs or snowmelt. Currently, fewer than 10 small populations are known to persist in this region, all within the San Bernardino National Forest and Angeles National Forest. Adult populations at most sites are precariously small (i.e., usually fewer than 5 and no more than 15 adults) (USFWS 2012). Only one population is known in the San Bernardino Mountains (East Fork City Creek), three in the San Jacinto Mountains (Fuller Mill Creek, Dark Canyon, and Tahquitz Creek) and five in the San Gabriel Mountains (Bear Gulch, Vincent Gulch, South Fork Big Rock Creek, Little Rock Creek, and Devil’s Canyon). Although additional

undiscovered populations are possible, USGS performed surveys of more than 200 locations throughout the historical range between 1998 and 2012, including at least 13 sites in the Mojave River watershed (e.g., on the WFMR, Deep Creek and tributaries, and tributaries of the East Fork of the WFMR) and sites along the coastal-facing slopes of the San Bernardino Mountains, finding only two populations not known at the time of listing (Backlin et al. 2003; USFWS 2012). These two new locations were both in the San Jacinto Mountains. Dark Canyon, which was known to be occupied in 1998 and 1999, was found to have individuals in 2003 (USFWS 2012). In 2009, one adult was found at Tahquitz Creek (USFWS 2012). Both of these locations are over 50 miles to the southeast of the WFMR reach. Critical habitat has been designated in Los Angeles, San Bernardino, and Riverside Counties, including some subunits that are currently unoccupied.

There are seven CNDDDB records of SMYLF in the vicinity of the WFMR reach, including records from Silverwood Lake, Lake Arrowhead, San Bernardino North, Harrison Mountain, and Devore quadrangles (CDFW 2018a). The 1947 record from the Silverwood Lake quadrangle is described as WFMR at Horsethief Canyon, near Silverwood Lake and Summit Valley; however, the exact location is unknown. This occurrence is described as “extirpated.” A second record, also from 1947 and “possibly extirpated,” is described as East Fork of the WFMR, 1.25 miles east of Cedar Springs Camp (3,300 feet elevation); based on this description, the location was at the future site of Silverwood Lake. Other occurrences were reported from Deep Creek (3 miles east of Lake Arrowhead), and streams in the Santa Ana River drainage, including Lytle Creek and City Creek. As indicated above, recent surveys by USGS have failed to find SMYLF at any sites within the Mojave River drainage. The CWHR identifies a general habitat association of SMYLF to three habitat types occurring within the vicinity of the WFMR reach: Montane Hardwood-Conifer, Montane Hardwood, and Sierran Mixed Conifer (CDFW 2018b).

There are no known recent records of SMYLF within the WFMR reach or vicinity and designated critical habitat for the species does not occur in the reach.

3.1.3.4 Mohave Tui Chub

The Mohave tui chub was listed as endangered on October 13, 1970 (35 FR 16047). Critical habitat has not been designated for this species. The Recovery Plan was issued on September 12, 1984 (USFWS 1984) and the results of a five-year review on February 4, 2009 (USFWS 2009b). No recovery actions specific to the proposed Project boundary or nearby area are identified in the Recovery Plan or five-year review.

Historically, the Mohave tui chub was the only fish species in the Mojave River, occurring in deep pools and sloughs. The Mohave tui chub was extirpated (including loss of genetically pure Mohave tui chub) from nearly all of its range by 1970 as a result of the introduction of the related arroyo chub (*Gila orcuttii*), a species which interbred and competed with Mohave tui chub. Other contributors to the Mohave tui chub extirpation include the introduction of other predaceous fish species and development of water projects which reduced flow in the Mojave River. Most attempts to establish new

populations, often in constructed ponds, have not been successful. All but one of the three known existing populations referenced in the five-year review (USFWS 2009b) represent introductions outside of the historical range. Few areas of the Mojave River remain suitable for the species, which would at minimum require elimination of arroyo chub.

There are five records of Mohave tui chub from the vicinity of the WFMR reach (CDFW 2018a). Occurrences from the WFMR at the present location of Silverwood Lake (1967), Mojave River Forks (1967), and Deep Creek 2 to 3 miles east of the Mojave River confluence (1931) are categorized as “extirpated.” Occurrences from an unnamed creek at Little Horsethief Ranch (1937) and Mojave River, 1 mile north of the State Fish Hatchery (1967), are “presumed extirpated.”

There are no known recent records of Mohave tui chub within the WFMR reach, where the species had likely already been extirpated by 1970 due to the spread of introduced arroyo chub. Designated critical habitat for the species does not occur in the reach.

3.1.3.5 Western Spadefoot

The western spadefoot is a California Species of Special Concern. Its range is located throughout the Central Valley and adjacent foothills. This species is usually common where it occurs, although the current distribution has been substantially reduced by conversion of native habitats to other land uses such as agriculture and development. The species is known to occur from near sea level to about 4,500 feet elevation (Jennings and Hayes 1994; Morey 2005); however, most populations are found below 3,300 feet (Morey 2005). Breeding habitats include vernal pools, vernal playas, rainwater pools, stock ponds, and pools in intermittent streams. Although most breeding sites dry seasonally, permanent ponds are occasionally used. Absence of fish is usually a prerequisite for successful breeding.

The distribution of western spadefoot in San Bernardino County is uncertain. Jennings and Hayes (1994) depict a verified, historical museum record of western spadefoot for southwest San Bernardino County (considered extirpated); however, other sources do not include the county within the species’ current range. USFWS (2005b) indicates no extant or extinct populations within San Bernardino County. HELIX (2014) did not include western spadefoot as a species potentially occurring in the Tapestry Project area north of Silverwood Lake. Aspen Environmental Group and Hunt & Associates Biological Consulting (2005) reported hearing a call that may have been of this species during the Horsethief Creek Bridge Replacement Surveys, but no verifying information was collected. The CNDDDB (CDFW 2018a) includes an occurrence with multiple records of adult and juvenile western spadefoot on Devils Canyon Road in the City of San Bernardino since 2011. These records are evidently associated with western spadefoot crossing the road to and from percolation basins, which provide breeding habitat. There are no other CNDDDB records from the vicinity of the WFMR reach. Western spadefoot is not known to occur within the WFMR reach.

3.1.4 Aquatic Invasive Species

The USFWS Fisheries Program defines AIS as “aquatic organisms that invade ecosystems beyond their natural, historic range and may harm native ecosystems or commercial, agricultural, or recreational activities.” Although most AIS are nonindigenous (i.e., exotic or non-native in origin), also included in this category are native species that grow out of control in their natural habitats due to excessive nutrients, warmer waters, or other factors. USGS maintains a list of AIS, including reported geographical locations (USGS 2018). This list was used to identify species that may occur within the WFMR reach.

3.1.5 Disturbance

Two general categories of stream channel disturbance are evident from review of readily available information. Ranching is present on both sides of the WFMR toward the upstream end of the reach. The proximity of the ranches to the stream channel increase the likelihood that cattle may regularly enter the river. Evidence of recreation in the vicinity included marked and unmarked established trails, rural roads, and an established campground. The Pacific Crest National Scenic Trail runs parallel to the WFMR and crosses Deep Creek at the confluence of the two streams. From review of aerial imagery, unmarked established trails and rural roads are evident and regular in the downstream portion of the reach. Several of these unmarked trails originate at Mojave River Fork Campground, which is within 0.5 miles of the WFMR.

3.2 SURVEY

3.2.1 West Fork Mojave River Reach Characterization

Based on existing information and field reconnaissance, DWR divided the WFMR reach into six sub-reaches based on channel form, the influence of major tributaries, the presence or absence of flow, and riparian composition, abundance and distribution. The six sub-reaches are:

1. Cedar Springs Dam Spillway Tailrace
2. WFMR above Horsethief Creek
3. WFMR below Horsethief Creek
4. WFMR above Grass Valley Creek
5. WFMR below Grass Valley Creek
6. WFMR Mature Riparian Corridor

Figure 3.2-1 provides the extent of each sub-reach, its position relative to tributaries in the vicinity of the WFMR reach, and identification of areas observed in the wet and in the dry.

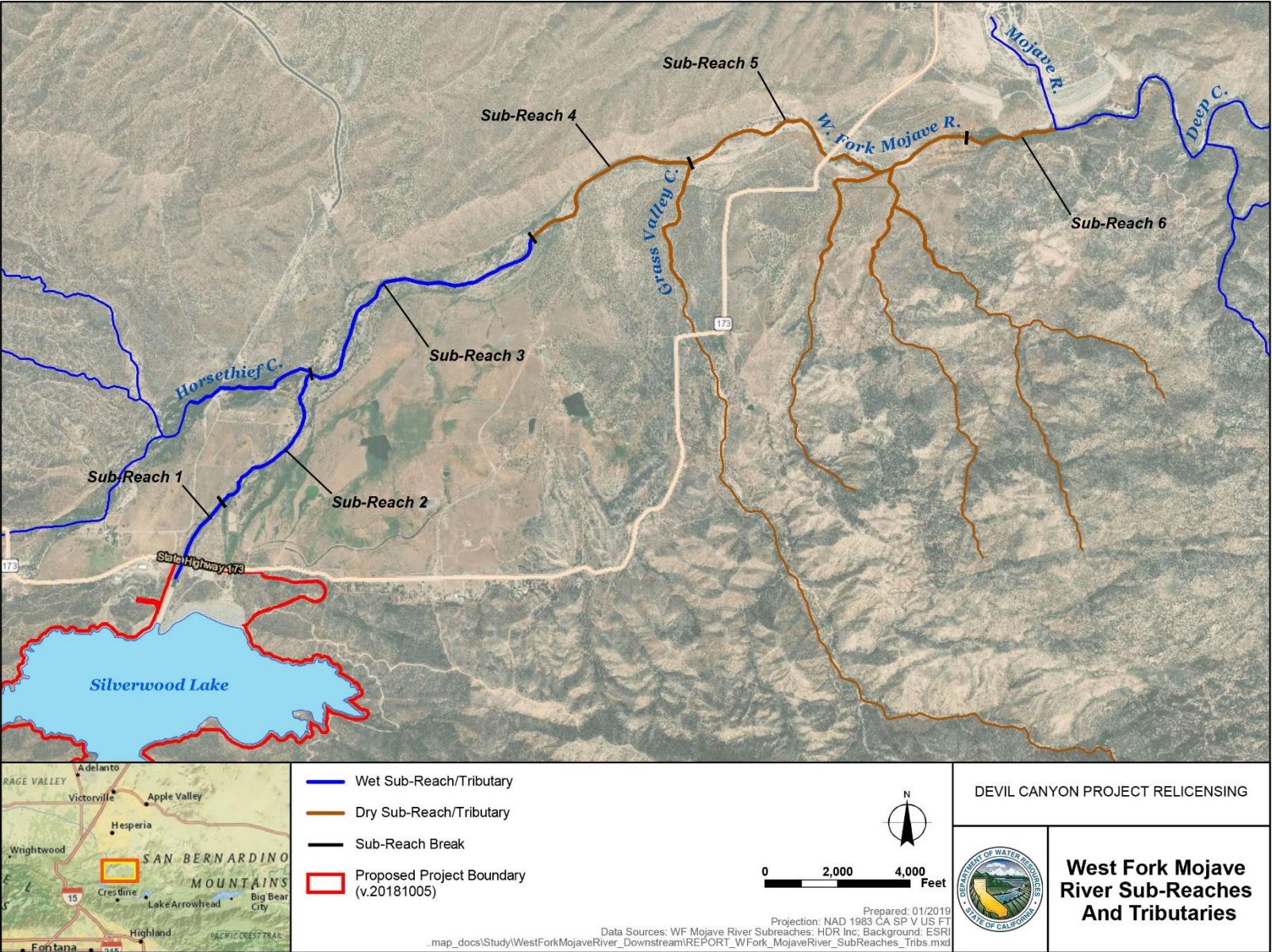


Figure 3.2-1. WFM R Sub-Reaches 1 Through 6

3.2.1.1 Sub-Reach 1

Sub-Reach 1 is 0.5 miles long and begins immediately downstream of the Cedar Springs Dam concrete spillway and continues 0.5 miles downstream through a series of homogenous, long and wide flat-water sections. Wetted widths averaged 60 feet through the sub-reach and ranged from a minimum of 8.5 feet through a braided section at the top of the sub-reach to a maximum of 105 feet just downstream of Highway 173. Average OHW through the sub-reach was estimated at 180 feet. The stream in this sub-reach was confined to, and almost fully wetted between, the toes of each sloped bank. Less than 1 cfs of flow was observed at the bottom of the sub-reach with no apparent source of the flow observed at the upstream end (i.e., Cedar Springs Dam was not spilling and no releases from the Cedar Springs Dam low-level outlet). Based on observations made at accessible locations, the substrate was dominated by sand and small gravel with some medium to large cobble present within gradient breaks between the flat water sections. From observations made during this survey, the wetted channel in Sub-Reach 1 was generally bordered on both sides by large mats of common reed (*Phragmites australis*). A few narrow patches of willows and small deciduous trees were observed growing adjacent (upland) to the mats of common reed in several locations. Representative photos of Sub-Reach 1 are provided in Figure 3.2-2 and Figure 3.2-3.



Figure 3.2-2. WFMR, Near the Upstream End of Sub-Reach 1: Looking Northeast and Downstream



Figure 3.2-3. WFMR, Downstream End of Sub-Reach 1: Looking Southwest and Upstream

3.2.1.2 Sub-Reach 2

Sub-Reach 2 is 0.91 miles long and extends from the downstream end of Sub-Reach 1 to the confluence with Horsethief Creek. Within this sub-reach, the wetted stream was more complex than Sub-Reach 1, with small split channels and a variety of well-defined but shallow main channel pools, deep lateral scour pools, long low-gradient riffles, short high-gradient riffles, runs, and step runs. Less than 1 cfs was flowing through the sub-reach at the time of the survey. Wetted widths ranged from 8 feet in narrow riffle sections toward the downstream end of the sub-reach, to 60 feet in a wide pool upstream of a ford crossing. OHW channel widths ranged from 23 to 98 feet. Substrate within the flowing channel was primarily dominated by medium and large cobble, with sand as the subdominant substrate, though sand was dominant in some slow water habitat types. In a few locations, all substrate was comprised of medium and large cobble. Within OHWM, sand was typically dominant and cobble subdominant.

Riparian vegetation included mature cottonwood (*Populus fremontii*), ash (*Fraxinus* sp.) and willow (*Salix* sp.), and areas with willow and mule fat (*Baccharis salicifolia*) shrubs. Stands of mature ash were located toward the upstream end of the sub-reach and a few

lone western sycamore (*Platanus racemosa*) trees were located in several areas. Throughout much of the sub-reach, the water's edge was bordered by narrow patches of common reed with a mix of rushes (*Juncus* sp.) in some locations. Riparian vegetation abundance varied from dense to sparse throughout the sub-reach. Higher density riparian assemblages alternated from bank-to-bank, as the wetted stream meandered within the bankfull width. The lateral extent of the riparian zones fluctuated from 10 to 100 feet wide, and typically began at the water's edge or up to 20 feet from the water's edge. Representative photos of Sub-Reach 2 are provided in Figure 3.2-4 and Figure 3.2-5.



Figure 3.2-4. WFMR, Middle of Sub-Reach 2: Deep Lateral Scour Pool, Looking Southwest and Upstream



Figure 3.2-5. WFMR, Middle of Sub-Reach 2: Braided Low Gradient Riffle with Moderate Riparian Density and Some Mature Trees, Looking East and Downstream

3.2.1.3 Sub-Reach 3

Sub-Reach 3 is 1.6 miles long and consists of the approximately 1.5-mile section of the WFMR downstream of Horsethief Creek to just beyond the Hesperia Venture I (LFR) property boundary with USACE's property. Wetted widths ranged from 7 feet in narrow riffle sections toward the downstream end of the sub-reach, to 78 feet in a wide pool with a large beaver dam. OHW channel widths ranged from 27 to 123 feet. In this sub-reach, the OHW channels widened and the stream meandered through the bankfull channel between wider sandy gravel bars and steep or scoured banks. Much of the upstream half of the sub-reach consisted of long and shallow step-run and riffle complexes. Within the lower half of the sub-reach, habitat types were better defined with easily discernable step-runs, runs, and low and high-gradient riffles.

Many of the pools encountered throughout the sub-reach were either created or enhanced by beavers (*Castor canadensis*). Many of the pools consisted of abandoned beaver dams, with a few occupied dams present in the sub-reach. Nine beaver dams were documented within the sub-reach, and several other smaller dams were observed

on short splits off the primary channel. Two beaver lodges were observed in the vicinity of new dams in the upstream half of the sub-reach and one beaver was observed retreating into its lodge to avoid the DWR stream survey team. Pools without beaver dam influence were also documented throughout the sub-reach and included long and short main channel pools, a couple of long step pools, and one larger lateral scour pool armored by the roots of a mature cottonwood. At the time of the survey, stream flow from Horsethief Creek went subsurface through a sandy gravel bar at the confluence with the WFMR.

At the top of Sub-Reach 3, stream flows were similar to those in Sub-Reach 2, but appeared to increase slightly 700 feet downstream, though flow remained less than 1 cfs. Flowing water was observed through the remaining sub-reach. Approximately 0.25-mile upstream from the bottom of the sub-reach surface, flows began to decrease before going subsurface.

Substrate within the wetted width was dominated by sand and small gravel, with large cobble subdominant within the step-run riffle complexes located in the upper half of the sub-reach. Within the lower half of the sub-reach, small to large cobble were the dominant and subdominant substrate present in riffle habitats, whereas pools and runs generally maintained a sand and gravel composition. Between the water's edge and OHWM, substrate compositions generally consisted of sand and small gravel, with short sections of subdominant medium gravel, or small to large cobble.

Riparian vegetation consisted mostly of willow and mule fat shrubs with some lone mature willow, white alder (*Alnus rhombifolia*), cottonwood, ash and sycamore in some locations. Common reed was present throughout the sub-reach, but with more regularity in the downstream half. Rushes were infrequently observed and most often occurred in combination with patches of common reed throughout the sub-reach. Riparian abundance varied throughout the sub-reach, with moderate to dense riparian habitat being more common than in Sub-Reach 2. Mature riparian vegetation was typically limited to solitary trees in between large patches of willow and mule fat shrubs. Similar to conditions observed in Sub-Reach 2, higher density riparian assemblages tended to alternate from bank to bank as the wetted stream meandered within the bankfull width. The extent of the riparian zone fluctuated from 10 to 100 feet wide, and typically began at the water's edge, but in some instances began up to 50 feet from the water's edge.

Photos of Sub-Reach 2 depicting representative step-run riffle complex and beaver-enhanced pool habitat types in the upstream half of the sub-reach are provided in Figure 3.2-6 and Figure 3.2-7. A photo representative of step-run habitat in the downstream half of the sub-reach is provided in Figure 3.2-8.



Figure 3.2-6. WFMR, Upstream Half of Sub-Reach 3: Long Step-Run Riffle Complex with Moderate to Sparse Riparian of Willow and Mule Fat, Looking Northeast and Downstream



Figure 3.2-7. WFMR, Near the Midpoint of Sub-Reach 3: 605-Foot-Long Beaver Dam Pool, Moderate to Sparse Riparian of Willow and Mule Fat with Some Patches of Common Reed, Looking East and Downstream



Figure 3.2-8. WFMR, Downstream Half of Sub-Reach 3: Step Run Near Void of Riparian Vegetation on the North Bank and Moderate to Dense Riparian Set Back on the South Bank, Looking East and Downstream

3.2.1.4 Sub-Reach 4

Sub-Reach 4 is 1.0 mile long and extends from the subsurface zone at the bottom of Sub-Reach 3 to the confluence with Grass Valley Creek. Along the primary channel, low-flow channel width estimates ranged from 8.5 to 38.5 feet. OHW channel widths ranged from 13 to 129 feet. Sub-Reach 4 was dry during the survey, with the exception of two isolated pools at the upstream end, downstream of where flows went subsurface in Sub-Reach 3. Though dry, a variety of habitat types were identified including shallow pools, run-like sections, low-gradient riffles, and high-gradient riffles. Stream channels are braided through several sections with the primary channel likely alternating back and forth from year to year and after high-flow events. In addition to the braided sections, a couple of larger high-flow split channels were observed adjacent to longer bends in the primary channel. Dominant substrates within the primary channel was generally observed to be sand and small to medium gravel while small to large cobble was subdominant. Small areas of boulder-dominant riffles were also observed. Substrates within the OHW were sand-dominant and small gravel subdominant with medium gravel to large cobble subdominant in several locations.

Riparian vegetation in the sub-reach consisted predominantly of willow and mule fat shrubs. Small ashes were observed within a mix of willow and mule fat in several locations and common reed sparsely populated the primary channel in several other locations. The abundance and extent of riparian vegetation was noticeably less than that observed in Sub-Reach 2 and Sub-Reach 3. The same alternating bank pattern was observed, but riparian abundance typically fluctuated between sparse and near void. Moderate riparian abundance was still observed in several locations. The extent of riparian vegetation through the sub-reach typically ranged from 10 to 30 feet. Some wider extents were documented ranging from 40 to 70 feet, but the riparian vegetation was sparse.

Representative photos of Sub-Reach 4 depicting dry high-gradient habitat with coarse substrates and dry low-gradient, flat-water habitat with finer substrates are provided in Figure 3.2-9 and Figure 3.2-10.



Figure 3.2-9. WFMR, Middle of Sub-Reach 4: High Gradient Riffle Through Braided Section with Boulder and Large Cobble, Near Void to Moderate Riparian, Looking West and Upstream



Figure 3.2-10. WFMR, Middle of Sub-Reach 4: Step Pool-Like, Small to Large Gravel with Sand, Void to Sparse Riparian, Looking West and Upstream

3.2.1.5 Sub-Reach 5

Sub-Reach 5 is 1.9 miles long and extends from Grass Valley Creek downstream 1.75 miles to a point where mature riparian vegetation dominates the channel. Sub-Reach 5 was dry during the survey, thus all stream channel observations were made using geomorphic characteristics. Two small unnamed tributaries to the WFMR, downstream of Arrowhead Lake Road, were also dry.

Due to the influence of Grass Valley Creek flows, OHWM and bankfull widths within this sub-reach increase, primary channels widen and secondary channels and long split channels are larger. More established and larger braids off the primary channel sections were observed as compared to upstream sub-reaches. Low-flow channel width estimates ranged from 8 to 59 feet. OHW channel widths ranged from 11 to 134 feet. Similar to sections of Sub-Reach 4, the primary channel likely alternates back and forth between large split channels from year to year and after high-flow events. Immediately downstream of the confluence with Grass Valley Creek, the WFMR fans out and splits into a well-defined primary channel and large secondary channel. Intermediate splits and braids run between the primary and secondary channels before all channels come

together upstream of the Arrowhead Lake Road crossing. Downstream of Arrowhead Lake Road, the stream briefly fans out again and has intermediate splits, but the secondary channel is less defined. The smaller secondary channel and intermediate splits come together more quickly than upstream. Further downstream and through the rest of the sub-reach, the channel generally remains singular with several shorter sections having small splits.

When wetted, this sub-reach would generally consist of meandering flat water habitats with intermittent steps at increased gradients. Given the dry conditions, the distinction between runs and shallow pools was not easily discernable during the survey. Some pool-like depressions appeared in some locations within the sub-reach, generally along sharper bends in the stream. Substrate in low-gradient sections of the stream were typically sand-dominated, with small to medium gravel subdominant mid-channel. The OHWM maintained a similar composition. Medium gravel and small cobble were the dominant substrate in a few low-gradient sections through the sub-reach. Some locations had increased gradient, which would likely present as either high-gradient or low-gradient riffles.

Where present, riparian vegetation primarily consisted of willow and mule fat shrubs. Much of the sub-reach was void or near void of any riparian vegetation, with brief sections of moderate riparian abundance in a few locations in the lower 1.5 miles. Moderate riparian abundance was more regular in the upstream 0.25-mile of the sub-reach. Typically set back from the primary channel, mature lone sycamores were present throughout. The extent of riparian vegetation ranged from 8 to 60 feet.

Representative photos of Sub-Reach 5 are provided in Figure 3.2-11 and Figure 3.2-12. Figure 3.2-11 details conditions at the confluence of the primary channel and the main secondary split channel in the upstream end of the sub-reach. Similar conditions were observed at the confluences of other split sections through the sub-reach. Figure 3.2-12 details conditions of the singular channel toward the downstream end of the sub-reach, but is representative of other sections through the sub-reach where only one channel was present.



Figure 3.2-11. WFMR, Sub-Reach 5 Confluence of Primary and Secondary Channels Downstream of Grass Valley Creek: Run-Like in the Foreground and Two Riffles in the Background, Small to Large Gravel Dominant and Small Cobble Subdominant with Sand and Gravel Within OHW, Sparse Riparian, Looking West and Upstream



Figure 3.2-12. WFMR, Run-Like Flat Water Section in Sub-Reach 5 Downstream of Arrowhead Lake Road: Sand-Dominant and Small Gravel Subdominant, Void of Riparian, Looking West and Upstream

3.2.1.6 Sub-Reach 6

Sub-Reach 6 is 0.5 miles long and has a WFMR mature riparian corridor which is noticeably different from all other sub-reaches surveyed. This sub-reach includes the last 0.5 mile of the WFMR before reaching the confluence with Deep Creek at Saddle Dike Diversion Dam. Low-flow channel width estimates ranged from 8 to 23 feet. OHW channel widths ranged from 17 to 39 feet. The channel was dry during the survey and channel descriptions and typing were based on geomorphic characteristics. Toward the top of the sub-reach, the active channel is wide and shallow before funneling into a narrow canyon. Within the narrow canyon, the active channel becomes deeper, more entrenched and slightly narrower. Between run and glide-like flat water sections, and low-gradient riffle sections, dry pool-like features were present in multiple places. Pool-like features were usually present adjacent to bends in the stream or large fallen trees. No high-gradient sections were observed in the sub-reach.

Primary channel dominant substrates throughout the sub-reach were generally medium gravel to small cobble. In a few locations, sand and small gravel were the dominant substrate. Subdominant substrates through the sub-reach ranged from sand to medium gravel. Within the OHWM, sand was generally the dominant substrate and small gravel the subdominant. At some locations within OHWM this dominant/subdominant assemblage was inverted and in a few instances the dominant substrate was medium gravel.

No surface flow was observed within the sub-reach, though one isolated pool was encountered immediately before the confluence with Deep Creek. Deep Creek had active flow of 5.6 cfs at the time of the survey.

Riparian vegetation composition included mature willow and cottonwood trees throughout the entire sub-reach. Riparian vegetation abundance ranged from moderate to dense. Toward the narrowing section at the top of the sub-reach, the extent of riparian vegetation ranged from 20 to 60 feet on the southern bank and from 120 to approximately 300 feet on the northern bank. Willow shrubs occupied the understory below mature willow and cottonwood throughout this upper section of the sub-reach. Within the narrow section of the sub-reach, the extent of the riparian vegetation was confined to the steep canyon walls and limited understory riparian vegetation was present.

Representative photos of Sub-Reach 6 are provided in Figure 3.2-13 and Figure 3.2-14, and depict conditions through the wider, funneling section at the top of the sub-reach and conditions through the narrow canyon before the confluence with Deep Creek.



Figure 3.2-13. WFM, Upstream End of Sub-Reach 6: Funneling Channel, Low-Gradient Riffle-Like, Sand Dominant and Small Gravel Subdominant, Moderate Riparian Vegetation Abundance, Looking East and Downstream



Figure 3.2-14. WFMR, Narrow Section of Sub-Reach 6: Pool-Like Depression in the Foreground and Meandering Flat Water in the Background, Sand Dominant and Small Gravel Subdominant, Downstream of Arrowhead Lake Road, Mature Riparian Vegetation with Moderate Abundance, Looking East and Downstream

3.2.2 General Hydrology and Water Quality

A small amount of rain was in the forecast two weeks before the scheduled survey, which occurred on December 18, 2018 and December 20, 2018. Less than 0.1 inch of rain fell between December 5, 2018 and December 7, 2018. No rain occurred during the survey and daily conditions during the survey were clear and dry. Ambient air temperatures were in the mid- to high 30s °F in the morning and rose to mid-70s °F by the afternoon. Overnight temperatures remained in the range or low to mid-30s °F.

No spill events or MWA transfers occurred prior to or during the field survey effort. No water deliveries to LFR occurred during the field survey effort. No evidence of recent water deliveries was observed. The diversion valve box was inspected as was the bypass channel and portions of the ranch canals. Some stagnant water was observed low in the bottom of the valve box, approximately 10 feet below the lip of the bypass spill notch. No water was flowing out to the bypass channel or ranch canals and ranch pasture ponds were dry. One ranch canal was muddy.

Flowing water was observed in Sub-Reaches 1, 2, and 3. No stream flow was observed in the other sub-reaches. Of all the tributaries identified during the desktop portion of this assessment, only Horsethief Creek was wet and had flowing water. All other tributaries were dry.

Surface flows in Horsethief Creek were observed from a ranch road crossing on Vanhoops Holding LP property further upstream from the confluence with WFMR. Flow estimates were similar to that observed in the WFMR and less than 1 cfs. From in-field discussions with DWR personnel, flow was observed in Horsethief Creek during every instance they had accessed this crossing over 10 plus years (pers. comm., Evans 2018). At the confluence of Horsethief Creek and WFMR, all tributary flows appeared to go subsurface through a sandy gravel bar. A slight increase in surface flows in Sub-Reach 3 was observed during the field survey and is most likely elevated by ground water seepage from Horsethief Creek.

Water quality measurements were collected at four locations within the flowing stream (Table 3.2-1). Water temperatures were cold at all measurement locations. DO concentrations increased further downstream through the sub-reaches. At the downstream end of Sub-Reach 3, flow was seeping through a remnant beaver dam and DO measurements were surprisingly lower. Multiple measurements resulted in similar results.

Table 3.2-1. Stream Water Quality

Location	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)
DS end of Sub-Reach 1	6.5	9.08	73.7
DS end of Sub-Reach 2	12.9	10.3	97.8
Middle of Sub-Reach 3	14	11.41	1111
DS end of Sub-Reach 3	11.52	7.62	732
Sub-Reaches 4, 5 and 6	Dry, except for a few isolated pools in Sub-Reaches 4 and 6		

Notes:

¹High measurements attributed to abundant algae in large beaver dam pool.

²Lower measurements attributed to seepage through remnant beaver dam immediately upstream.

Key

% = percent

DS = Downstream

*C = Degrees Celsius

mg/L = milligrams per liter

The three downstream reaches were essentially dry. Two small isolated pools were identified at the upstream end of Sub-Reach 4, just downstream of where stream flows went subsurface at the bottom of Sub-Reach 3. A third and larger isolated pool was located at the bottom of Sub-Reach 6 and was found upstream of the confluence with Deep Creek. Table 3.2-2 presents the dimensions and water quality for each isolated pool. The especially low DO levels in Pool 3 are likely the result of decaying vegetation observed throughout the pool. No isolated pools were identified in Sub-Reach 5.

Table 3.2-2. Isolated Pool Water Quality

Location		Dimensions (feet)		Depth (feet)		Water Quality		
		Length	Width	Mean	Max.	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)
US end of Sub-Reach 4	Pool 1	12	5.5	0.5	0.8	7.6	5.8	49
	Pool 2	8.5	3.2	0.1	0.3	11.5	6	54.5
DS end of Sub-Reach 6	Pool 3	150.5	19.8	0.4	5	4.3	2.32	17

Key:
% = percent
US = Upstream
DS = Downstream
Max. = Maximum
°C = Degrees Celsius
mg/L= milligrams per liter

3.2.3 Amphibians and Fish

No ESA-listed or special-status amphibian or fish species were observed during the survey; however, due to the late-December timing of the survey, it was expected that amphibian species would not be observed. Hibernating adult and juvenile American bullfrogs (*Lithobates catesbeianus*) were observed in Sub-Reach 2 and Sub-Reach 3, as discussed in Section 3.2.4.3. Chorus frog (*Pseudacris* sp.) vocalizations were heard in Sub-Reach 3. In addition, multiple unidentified minnows, as well as mosquitofish (*Gambusia affinis*), were observed in Sub-Reach 2 and Sub-Reach 3.

3.2.4 Aquatic Invasive Species

Evidence of four AIS species was observed during the survey. These species were the Asian clam (*Corbicula fluminea*), red swamp crayfish (*Procambarus clarkii*), American bullfrog, and Eurasian watermilfoil (*Myriophyllum spicatum*). Table 3.2-3 presents the sub-reaches where evidence of each AIS was observed. Species descriptions for each of the AIS observed during the survey are included below.

The Asian clam is a small freshwater mollusk, native to southern Asia, the eastern Mediterranean and the Southeast Asian islands to Australia. The species was first observed in the U.S. in 1938 in the Columbia River, and is believed to have been brought over by immigrants as food. Bait buckets, aquaculture, and intentional introductions for consumption are thought to be responsible for its spread (USGS 2018).

Table 3.2-3. Aquatic Invasive Species Observed During Survey

AIS	Sub-Reach 1	Sub-Reach 2	Sub-Reach 3	Sub-Reach 4	Sub-Reach 5	Sub-Reach 6
Asian clam		X	X	X	X	
Red swamp crayfish		X	X	X	X	
American bullfrog		X	X			
Eurasian watermilfoil		X	X			

3.2.4.1 Asian Clam

Asian clam is known to inhabit lakes, including Silverwood Lake, reservoirs and streams, often covering themselves in sandy sediments. These bivalves can cause serious structural damage, weakening dams and related structures. The species has a low tolerance to cold water, which causes fluctuations in population numbers. Additionally, the Asian clam exhibits sensitivity to salinity, drying, low pH and siltation (USGS 2018). Treatment methods include mechanical removal, barrier placement, and chemical and temperature alteration to water systems, although the effectiveness of these methods is still being tested (USGS 2018).

Asian clam shells (i.e., no live clams) were observed in Sub-Reach 2 through Sub-Reach 5, but were noticeably absent from Sub-Reach 1 and Sub-Reach 6. Additionally, while Asian clam shells were observed within Sub-Reach 2, they were absent from the upper 600 feet of this sub-reach. Abundance of Asian clam shells appeared to be lower in Sub-Reach 5 and Sub-Reach 4 and increased moving upstream into Sub-Reach 3 and Sub-Reach 2, where surface flows increased and became more permanent.

3.2.4.2 Red Swamp Crayfish

The red swamp crayfish is a dark red crustacean with extended claws and head. The first walking leg bears bright red rows of tubercles on its side margin and palm. Adults can grow as large as 4.7 inches and can weigh in excess of 1.75 ounces. Populations in the U.S. are the likely result of a release from aquaculture or aquarium trade (USGS 2018).

The life cycle of the red swamp crayfish is relatively short, with sexual maturity occurring as early as two months of age. Breeding takes place in the fall and females can produce up to 500 eggs. Egg production takes roughly six weeks, followed by a three-week incubation period and an additional eight-week maturation period. The red swamp crayfish demonstrates cyclic dimorphism, alternating between sexually active and inactive periods (USGS 2018).

This species inhabits freshwaters, including rivers, lakes, ponds, streams, canals, seasonally flooded swamps and marshes, and ditches with mud or sandy bottoms and plenty of organic debris. Additionally, the red swamp crayfish has been known to colonize rice fields, irrigation channels, and reservoirs. The species is an ecosystem engineer, primarily constructing simple burrows. The species is tolerant of a variety of water quality parameters including salinities less than 12 mg/L, pH from 5.8 to 10, DO levels greater than three parts per million, variable water temperatures, and variable pollution levels (USGS 2018).

It is possible that the species causes an assortment of environmental impacts, including but not limited to alteration of food web, bioaccumulation of toxic substances, community dominance, modification of physical-chemical habitat properties, consumption of native plants and algae, and predation on native species (USGS 2018). Management of this species includes draining small bodies of water, trapping, and the use of biocontrols. However, for larger populations, these methods can be expensive and unlikely to fully eradicate the species (Loureiro et. al. 2015).

Red swamp crayfish has not been reported to occur within the proposed Project boundary. The USGS location database, Nonindigenous Aquatic Species (NAS), reported an occurrence in Lake Arrowhead, San Bernardino County, in 1959, roughly 7 miles from the WFMR reach in the Willow Creek/Deep Creek watershed.

Exoskeletons of red swamp crayfish were observed in Sub-Reach 2 through Sub-Reach 5. As with the Asian clam, abundance of red swamp crayfish exoskeletons appeared to be lower in Sub-Reach 5 and Sub-Reach 4, and increased moving upstream into Sub-Reach 3 and Sub-Reach 2, where surface flows increased and became more permanent. Evidence of this species was not observed within the upper 600 feet of Sub-Reach 2.

3.2.4.3 American Bullfrog

The American bullfrog is the largest frog in North America (up to 8 inches snout to vent length). Native to eastern and central North America, American bullfrog was first introduced into California in the twentieth century as a food source, and further spread by fish stocking. The species is currently widespread and well-established in California, with populations found up to 6,000 feet elevation (Zeiner et al. 1988).

American bullfrogs are highly aquatic and closely associated with permanent or semi-permanent water bodies, including ponds, lakes, reservoirs, irrigation ditches, streams, and marshes, and are capable of dispersing long distances during wet periods (CDFW 2019). In California, breeding can occur as early as March and as late as July, depending on local conditions, but generally later than native amphibians in the same areas and over a longer period of time (Jones et al. 2005; Cook and Jennings 2007). Breeding sites are often characterized by abundant submerged aquatic or emergent vegetation. Individual clutches are large (10,000 to 20,000 eggs per female). Tadpoles are found in warm, shallow water, and grow to large sizes before metamorphosing, often in their second year (Jones et al. 2005). The presence of predatory fish,

particularly bass (*Micropterus* sp.) and sunfish (*Lepomis* sp.), is a good indicator of bullfrog habitat suitability. Larvae benefit by the presence of fish feeding on predatory aquatic insects that could have preyed upon bullfrog larvae; bullfrog larvae are generally avoided by fish (Kruse and Francis 1977; Werner and McPeck 1994; Adams et al. 2003).

Similar to most native frogs, American bullfrog is an opportunistic, gape-limited predator. However, this species grows to such a large size that a broad array of species are potential prey, particularly those closely associated with aquatic habitats, including smaller frogs, turtles, fish, and crayfish, as well as aerial insects, birds, and bats (Nafis 2013; CDFW 2019). American bullfrog has also been implicated in the spread of the chytrid fungus (*Batrachochytrium dendrobatidis*), the agent in the potentially fatal disease of frogs called chytridiomycosis, although several native species have also been shown to be carriers (Padgett-Flohr 2008; Fellers et al. 2011).

Treatment options for American bullfrog are limited to localized areas, as eradicating bullfrogs from large water bodies is currently infeasible. Currently, there are only a few methods for managing bullfrogs, including chemical control, bullfrog-specific traps, and hunting. Prevention remains the best means of management (Snow and Witmer 2010).

American bullfrog has not been reported to occur at the Project. NAS documented two American bullfrog occurrences within the Project vicinity. The first occurrence was reported at Yates Road Mojave River crossing at the Mojave Forks Regional County Park in 1989, roughly 3 miles downstream of the Project. The second reported bullfrog occurrence was in Deep Creek at the Mojave River Flood Control Dam in 1989, roughly 5.5 miles from the Project area (USGS 2018). American bullfrogs were also documented by surveys associated with investigations for the Horsethief Creek Bridge Replacement Project in 2004, characterized as a large breeding population in Horsethief Creek and in pools in the West Fork Mojave River between Cedar Springs Dam Spillway and Highway 173 (Aspen Environmental Group and Hunt & Associates Biological Consulting 2005). HELIX (2014) reports the continued presence of American bullfrog on the West Fork Mojave River downstream of the Project and in Horsethief Creek. This species was found in Sub-Reach 2 and Sub-Reach 3. A total of three individuals were observed hibernating within the WFMR during the survey.

3.2.4.4 Eurasian Watermilfoil

Eurasian watermilfoil grows submerged, rooted in mud or sand, with branching stems 12 to 20 feet long. Its leaves are feather-like and whorled in groups of three to six around the stem (Cal-IPC 2018; DiTomaso et al. 2013). In the early 1990s, it was present, but uncommon, in San Francisco Bay Area's ditches and lake margins, as well as in the Sacramento-San Joaquin Delta (SFEI 2014). Watermilfoil is now prevalent throughout California, including the Central Valley (Donaldson and Johnson 2002).

Establishment of Eurasian watermilfoil is dependent upon still water (Donaldson and Johnson 2002). Its reproduction is primarily vegetative via rhizomes, stem fragments, and axillary buds. The species can tolerate a range of environmental conditions,

including low light, nutrient variations, and near-freezing water temperatures (Cal-IPC 2018). The species is capable of creating its own habitat by trapping sediment and producing a favorable environment for further establishment (Cal-IPC 2018). The species can grow on sandy, silty, or rocky substrates.

Transport via boating equipment plays the largest role in contaminating new water bodies. A single stem fragment on a boat or boat trailer can spread the plant from lake to lake (Donaldson and Johnson 2002). Some treatment techniques for this species includes mechanical removal, herbicide treatment, benthic barriers, and tillage (Invasive Species Compendium 2014). Mechanical removal can help remove stem densities, but escaped stem fragments can drift and develop into new individuals (DiTomaso et al. 2013). The most effective technique is to prevent its spread to and establishment in new water bodies.

Eurasian watermilfoil is given a “high” invasive plant rating by the Cal-IPC, meaning “the species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure” (Cal-IPC 2018).

Forty-five occurrences of Eurasian watermilfoil were recorded in Silverwood Lake by DWR near most of the recreation areas during its 2017 AIS Relicensing Study. In addition, Eurasian watermilfoil occurs within Arrowhead Hot Springs.

Eurasian watermilfoil was observed in Sub-Reach 2 and Sub-Reach 3, where water was present. It was found throughout Sub-Reach 3 and the majority of Sub-Reach 2, with the exception of the upper 600 feet of the sub-reach.

3.2.5 Other Observations and Disturbance

During the survey, man-made features and/or ranching or recreational disturbance were observed through all sub-reaches. Table 3.2-4 details the types of features or disturbance observed in each sub-reach. Evidence of off-highway vehicle disturbance was regularly present in all dry sub-reaches, but most evident in Sub-Reach 6, where a regularly used trail crosses back and forth across the stream. Two all-terrain vehicles were observed in Sub-Reach 6 during the survey. Regular evidence of cattle in the stream channel was observed in Sub-Reaches 2, 3, and 4. The downstream half of Sub-Reach 3 had the most regular evidence of cattle disturbance compared to the rest of three sub-reaches where it was observed. All other observations show regular human traffic throughout the WFMR reach. Rural and ranch roads and established trails in the vicinity are set back from the stream except for at two locations. At the top of Sub-Reach 1, a path has been worn from Highway 173 to the Cedar Springs Dam spillway plunge pool. In Sub-Reach 2, an established ford crosses the WFMR from LFR to the Vanhoops Holding LP. There are two observations not included in the table, but also notable. The first, adjacent to the ford crossing and set back from the channel is a large shaded deck structure on the west side of the WFMR. The second is a repurposed gate situated across WFMR at the boundary of the LFR property with USACE property.

Table 3.2-4. Disturbance in WFMR Reach

Location	Off-highway Vehicle Disturbance ¹	General Recreation ²	Established Ford ³	Remnant Structures ⁴	Cattle Disturbance ⁵	Rural/Ranch Roads ⁶	Trails ⁷
Sub-Reach 1		X					X
Sub-Reach 2			X	X	X	X	X
Sub-Reach 3					X	X	
Sub-Reach 4	X	X			X	X	X
Sub-Reach 5	X	X				X	X
Sub-Reach 6	X	X				X	X

Notes:

¹Maintained wet crossing of the river

²Evidence of target shooting, hunting, fishing and urban artwork

³Abandoned bridge abutments and abandoned pumping infrastructure

⁴Observations of cattle tracks and dung

⁵Bare earth single-track trails

⁶Rural and ranch roads

⁷Regular human traffic

Key:

X = observations in the vicinity of stream channels

X = observation within or immediately adjacent to stream channels

3.2.6 Incidental Observations

In addition to the species described in Sections 3.2.2 and 3.2.3, several other species were directly observed or evidence of the species was observed during the survey. Table 3.2-5 provides the list of species observed or detected during the survey.

Table 3.2-5. Other Species Observations During WFMR Reconnaissance Survey

Common Name	Scientific Name	Notes
Mountain lion	<i>Puma concolor</i>	Scratch pile observed adjacent to Grass Valley Creek
Coyote	<i>Canis latrans</i>	Sign observed in several locations within WFMR reach, individual observed near reach
Striped skunk	<i>Mephitis mephitis</i>	Observed in Sub-Reach 2
Great blue heron	<i>Ardea herodias</i>	Observed in Sub-Reach 3
Red-tailed hawk	<i>Buteo jamaicensis</i>	Observed in Sub-Reach 4
Tadpole Physa	<i>Physella gyrina</i>	Observed in Sub-Reach 2, 3, 4, and 5
Gyraulus	<i>Gyraulus</i> sp.	Snail found in Sub-Reach 2, 3, 4, and 5

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